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## Is Tuition Free College the Golden Ticket? A Time Series Analysis of Germany's Higher Education Policy, 1990-2017

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# *IS TUITION FREE COLLEGE THE GOLDEN TICKET?*

A TIME SERIES ANALYSIS OF GERMANY'S HIGHER EDUCATION  
POLICY, 1990-2017

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for Honors in Applied Economics and Modern Language Departments

IS TUITION FREE COLLEGE THE GOLDEN TICKET?  
A Time Series Analysis of Germany's Higher Education Policy, 1990-2017

Hannah Wolfram

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**Abstract<sub>1</sub>**

Countries which have been able to offer free tertiary education are being applauded while the United States tries to find a way to rectify its high tertiary education costs. Germany has accomplished a system of subsidized higher education since the 1950s, making it seem highly successful. In order to investigate the potential benefits of subsidized higher education, this study uses a time series regression analysis to investigate the relationship between tertiary unemployment rate and public spending as a share of the Gross Domestic Product (GDP) in Germany over the period 1990-2017. The regression analysis corrected for multi-collinearity and serial correlation, and to minimize the potential harms of spurious regression and non-stationary variables, a final model in first differences was estimated and interpreted. After controlling for human capital, including parental education, the degree of economic opportunity, the health of the economy and public unemployment benefits, the variable for public expenditure on tertiary education became insignificant. However, as expected, the public spending on the unemployed as a share of GDP entered positively and statistically significant, confirming that the unemployment benefits are a robust determinant of unemployment.

<sup>1</sup> This research has benefitted from helpful comments and suggestions from faculty members of the Business and Economic Department as well as Modern Languages Department at Ursinus College. Special thanks to Professors Vera Brusentsev, Scott Deacle, Andrew Economopoulos, Jennifer VanGilder, and of course my project advisors Professors Olga Nicoara and Robin Clouser. This research also benefitted from helpful feedback provided by Professor Hugo Montesinos from the Math and Computer Science department at Ursinus College.

## **Introduction**

American politicians are gearing up for the 2020 election with the looming \$1.6 trillion in student loan debt as a prominent issue which voters are concerned about. Politicians are constantly comparing the free higher education system in Germany to what we have in the United States. Senator Bernie Sanders has been vocal in this regard, saying for example that “In Germany, college tuition is free. In America, it’s increasingly unaffordable—which country do you think has a competitive advantage?” (Birnbaum, 2019) In fact, Sanders has focused his campaign around the idea of eliminating the \$1.6 trillion in student loan debt and making public college tuition free. Sanders is not the only one to have proposed this idea. Other presidential candidates have also proposed plans to address the student loan debt crisis. Sen. Elizabeth Warren, for example, is a known advocate for removing up to \$50,000 in student loan debt per borrower. It is well known that the United States has the most expensive universities in the world, which is causing millennial students to go into debt to pay for their bachelor’s degree alone. Rising college debt has negative implications for the demographics of the U.S. because millennials now tend to delay starting families due to the financial hardships they experience after graduation (Birnbaum, 2019).

Germany is a leading powerhouse in the European economy. Its unemployment rates are low, and it manages to offer tuition free public higher education, making its system seem highly successful (Birnbaum, 2019). While Germany may have been the first country to eliminate tertiary tuition costs, other European countries are beginning to follow suit (Tsekova, 2019). Norway and Iceland have also eliminated tuition costs not only for residents, but also for international students (Tsekova, 2019).

So, is free tertiary education really the answer the United States is looking for? Using Germany as a case study of publicly subsidized tertiary education, in this paper I will empirically investigate the implications of a subsidized tertiary education system on tertiary unemployment. I will use the results of my empirical investigation to inform the answer to my research question as applied to the United States. My research hypothesis is that an increase in government spending on tertiary education will have a negative impact on tertiary employment or, equivalently, a positive impact on tertiary unemployment. In order to evaluate this hypothesis, I will use time-series analysis to investigate closely the relationship between a measure of subsidized higher education and a measure of the unemployment rate of individuals with a college degree in Germany over the 1990-2017 period. More precisely, I will use data on Germany's public spending on tertiary education as a share of GDP and data on the unemployment rate of Germans with a college degree. Through this research, I hope to find out to what extent, if at all, working with data on Germany's education system can help illuminate the debate over the benefits and drawbacks of free tertiary education.

## **Background**

### **The German Education System**

Germany is comprised of sixteen federal states, with each state holding the responsibility for its local education system as opposed to it all being controlled by the central federal government. Nonetheless, education across the sixteen states is nearly identical. Education from preschool through college became free within each state during the 1950s. Preschool, much like in the United States, is not mandatory until children reach the age of six when they are required to attend school. Their first four years of schooling are comparable to the United States in that

they are learning the basics in reading, writing, and arithmetic. After the first four years however, there is a crucial turning point. It is up to a child's parents, with guidance from the teachers, to decide which of three tracks their child will continue on for the remainder of their education. The three choices are general education, intermediate education or high school. The general education track is an additional five to six years where the child is prepared to take on a blue-collar apprenticeship afterward. The intermediate track is an additional six years where a child is prepared for an apprenticeship training for a white-collar job. The high school track is more along the lines of what we are accustomed to in the United States with an additional 8-9 years in preparation for the potential to attend a university (Dustmann, 2004).

During a student's final year of high school, they will take their *Abitur*. This is the qualification test for university. The test is comprised of three or four sections, depending on the state, and it includes a writing, math, and foreign language component as well as an oral exam. Each of the written subjects are approximately four hours in length. The results of this exam are graded out of 300 and in order to pass, you must receive a score of 180. As a caveat to that, if you score at least 100 you are eligible to receive your high school diploma. Even assuming you score well on the *Abitur* there is no guarantee you will be able to attend college right away. In Germany, you are not so much attempting to get into your "dream" school, but rather aiming to attain placement in a program. Highly sought-after subjects of study such as medicine, pharmacy, dentistry along with a number of others, have waiting lists. Each program has a given number of waiting semesters, as many as 16 are possible, which are a part of a designation called "Numerous Clausus" or "NC" for short. NC determines the grade requirement as well as the number of semesters a student will need to wait to potentially obtain placement in a program, during which time the student must then only either work part time, get an apprenticeship or

travel. Additionally, due to the nature of the education system, students must choose their subject of study before applying for placement in university. This is the only way in which the states are able to organize placement for students in the public universities (Abiturprüfung, n.d.).

As I briefly stated before, public education as a whole has been free in all German states since the 1950s, including tertiary education. There was a pivotal change to the university system instituted in 1999 that created the distinction of degree type, bachelors and masters, which had not previously been established. This reform was named the “Bologna Process” and was not only used in Germany but in 46 other European countries as well. The implementation of the Bologna reforms allows for easier cross-country comparisons between degree structures within the European Union.

One final piece that should be noted regarding the tertiary education system is that in the late 2000’s a few of the states did attempt to implement minimal tertiary tuition fees for public universities. These fees however were quickly removed due to large protests by the students (Malamud, 2010).

While tuition itself may be free at public universities in Germany, there is one additional point that should be raised. German universities do not offer the amenities we are accustomed to here in the United States. There are usually no dorms, least of all the ones that now look like studio apartments as they do at some of the American schools. Students in Germany are required to find their own place to live near their school. In addition, German universities do not offer any extra-curriculars. There are no college sports, no student government, no dance club, and so on. Universities in Germany, for better or worse, are strictly a place of learning (McMaken, 2018).

## **Government Spending in Comparison**

Given the specificities of the German education system discussed in the previous section, it should not be a surprise that only 29.1% of adults ages 25-64 held a tertiary degree in 2018, compared to 47.4% in the United States. Conversely, the German government spent 1.01% of GDP on tertiary education in 2015, while the United States government spent only 0.91% of its GDP (OECD, 2020).

It is important to remember when comparing the education systems of these two countries that the US has approximately 246 million more people than Germany, so these numbers are difficult to compare directly. Additionally, the overwhelming majority of universities in Germany are publicly funded, compared to the U.S. where only 24% are public four-year institutions (Digest of Education Statistics, 2017).

## **Labor Laws and Unemployment Benefits**

The German government has a large amount of control over the country's social benefits. There are a number of labor laws set in place beyond what we are accustomed to in the United States. Germany requires any fulltime employee to be given a minimum of 24 paid leave days per year in addition to any public holidays. In the case of pregnancy, a woman is granted 6 weeks leave prior to the birth of her child followed by an additional 8 weeks after, during which time she should be paid from the statutory health insurance fund and an additional supplement by the employer. Should a parent wish to take child raising leave ('Elterngeld'), they may do so, likely paid, until the child is 4-years of age at which point, they are entitled to obtain their job back. In case of termination of employment, any employee of longer than 6 months is entitled to one month's notice. If an employee has been with the company for 5 years, an additional month's



notice is required. Subsequently, at the point at which the employee reaches eight, ten, twelve and fifteen years, an additional month's notice is required up to a maximum of 7 months' notice for employees with 20 years or more working at a given company ("National Labour", 2011).

### **Unemployment Laws:**

According to the unemployment policy in Germany, to be eligible for unemployment benefits requires one to (1) have made at least 12 months' worth of unemployment insurance contributions which is 2.5% of your income while employed, (2) be a German or an EU citizen residing in Germany, and (3) be registered as unemployed with one's local employment office. If one meets these three requirements, they are eligible for unemployment benefits in the amount of 60% of their previous income, up to a maximum of 6,500 euros per month. The unemployment check is subject to taxation which then gives one the same benefits, such as health and dental care, as they were allocated when employed. This is how, when unemployed in Germany, one still receives health insurance. Of course, this is not the case in the United States where insurance is not paid for by the government for most workers (Employment, Social Affairs & Inclusion, n.d.).

### **Review of Existing Literature**

There has been a significant amount of research on topics directly and indirectly linked to the effects of public spending per student on tertiary unemployment. It should be noted that, while the existing literature I will discuss is not all directly related to my research question, there are a number of studies and theories that led me to believe that seemingly tangential factors may help assess the extent to which public spending on tertiary education has an influence on tertiary unemployment.

## **Tertiary Education and its Relation to Parental Education Level**

Germany has chosen to support its young people with tuition-free public tertiary education for numerous reasons, one of which being that politicians in Germany consider tuition fees to be socially unjust (Denhart, 2014). Senator Dorothee Stapelfeld was quoted to have said “Tuition fees are socially unjust, they particularly discourage young people who do not have a traditional academic family background from taking up studies.” While this is a noble thought in theory, a study done by Christian Dustmann published in the Oxford Economic Papers (2004) supports the view that the system is set up to not support the idea of equal opportunity in regard to tertiary education. The study argues that the mandatory choice of secondary school track at such a young age leads to intergenerational immobility in education. The study demonstrates that there is strong correlation between a child’s post-education track and their parents educational background which leads to a significant association between the wage and career of the child and their parents. Due to the fact that a child’s educational track is primarily chosen by their parents at age ten, the parents are liable to stick with the resources they understand, which corresponds to whatever level of secondary education they themselves received. An additional point that was raised in this study is that at ten years old, children may not have revealed their full potential. Parents with a higher level of education may be more likely to push their child in this type of situation and go against a negative recommendation of a teacher (Dustman, 2004).

Education as it relates to employment is handled uniquely in Europe. A piece written in *The Economist* (2013) discusses how Chancellor Merkel, the current German Chancellor, pushes for a cure for the youth joblessness being faced in southern Europe. Germany is the driving force behind social programs in the European Union and often looked to as a role model. Specifically, Spain, Greece and Italy faced high unemployment for young people who additionally lack higher

education was Chancellor Merkel's focus. She helped Europe institute a "Youth Guarantee" which secured a job, apprenticeship or place of higher education within four months of being unemployed or having finished school. The EU also took 10.5 billion dollars, distributed over two years, to help invest money in small businesses to allow them to train the young people. While this helps, it does not solve the problem but only patches a leak in the system. Germany has long been known for its unique system that encourages vocational training and apprenticeships which is what this "Youth Guarantee" has tried to echo. As of 2013, Germany had the lowest unemployment rate in the EU which is thought to be largely due to its educational training programs. However, low unemployment and Germany's training programs are not entirely correlated as this system was also in place when Germany had an unemployment rate of 15% in 2005 (The Economist, 2013).

### **Unemployment In Relation To The Supply Tertiary Education**

It has already been established that Germany has stricter labor regulations than we are accustomed to in the United States. The inherent problem is that it reduces the incentive for firms to offer permanent, long-term and readily available jobs and can lead to structural employment issues in Germany.

The fact that Germany has a dual post-primary school education system may not initially seem relevant, but it is the ultimate point of balance. This comes from a study done in Germany that looks at the labor market trends over an eighteen-year period beginning in 2000. The demand for a college-level degree has always been less in Germany than in other Western countries simply due to the nature of the system. The focus on apprenticeship opportunities allows mutual benefit for both the trainee and employer. Employers have a three-year period in

which they are able to assess an individual's productivity and work ethic. This gives trainees more credibility when their apprenticeship is up, and they are then looking to receive a job. Their apprenticeships serve as a screening mechanism for employers that reassures their ability to take a chance on a young worker where they otherwise may have been reluctant. Due to the employment protection legislation in Germany being so strict, apprenticeships function as a bridge to support industry supply while also filling a company's need for reliable productive employees with prior experience. The growing concern in Germany is the Western push for a traditional degree, a 4-year bachelor's degree, which has caused nearly a 10% increase in demand for university placement among the youth from 2000 to 2017. The fear is that with such a supply-driven education system, there is danger of overproduction which will cause a mismatch in the supply and demand for skill sets and disrupt the educational balance Germany prides itself on (Schneider & Rinne, 2019).

### **Unemployment Rates in Relation to Public Spending Per Student and Tertiary Enrollment**

So how is it that Germany has such a seemingly successful education system and still have periods of highly inflated levels of unemployment at times? Research done in Germany looks at the effects of unemployment on higher education enrollment as well as spending per student from 1975 to 2000. The research is analyzed through a political lens, finding evidence that the government wins favor through increasing university enrollment during times of higher unemployment which gives an immediate addressment to the country's problem without having any impact on government spending or policies. Due to an amendment to the German Basic law in 1970, the government has control over the supply of students within different disciplines as well being able to alter the education requirements for a given field of study. Findings support

the fact that the government uses education as an inexpensive alternative in times of labor market tension. After funds have been distributed to the different states, the local governments then have the final say in how education funds are allocated even within the universities. The government's impact on higher education was seen during the oil crisis in the 1970s, when unemployment spiked, but then quickly dropped as a major increase in higher education enrollment occurred. The study found that the government essentially reallocated personnel by expanding the number of students allowed to be admitted into college, so they were then reducing the size of the labor force used to calculate the unemployment rate. In doing this, however, they never significantly increased the amount of government spending per student: instead the spending per student decreased proportionately as enrollment increased. The study found that due to a lack of increased educational budget the institutions student-professor ratio exceeds many other countries (Plümper and Schneider, 2007).

### **Theoretical Analysis**

My hypothesis is that, holding other important factors constant, an increase in government spending on tertiary education will translate into an increase in tertiary unemployment. Based on the literature reviewed and the economic theory, I developed the following theoretical model (see table 1 for variable descriptions):

Tertiary Unemployment Rate = f (Prior Subsidies to Higher Education, Control Variables)

Control Variables = (Income per Capita, Level of Higher Education, Economic freedom, Parental Education, Unemployment Benefits, Total Unemployment, Recession Dummy)

The corresponding empirical model is the following:

$$Y_t = \beta_0 + \beta_1 X_{1,t-4} + \beta Z_t + \epsilon_t$$

Where  $Y_t = \text{Tertiary Unemployment Rate at time } t$ ,

$X_{1,t-4}$  = *Public Expenditure on tertiary education lagged 4 years (or in general, k years)*

$Z_t$  is a vector of controls at time t, or possibly lagged. This vector is comprised of:

- 1) Real Per Capita GDP at time t-1 (that is, lagged one year).
- 2) Percentage of the population over 25 years-old who have attained a college degree,
- 3) Economic freedom of the world index at time t-1,
- 4) Percentage of the population over 25 years-old who have attained a college degree lagged 25 years (as a proxy for parental education) at time t-4,
- 5) The total public unemployment expenditure as a measure of unemployment benefits,
- 6) The total unemployment rate, and
- 7) A well-defined dummy for the recession period (d=1 for recession years; and d=0 for all other years).

My main independent variable is government expenditure on tertiary education. In my model, an increase in government expenditure on tertiary education is expected to be associated with an increase in tertiary unemployment. The rationale here is that when government spending on tertiary education increases, an increase in total nationwide college enrollment will follow because the more subsidized one's college education becomes, the lower one's opportunity cost of attending college. In time, the higher the number of individuals subsidized to attend college in turn may decrease the academic quality per student as was argued in a study by Plümper and Schneider (2007). A larger number of subpar, academically-underprepared college graduates could translate into a larger number of them experiencing difficulties on the job market. On the other hand, when total unemployment increases, such as during a recession, the opportunity cost of furthering one's education decreases. Total unemployment has an inverse relationship with Gross Domestic Product. It is natural for unemployment to decrease in times of an economic boom in a country, and to increase in times of a downturn. However, Plümper and Schneider (2007) find that the total unemployment rate may also be manipulated politically through the allocation of students in higher education in times of downturns. Their argument is that

governments can lower the total unemployment rate not by fostering a strong economy with abundant jobs, but by expanding the scope of free tertiary education, making it more attractive for individuals to enroll thus reducing the number of people in the labor force (or lowering the denominator in the formula for unemployment rate). Thus, a decrease in the total unemployment rate in times of economic distress, may be due to an increase in enrollments incentivized by government programs. However, when the number of people in the labor force decreases due to many more choosing college, the options for the already tertiary-educated are not the same. Particularly during a recession, the tertiary unemployment rate will tend to be higher in a country like Germany where public spending on education is used for political gains. At the same time, graduates may wish to pursue additional advanced degrees after college, such as Masters' or Doctoral Studies, or MBAs.

The root of my hypothesis in this paper is that when individuals are not invested in their education, they may lack the motivation to perform in school. Lower academic motivation translates into a decreased motivation and decreased success to find a job after graduation. People are more likely to find other ways to spend their time, for instance continuing their education further because it is easier to take on a free education than searching for a job which takes time and energy and can be costly.

There other key variables I include in my analysis are the Economic Freedom of the World index, parental tertiary education, and unemployment benefits. The Economic Freedom Index (EFW) would allow us to measure the health of the economy by impact of government regulation on unemployment. A study published by Boudreaux et al. (2018), found that a decrease in government regulation frees up the labor market and increases entrepreneurial activity. Given an increase in entrepreneurial activity, there would be more opportunity

employment and therefore a decrease in unemployment. Another possible variable to consider is parental tertiary education, this can be measured with data from the Barro and Lee (2015) data set. As was discussed previously, children raised by parents who attended college are more likely to see the benefit in attending college themselves and have a higher probability of being successful. Finally, unemployment benefits are expected to naturally play a role in the unemployment rate. Unemployment benefits for this study are measured by the total public expenditure on unemployment. When unemployment benefits increase the incentive to find a job quickly decreases because the opportunity cost of not having a job decreases.

**Table 1:**

<b>Independent Variable</b>	<b>Description and Source</b>
Government Expenditure on Tertiary Education	The portion of allocated monetary funds toward tertiary education from government spending on education as a percentage of GDP. This data was collected from OECD (OECD, 2018).
Total Unemployment Rate	The total percentage of adult citizens who are out of work and actively searching for a job. This data was collected from the OECD (OECD, 2018).
Real Gross Domestic Product (GDP) per capita	The monetary measure of final goods and services during a specified period of time divided by the total population of the country. The higher the wealth in Germany, the more the government has to spend on tertiary education. The real per capita GDP is measured in constant 2011 dollars (The World Bank, 2019).
Percent of Population over 25 with a Tertiary Education	Percentage of the population over 25 years old who have attained a college degree. (Barro, R. & Lee, J., 2015)
Parental Education Rate	Percentage of the population over 25 years old who have attained a college degree, lagged 25 years (as a proxy for parental education) (Barro, R. & Lee, J., 2015).
Total Public Unemployment Expenditure	The total amount, as a percentage of GDP, spent on unemployment benefits. This data was collected from the OECD (OECD, 2018).



Economic Freedom of the World Index	This variable is a proxy for Economic Institutions and it is composed of 5 main areas comprising over 42 different components measuring the degree to which institutions and policies of a country are consistent with personal choice, voluntary exchange coordinated markets, freedom to enter and compete in markets, and the protection of private and legitimate own property rights from aggression by others. Sound economic institutions allow for more entrepreneurial innovation as well as foreign direct investment that will provide employment opportunities for the college educated population (The Frazer Institute).
Recession Dummy	1 if a recession, 0 if not a recession. This data was collected from the FRED Economic Data. (FRED, 2020)

**Table 2:**

<b>Independent Variable</b>	<b>Expected Sign</b>
Government Expenditure on Tertiary Education	Government spending on education may or may not translate into higher quality of education and more employable citizens. Increased government spending on education is expected to increase total nationwide enrollment (lower opportunity cost) and decrease the academic quality <b>per student</b> translating into a larger number of unemployed. Therefore, I hypothesize a <b>positive</b> relationship.
Total Unemployment Rate	When the total unemployment rate increases, the tertiary unemployment rate does as well by association. Therefore, this is expected to have a <b>positive</b> relationship.
Real Gross Domestic Product (GDP) per capita	When there is a decrease in GDP, Tertiary unemployment will increase due to companies having to make budget cuts and let people go. Therefore, a <b>negative</b> relationship is expected.
Percent of Population over 25 with a tertiary education.	This variable proxies for the human capital of the population. Higher numbers are associated with larger percentage of tertiary employable population. Therefore, a <b>negative</b> relationship is expected.

Parental Education	Parental education has been proven to increase the desire for their children to also attend college and their academic and professional success. Therefore, this variable is expected to exert a <b>negative</b> influence on unemployment of the tertiary educated.
Economic Freedom of the World Index	Higher economic freedom is associated with a higher employment opportunity. Therefore, a <b>negative</b> association with unemployment is expected.
Total Public Unemployment Expenditure	An increase in unemployment benefits would decrease the opportunity cost of not having a job and would therefore increase tertiary unemployment. A <b>positive</b> relationship is expected. Incentives matter!
Recession Dummy	When the dummy equals 1 there is a recession (high overall unemployment). Therefore, the recession dummy is expected to have a <b>positive</b> effect on tertiary unemployment.

**Results:**

The data set used to evaluate the research hypothesis that the tertiary unemployment rate is increased when government spending on tertiary education is increased contains some initial limitations which should be noted. As can be seen by the descriptive statistics shown in Table 3, there are only 28 observation in the data set. This is due to the fact that consistent data was only available from 1990-2017. Prior to 1990, Germany was not a unified country and the data was not consistent or reflective of Germany post the reunification of East and West Germany. Therefore, conclusions drawn from the regression analysis should take this into consideration as a larger data set, of at least 30 years, is advisable. Furthermore, the measures for parental education as well population over 25 with a college degree were both found only in five-year increments. Data for the four years in between each given year was created using the difference

**Table 3:**

	<b>N</b>	<b>Mean</b>	<b>Std Dev</b>	<b>Min</b>	<b>Max</b>
TerUnRt	28	4.025	1.217	2.000	5.700
GovExpEd	28	24.611	1.834	21.700	28.100
RGDP_pcp	28	38647	4254	31075	45960
lnRGDPpcp	28	10.556	0.111	10.340	10.740
Parent_Ed	28	4.275	1.837	2.000	8.500
EFWindex	28	7.838	0.070	7.710	8.000
PPwTerEd	28	12.579	2.294	8.300	16.100
Rec_Dum	28	0.536	0.508	0.000	1.000
PubUnSpd	26	1.385	0.285	0.800	1.800
TotalUnRt	28	7.414	2.033	3.700	11.200

*Note: TerUnRt =tertiary unemployment rate, GovExpEd=% of government education expenditure allocated to tertiary education, RGDP\_pcp=Real Gross Domestic Product per Capita, lnRGDPpcp=log of Real Gross Domestic Product per Capita Parent\_Ed=parental education rate, EFWindex=Economic Freedom of the World Index, PPwTerEd=% of total population over 25 with a college degree, Rec\_Dum=recession dummy, PubUnSp=total public unemployment expenditure, TotalUnRt=total unemployment rate. GovExpEd and Parent\_Ed are lagged 4 years, EFWindex, RGDP\_pcp and lnRGDPpcp are lagged 1 year*

between the previous and the current year and evenly distributing the increase over the four years. Any other minor missing data calculations can be found in the notes in the appendix.

In Table 4, we see a comparison of the independent variable coefficients from five models run. This allows us to refer back at any time as we move through the discussion of each model and regression results obtained from each. In each model, the variables percent of government education expenditure allocated to tertiary education (GovExpEd) and parental education rate (Parent\_Ed) are lagged 4 years. This was done as both variables are expected to have a lagged impact on an individual's choice to go to college and therefore the relevant data would need to be 4 years prior to their completion of university. Additionally, real gross domestic product per capita (RGDP\_pcp) as well as the logged form (lnGDPpcp) of the same variable was lagged one year due to the fact that GDP per capita from the year prior is expected to have an impact on the job market in the current year. It should also be noted, for interpretation purposes, that almost all the variables are percentages with the exception of the Economic

Freedom index which doesn't have a unit of measurement, real gross domestic product per capita which is expressed in constant 2010 U.S. dollars as well as the logged version of this variable which also has not a unit of measurement.

**Table 4:**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
Intercept	2.645	-51.289	81.881	0.206	0.184
GovExpEd	0.265	-0.309	-0.431	-0.239	-0.186
RGDP_pcp	-6.71E-05				
lnRGDPpcp		3.134	-9.906	-2.394	-2.671
Parent_Ed	-0.275	0.111	0.393	-0.503	-0.475
EFWindex	-0.336	3.749	4.380	1.963	1.881
PPwTerEd	-0.245	-0.268	0.114	-0.451	-0.433
Rec_Dum	0.185	-0.001	0.089	0.0838	0.079
PubUnSpd	0.754	2.554		2.457	2.385
TotalUnRt	0.436				
<i>n</i>	20	20	22	20	20
<i>R</i> <sup>2</sup>	0.984	0.954	0.859	0.704	0.709

An initial ordinary least squares regression (OLS) was conducted on Model 1 with tertiary unemployment rate as the dependent variable and the following independent variables; real gross domestic product per capita (RGDP\_pcp), total unemployment rate (TotalUnRt), percent of government education expenditure allocated to tertiary education (GovExpEd), percent of total population over 25 with a college degree (PPwTerEd), parental education rate (Parent\_Ed), Economic Freedom of the World index (EFWindex), total public unemployment expenditure (PubUnSpd) and a recession dummy (Rec\_Dum) – see Table 1 for full variable descriptions. A comprehensive summary of these results can be found in Table 5. After an initial evaluation, it is clear that there is strong multicollinearity in the model. The variance inflation factor (VIF) of parental education rate (Parent\_Ed), percent of government education expenditure allocated to tertiary education (GovExpEd), real gross domestic product per capita (RGDP\_pcp) and total unemployment rate (TotalUnRt) far exceed 10, which is the advised max

for the VIF of any given variable. It should also be noted that Model 1 was also run using the purchasing power parity GDP in place of real gross domestic product per capita. This was done knowing that East and West Germany may have not had same standard of living directly after the reunification of the country given that East Germany had previously used a communist economic system which led to economic deprivation. However, the empirical results did not change at all. The two alternative measures of real per capita GDP are each a constant multiple of the other during the whole sample period 1990-2017. The multiples are 0.97 and 1.03, respectively. Even though theoretically it would make sense to use PPP adjusted real per capita GDP, the calculations yield identical results because only one country (Germany) is involved in the regressions.

Returning to the results from Model 1, we can also see that the  $R^2$  is 0.984 which is quite high and because this is time series data, this could be a sign of high correlation between variables. That is, it might seem that high unemployment spending causes unemployment rates, but part of the explanation is undoubtable do to the fact that when unemployment increases, unemployment payment automatically increase. To begin by addressing the multicollinearity issue visible in the high variance inflation factors, a Pearson correlation matrix was done to

**Table 5:**

<b>Model 1</b>	<b>Est. Coefficient</b>	<b>t Value</b>	<b>VIF</b>
Intercept	2.645	0.37	0
GovExpEd	0.265	1.39	63.340
RGDP_pcp	-6.71E-05	-0.86	38.226
Parent_Ed	-0.275	-1.36	31.076
EFWindex	-0.336	-0.3	3.736
PPwTerEd	-0.245	-4.35	4.495
Rec_Dum	0.185	1.76	1.545
PubUnSpd	0.754	1.53	9.299
TotalUnRt	0.436	4.92	13.898
<i>n</i>	20		
$R^2$	0.984		
DW	1.899		

evaluate the relationship between each independent variable and the dependent. As can be seen in Table 6, there are five variables that are highly correlated to the dependent. This is evident by the p-values which are <0.0001. The five variables for which this is the case is total unemployment rate (TotalUnRt), percent of government education expenditure allocated to tertiary education (GovExpEd), parental education rate (Parent\_Ed), real gross domestic product per capita (RGDP\_pcp), and total public unemployment expenditure (PubUnSpd). Since the Pearson correlation coefficient for total unemployment rate was slightly higher than the rest, aside from percent of government education expenditure allocated to tertiary education, which is

**Table 6:**  
*Pearson Correlation Matrix*  
*Dependent: Tertiary Unemployment*

	<b>Coefficient</b>	<b>Prob&gt;  r </b>
GovExpEd	-0.8959	<.0001
RGDP_pcp	-0.7937	<.0001
Parent_Ed	-0.8450	<.0001
EFWindex	0.2909	0.1409
PPwTerEd	-0.2884	0.1366
Rec_Dum	-0.0703	0.7219
PubUnSpd	0.7497	<.0001
TotalUnRt	0.8499	<.0001

the primary independent variable, it was removed from the model. A regression was run having removed total unemployment rate from the equation, making it Model 2. Additionally, knowing a number of the variables are derived from gross domestic product, the log of real gross domestic product per capita was used rather than the level form in an effort to eliminate additional multicollinearity in the model without removing the variable and risking the creation of omitted variable bias. A test for multicollinearity was done on Model 2, the regression results for which are listed in Table 7. As can be seen, the VIF of both parental education rate (Parent\_Ed) and percent of government education expenditure allocated to tertiary education (GovExpEd)

dramatically decreased. Additionally, the log of real gross domestic product per capita (lnRGDP\_pcp) lead to a decrease in its VIF as well, but all three variables are still experiencing strong multicollinearity. The white test was also done to test for heteroskedasticity in the model.

**Table 7:**

<b>Model 2</b>	<b>Est. Coefficient</b>	<b>t Value</b>	<b>VIF</b>
Intercept	-51.289	-1.23	0
GovExpEd	-0.309	-1.29	37.716
lnRGDPpcp	3.134	0.73	29.328
Parent_Ed	0.111	0.37	26.192
EFWindex	3.749	3.17	1.579
PPwTerEd	-0.268	-2.72	5.254
Rec_Dum	-0.001	0	1.318
PubUnSpd	2.554	4.86	4.030
<i>n</i>	20		
<i>R</i> <sub>2</sub>	0.954		
DW	1.036		
Pr>ChiSq	0.599		

The Chi-squared value of 0.599 is not significant therefor eliminating the possibility of Heteroskedasticity influencing the results. An additional test, the Durbin-Watson test (DW), was done to test for serial correlation. The DW of 1.036 being less than 2 confirms that mild positive serial correlation is present in the model. Given that the t value for total public unemployment expenditure (PubUnSp) is 4.86, far higher than the rest, a third model was created without the variable present. The OLS results for model 3 can be found in table 8. The *R*<sub>2</sub> value decreased significantly which tells us that total public unemployment expenditure has a significant impact on the model. We can also see that while VIFs for both parental education rate (Parent\_Ed) and percent of government education expenditure allocated to tertiary education (GovExpEd) dramatically decreased, there was a significant increase in the VIF for percent of total population over 25 with a college degree. Due to the significant effects of removing total public unemployment from the model, it was deemed best to return the variable to the model, thus

returning to Model 2. This model however suffers from extreme multicollinearity issues and potentially also suffers from the spurious regression issues due to one or more of the variables

**Table 8:**

Model 3	Est. Coefficient	t Value	VIF
Intercept	81.881	1.37	0
GovExpEd	-0.431	-1.71	15.562
lnRGDPpcp	-9.906	-1.58	25.577
Parent_Ed	0.393	1.20	15.950
EFWindex	4.380	2.26	1.361
PPwTerEd	0.114	1.34	15.950
Rec_Dum	0.089	0.35	1.2239
<i>n</i>	22		
<i>R</i> <sup>2</sup>	0.859		
DW	1.147		

being non-stationary. That is, some explanatory times series variables may have unit root or be integrated of order one, I(1). If this is the case, a first differencing approach will convert them into stationary variables, or I(0), removing the unit root. So, given that model 2 is expressed as the following:

$$\begin{aligned}
 (\text{Tertiary Uemployment})_t = & \beta_0 + \\
 & \beta_1(\text{Public Expenditure Tertiary Education as a share of GDP})_{t-4} + \\
 & \beta_2(\text{Percent of the Population that Completed Tertiary Educ})_t + \\
 & \beta_3(\text{Parental Education})_{t-4} + \\
 & \beta_4(\text{Recession Dummy})_t + \\
 & \beta_5(\text{Economic Freedom of the World index})_{t-1} + \\
 & \beta_6(\text{natural log of Real GDP per capita})_{t-1} + \\
 & \beta_7(\text{Public Spending on the Unemployed as a share of GDP})_t + \\
 & \epsilon_t
 \end{aligned}$$

Alternatively, Model 2 can be written more compactly like this:

$$Y_t = \beta_0 + \beta_1 X_{1,t-4} + \beta_2 X_{2,t} + \beta_3 X_{3,t-4} + \beta_4 X_{4,t} + \beta_5 X_{5,t-1} + \beta_6 X_{6,t-1} + \beta_7 X_{7,t} + \epsilon_t$$

Assuming this model is true, then it is true for all time periods *t*, *t*-1, *t*-2, etc. Consider the model lagged one period.



$$Y_{t-1} = \beta_0 + \beta_1 X_{1,t-5} + \beta_2 X_{2,t-1} + \beta_3 X_{3,t-5} + \beta_4 X_{4,t-1} + \beta_5 X_{5,t-2} + \beta_6 X_{6,t-2} + \beta_7 X_{7,t-1} + \epsilon_{t-1}$$

This can be accomplished more directly using the first differencing operator:

$$\Delta Y_t = \beta_1 \Delta X_{1,t-4} + \beta_2 \Delta X_{2,t} + \beta_3 \Delta X_{3,t-4} + \beta_4 \Delta X_{4,t} + \beta_5 \Delta X_{5,t-1} + \beta_6 \Delta X_{6,t-1} + \beta_7 \Delta X_{7,t-1} + \Delta \epsilon_t$$

As can be seen, after taking first differencing, the original coefficients remained the same. Therefore, the interpretation of the coefficients will remain the same as for in the original Model 2. However, it is better to estimate the model in first differences because of the econometric considerations that were established previously. Although the first differencing equation is theoretically a hyperplane passing through origin, I estimated the model empirically with an intercept anyway, and test the hypothesis that the true intercept is equal to zero. This approach (estimating an equation with an intercept) ensures the mean of the error term is zero, which is an assumption of the Gauss-Markov Theorem. This brings us to the final model, which we will denote as Model 4 as referenced in Table 4:

$$\begin{aligned}
 (\Delta \textit{Tertiary Uemployment})_t &= \beta_0 + \\
 &\quad \beta_1 (\Delta \textit{Public Expenditure Tertiary Education as a share of GDP})_{t-4} && + \\
 &\quad \beta_2 (\Delta \textit{Percent of the Population that Completed Tertiary Educ})_t && + \\
 &\quad \beta_3 (\Delta \textit{Parental Education})_{t-4} && + \\
 &\quad \beta_4 (\Delta \textit{Recession Dummy})_t && + \\
 &\quad \beta_5 (\Delta \textit{Economic Freedom of the World index})_{t-1} && + \\
 &\quad \beta_6 (\Delta \textit{the natural log of Real GDP per capita})_{t-1} && + \\
 &\quad \beta_7 (\Delta \textit{Public Spending on the Unemployed as a share of GDP})_t && + \\
 &\quad \Delta \epsilon_t
 \end{aligned}$$

Having established Model 4, an OLS estimate was calculated with the first differences model. These results can be found in Table 9. In an initial review, it should be recognized that the VIFs for each variable are now less than 2 therefor confirming that the first difference model almost entirely eliminated the multicollinearity issue. It is important to notice that there are two statistically significant variables in the model with t values greater than 2, percent of the total

population over 25 with a college degree (PPwTerEd) and total public unemployment expenditure (PubUnSp). The Durbin-Watson (DW) value being 1.785, less than 2, shows the presence slight positive serial correlation in the model. This is easily corrected using the Yule Walker technique. These results are labeled as Model 5 as a means for comparison in Table 4

**Table 9**

<b>Model 4</b>	<b>Est. Coefficient</b>	<b>t Value</b>	<b>VIF</b>
Intercept	0.206	1.42	0
GovExpEd	-0.239	-0.94	1.648
lnRGDPpcp	-2.394	-0.60	1.652
Parent_Ed	-0.503	-1.09	1.357
EFWindex	1.963	1.34	1.574
PPwTerEd	-0.451	-2.17	1.275
Rec_Dum	0.084	0.69	1.546
PubUnSpd	2.457	4.88	1.347
<i>n</i>	20		
<i>R</i> <sub>2</sub>	0.704		
DW	1.785		
Pr>ChiSq	0.461		

and a comprehensive summary can be found in Table 10. We can see that the Durbin-Watson

**Table 10**

<b>Model 5</b>	<b>Est. Coefficient</b>	<b>t Value</b>	<b>Approx Pr&gt; t </b>
Intercept	0.184	1.18	0.2606
GovExpEd	-0.186	-0.73	0.4785
lnRGDPpcp	-2.671	-0.65	0.5297
Parent_Ed	-0.475	-0.99	0.3413
EFWindex	1.881	1.25	0.2343
PPwTerEd	-0.433	-1.89	0.0828
Rec_Dum	0.079	0.65	0.5291
PubUnSpd	2.385	4.62	0.0006
<i>n</i>	20		
<i>R</i> <sub>2</sub>	0.709		
DW	1.826		

(DW) value increased to 1.826, leaving very little serial correlation remaining in the model.

We can now move on to analyzing the impact of these results on the model and the hypothesis that the tertiary unemployment rate is increased when government spending on tertiary education is increased.

### **Interpretation of Final Results**

The main independent variable, government expenditure on tertiary education, was not statistically significant and therefore we can conclude that the variable has no impact on the tertiary unemployment rate. There were however, two statistically significant variables in the model. We can see that the strongest variable in the model is public spending on the unemployed. The estimated coefficient for the variable public spending on the unemployed, as a share of GDP ( $\beta_7$ ) is 2.385. This variable is highly significant at the 1 percent level, with a p-value of 0.0006 (the most statistically significant variable in the model). The estimated coefficient of 2.385 implies that, all else equal, a one percentage point increase in the public spending towards the unemployed relative to the GDP in any given year is associated with an average increase in the tertiary unemployment rate of approximately 2.385 percentage points. The next important variable in terms of its statistical significance is the percent of the population over 25 with a completed tertiary education. The estimated coefficients for the percentage of the total population over 25 that completed tertiary education ( $\beta_2$ ) is  $-0.433$ , is statistically significant at the 10 percent level. This coefficient tells us that on average, and holding everything else in the model constant, a one percentage point increase in the population over 25 that completed tertiary education is associated with a decrease of 0.433 percentage points in the tertiary unemployment rate.

The other variables were not statistically significant and therefore there is no point in interpreting their coefficients since they are not statistically different from zero. However, it is worth noting that the variables growth of real GDP per capita, parental education and the recession dummy entered with the expected sign. This is an indication that the theory behind these variables may be weakly supported by the data, but there is not enough statistical power to entirely detect their impact on tertiary unemployment given the limitations of the data and the relatively small sample period used, but it is reassuring that at least the sign of these variables was as expected. Note that in the first difference model, the difference in the logs of real GDP per capita is the growth rate of the economy, and its expected sign is negative, as found.

### **In Conclusion**

While public expenditure on tertiary education was neither statistically significant nor resulted in a positive coefficient, evidence of other underlying significant variables was found. It is important to note that the initial hypothesis, that an increase in government spending on tertiary education will result in an increase in the tertiary unemployment rate, was not supported. The possibility still stands, however, that given more observations or tested across additional countries in the future it could be supported. Given the data limitations not allowing for more than 30 observations, this may have caused less accurate results. At the same time, variables which were initially included as control variables resulted in a statistically significant impact on the model. These entered not only with the correct sign, but also with a robust impact on the model. Those variables are the share of the population over 25 with tertiary degrees and the public spending on the unemployed. Beyond the fact that these variables entered with the expected sign, the robustness of the results suggest that these variables represent a better theory

than was initially hypothesized regarding the factors that really matter for understanding tertiary unemployment.

If we return back to a question posed early on in the paper in trying to understand if free college education is the answer the United States is seeking, we can see that one cannot simply compare the two countries. The major structural differences, not only in the education system but also in the healthcare system and labor regulations, sets the value systems of each country to be significantly different. We can see this in the fact that Germany only has just over a quarter of the population who have obtained a college degree versus the almost 50% who have the United States. This is largely due to the fact that Germany values alternate training systems, such as apprenticeships, arguably as much as a college degree. This concept is not something the United States has adopted. Therefore, assuming that because Germany has made free college education possible, the United States can or should also accomplish free college education in the same way is not supported by cultural differences, institutional facts, and data. It seems that the culture of the United States may play an important role in explaining the value of a college degree and the expectation that every individual should hold one. Further cultural and institutional studies are needed to inform education policy if the United States is intended to reach a point in which education is less costly and of high quality at the same time. The idea of a completely free tertiary education may seem like a noble idea in theory, but empirical analyses, economic theory, and reality do not support it.

## **An Introduction and Summary in German in accordance with the Modern Language Honors Thesis Requirement**

### **Einführung**

Amerikanische Politiker bereiten sich auf die Wahlen im Jahr 2020 vor. Die drohenden Schulden für Studentenkredite in Höhe von 1,6 Billionen US-Dollar sind ein wichtiges Thema, über das sich die Wähler Sorgen machen. Politiker vergleichen ständig das freie Hochschulsystem in Deutschland mit dem in den Vereinigten Staaten. Senator Bernie Sanders äußerte sich dazu lautstark und sagte zum Beispiel: „In Deutschland sind die Studiengebühren kostenlos. In Amerika wird es immer unerschwinglicher - welches Land hat Ihrer Meinung nach einen Wettbewerbsvorteil?“ Tatsächlich hat Sanders seine Kampagne auf die Idee konzentriert, die 1,6 Billionen US-Dollar an Studentendarlehensschulden auszurotten und die Studiengebühren an öffentlichen Hochschulen frei zu machen. Sanders ist nicht der einzige. Andere Präsidentschaftskandidaten haben ebenfalls Pläne vorgeschlagen, die die Schuldenkrise bei Studentendarlehen auf eine Weise angehen, wie beispielsweise die Beseitigung von bis zu 50.000 USD pro Kreditnehmer, wie dies von Senatorin Elizabeth Warren dargelegt wurde. Es ist bekannt, dass die USA die teuersten Universitäten der Welt haben, was dazu führt, dass Studenten Schulden machen, um nur ihren Bachelor-Abschluss zu bezahlen. Dies wiederum führt dazu, dass Millennials die Gründung von Familien aufgrund der finanziellen Schwierigkeiten, in die sie sich gesteckt haben, verzögern (Birnbäum, 2019).

Deutschland ist ein führendes Kraftwerk in der europäischen Wirtschaft. Ihre Arbeitslosenquoten sind niedrig, und es gelingt ihnen immer noch, eine unterrichtsfreie öffentliche Hochschulbildung anzubieten, was ihr System als äußerst erfolgreich erscheinen lässt (Birnbäum, 2019). Während Deutschland möglicherweise das erste Land war, das die Kosten für Studiengebühren eliminierte, folgen andere europäische Länder diesem Beispiel (Tsekova,

2019). Norwegen und Island haben auch die Studiengebühren nicht nur für Einwohner ihres Landes, sondern auch für Ausländer, die dort studieren möchten, beseitigt (Tsekova, 2019).

Ist freie Bildung wirklich die Antwort, nach der die Vereinigten Staaten suchen? Wenn ich Deutschland als Fallstudie für eine kostenlose öffentliche Hochschulbildung betrachte, möchte ich die Auswirkungen der theoretischen Implementierung dieses Systems in den Vereinigten Staaten untersuchen. Ich gehe davon aus, dass sich ein Anstieg der Staatsausgaben für die tertiäre Bildung negativ auf die tertiäre Beschäftigung oder gleichermaßen positiv auf die tertiäre Arbeitslosigkeit auswirken wird. Um dies zu bewerten, werde ich die Auswirkungen der Hochschulbildung in Deutschland untersuchen, indem ich die Auswirkungen der Hochschulbildung auf die tertiäre Arbeitslosenquote in Deutschland messe. Dabei werde ich den Beitrag der öffentlichen Ausgaben für die Hochschulbildung und die Auswirkungen auf die Arbeitslosigkeit nach dem Abschluss berücksichtigen. Durch diese Analyse hoffe ich, die wichtigsten Unterschiede zu finden, die es dem deutschen Bildungssystem ermöglichen, so lange zu funktionieren, und die Vor- und Nachteile eines kostenlosen Studiengebührenunterrichts aufzudecken.

## **Zusammenfassung**

Meine ökonometrische Analyse ergab, dass die öffentlichen Ausgaben für die Hochschulbildung zwar weder statistisch signifikant waren noch zu einem positiven Koeffizienten führten, es jedoch Hinweise auf andere zugrunde liegende signifikante Variablen gab. Es ist wichtig anzumerken, dass die ursprüngliche Hypothese, dass ein Anstieg der Staatsausgaben für die Hochschulbildung zu einem Anstieg der Arbeitslosenquote im Tertiärbereich führen wird, nicht unterstützt wurde. Es besteht weiterhin die Möglichkeit, dass

dies angesichts weiterer Beobachtungen oder Tests in weiteren Ländern in Zukunft unterstützt werden könnte. Die Einschränkungen bezüglich der verfügbaren Daten ermöglichten keinen Datensatz mit mehr als 30 Beobachtungen, was möglicherweise zu weniger genauen Ergebnissen geführt hat. Gleichzeitig führten Variablen, die ursprünglich als Kontrollvariablen aufgenommen wurden, zu einem statistisch signifikanten Einfluss auf das Modell mit dem richtigen Vorzeichen und sehr robust. Diese Variablen sind der Anteil der Bevölkerung über 25 mit Hochschulabschluss und die öffentlichen Ausgaben für Arbeitslose. Abgesehen von der Tatsache, dass diese Variablen mit dem erwarteten Vorzeichen eingegeben wurden, deutet die Robustheit der Ergebnisse darauf hin, dass diese Variablen eine bessere Theorie darstellen, als ursprünglich in Bezug auf die Faktoren angenommen wurde, die für das Verständnis der tertiären Arbeitslosigkeit wirklich wichtig sind.

Wenn wir auf eine Frage zurückkommen, die zu Beginn der Zeitung gestellt wurde, um zu verstehen, ob freie Hochschulbildung die Antwort der Vereinigten Staaten ist, können wir sehen, dass man die beiden Länder nicht einfach vergleichen kann. Die großen strukturellen Unterschiede, nicht nur im Bildungssystem, sondern auch im Gesundheitssystem und in den Arbeitsvorschriften, führen dazu, dass die Wertesysteme der einzelnen Bezirke erheblich voneinander abweichen. Wir können dies daran erkennen, dass in Deutschland nur etwas mehr als ein Viertel der Bevölkerung einen Hochschulabschluss erworben hat, während es in den USA fast 50% sind. Dies ist vor allem darauf zurückzuführen, dass Deutschland alternative Ausbildungssysteme wie Lehrstellen wohl genauso schätzt wie einen Hochschulabschluss. Dieses Konzept haben die Vereinigten Staaten nicht angepasst, und daher ist es naiv, anzunehmen, dass die Vereinigten Staaten es auf die gleiche Weise erreichen können, weil Deutschland eine kostenlose Hochschulausbildung ermöglicht hat. Die Gesellschaft in den



Vereinigten Staaten hat einen Hochschulabschluss zu einer Erwartung gemacht und dadurch ihren Wert enorm gesteigert. Ein Gleichgewicht muss gefunden werden, wenn die Vereinigten Staaten einen Punkt erreichen wollen, an dem Bildung nicht mehr so kostspielig ist, aber ich denke nicht, dass eine völlig kostenlose öffentliche Bildung jemals erreichbar sein wird.

## Bibliography

- Abiturprüfung. (n.d.). Retrieved from <https://www.abitur-nachholen.org/tipps/infos/abiturpruefung>
- Barro, Robert and Jong-Wha Lee, 2013, "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics*, vol 104, pp.184-198.
- Boudreaux, C. J., Klein, P., Nikolaev, B.N. (2018, August 10) "Socio-cognitive traits and entrepreneurship: The moderating role of economic institutions" *Journal of Business Venturing*. DOI: 10.1016/j.jbusvent.2018.08.003
- Bundesagentur für Arbeit. (n.d.). Retrieved from <https://www.arbeitsagentur.de/finanzielle-hilfen/anspruch-hoehe-dauer-arbeitslosengeld>
- Cutler, D. M. & Huang, W. & Lleras-Muney, A., (2015). "When does education matter? The protective effect of education for cohorts graduating in bad times," *Social Science & Medicine*, Elsevier, vol. 127(C), pages 63-73. <https://www.nber.org/papers/w20156.pdf>
- Denhart, C. (2014, October 03). *There Is No Such Thing As A Free College Education*. Retrieved from Forbes: <https://www.forbes.com/sites/ccap/2014/10/03/there-is-not-such-thing-as-a-free-college-education/#2adcb930417a>
- Digest of Education Statistics, (2017). Retrieved from [https://nces.ed.gov/programs/digest/d17/tables/dt17\\_105.50.asp](https://nces.ed.gov/programs/digest/d17/tables/dt17_105.50.asp)
- Dustmann, C., (2004). *Parental background, secondary school track choice, and wages*. Oxford Economic Papers 56, pages 209-230. DOI: 10.1093/oep/gpf048
- Employment, Social Affairs & Inclusion. (n.d.). Retrieved from <https://ec.europa.eu/social/main.jsp?catId=1111>
- Guaranteed to fail; Youth unemployment in Europe. *The Economist*; London Vol. 408, Iss. 8845, (Jul 20, 2013): 10-11.
- "Hochschulen." (2019, August 12). *Statistisches Bundesamt*, [www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/\\_inhalt.html;jsessionid=992FCB4130EC8A8EFDA4C3F7D19A537B.internet732](http://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/_inhalt.html;jsessionid=992FCB4130EC8A8EFDA4C3F7D19A537B.internet732).
- Malamud, O. (2010). The Structure of European Higher Education in the Wake of the Bologna Reforms. In *American Universities in a Global Market* (pp. 205-230). National Bureau of Economic Research. <http://www.nber.org/chapters/c11597>

- McLeod, C. B., Lavis, J. N., MacNab, Y. C., & Hertzman, C. (2012). Unemployment and Mortality: A Comparative Study of Germany and the United States. *American Journal of Public Health*, 120(8), 1542–1550.
- McMaken, R. (2018, June 1). “Free“ College comes at a Price. Mises Institute. Retrieved from: <https://mises.org/wire/free-college-comes-price>
- National Labour Law Profile: Federal Republic of Germany. (2011, June 17). Retrieved from [http://www.oit.org/ifpdial/information-resources/national-labour-law-profiles/WCMS\\_158899/lang--en/index.htm](http://www.oit.org/ifpdial/information-resources/national-labour-law-profiles/WCMS_158899/lang--en/index.htm)
- OECD (2020), Adult education level (indicator). doi: 10.1787/36bce3fe-en
- Plümper, T., Schneider, C. J. (2007). Too much to die, too little to live: unemployment, higher education policies and university budgets in Germany, *Journal of European Public Policy*, 14:4, 631-653, DOI: 10.1080/13501760701314458
- Schneider, H., Rinne, (2019). U. The labor market in Germany, 2000–2018. *IZA World of Labor* 2019: 379 doi: 10.15185/izawol.379.v2
- “Unemployment - Unemployment Rate - OECD Data.” *The OECD*, [data.oecd.org/unemp/unemployment-rate.htm#indicator-chart](http://data.oecd.org/unemp/unemployment-rate.htm#indicator-chart).
- The Frazer Institute. *Economic Freedom Rankings*. Retrieved from <https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&page=dataset&min-year=2&max-year=0&filter=0>
- Tsekova, D. (2019). Free College Already Exists. *Yahoo Finance*.
- “World Bank.” *DataBank*, [databank.worldbank.org/source/education-statistics-^all-indicators#](http://databank.worldbank.org/source/education-statistics-^all-indicators#).

## Appendix

### Data Set

Year	TerUnRt	GovExpEd	PPwTerEd	Parent_Ed	EFWindex	Rec_Dum	Trend	PubUnSpd	TotalUnRt	LnRGDPpc_11	RGDPpc_11
1990	4.3	21.7	8.5	2.2	7.76	0	1	0.8	4.8	10.34	31075.10
1991	4.3	21.8	8.9	2.2	7.77	1	2	1.3	5.6	10.39	32427.38
1992	4.1	22	9.4	2.1	7.78	1	3	1.4	6.6	10.43	33836.42
1993	4.7	22.1	9.8	2.1	7.79	1	4	1.8	7.9	10.44	34227.57
1994	5.4	22.2	10.3	2.1	7.8	0	5	1.7	8.4	10.42	33670.29
1995	4.9	23	10.7	2	7.81	1	6	1.5	8.1	10.44	34358.34
1996	5.3	23.4	11.1	2.3	7.848	0	7	1.6	8.9	10.46	34783.29
1997	5.7	23.3	11.6	2.7	7.886	0	8	1.6	9.8	10.46	34967.48
1998	5.5	23.3	12	3	7.924	1	9	1.4	9.2	10.48	35539.13
1999	4.9	23.5	12.5	3.3	7.962	0	10	1.4	8.4	10.50	36251.19
2000	4	23.7	12.9	3.6	8	0	11	1.3	7.8	10.52	36913.19
2001	4.2	24	13	3.8	7.84	1	12	1.3	7.8	10.54	37930.49
2002	4.5	24.2	13.1	4	7.86	1	13	1.5	8.7	10.56	38509.61
2003	5.2	24.5	13.3	4.1	7.94	1	14	1.7	9.6	10.55	38368.62
2004	5.5	24.7	13.4	4.3	7.88	1	15	1.7	9.8	10.55	38073.76
2005	5.6	24.9	13.5	4.5	7.92	0	16	1.8	11.2	10.56	38535.17
2006	4.8	25.2	14	4.6	7.87	0	17	1.6	10.3	10.57	38835.38
2007	3.8	25.4	14.5	4.7	7.79	0	18	1.3	8.7	10.61	40362.29
2008	3.3	26.7	15.1	4.8	7.71	1	19	1.2	7.5	10.64	41622.36
2009	3.4	26.4	15.6	4.9	7.75	1	20	1.6	7.7	10.65	42102.85
2010	3.1	27.2	16.1	5	7.73	0	21	1.5	7	10.59	39804.92
2011	2.4	28.1	15.6	5.7	7.82	1	22	1.1	5.8	10.63	41531.93
2012	2.4	26.8	15.2	6.4	7.78	1	23	1.0	5.4	10.69	43969.26
2013	2.4	26.5	14.7	7.1	7.84	0	24	1.0	5.2	10.69	44070.92

2014	2.5	26.6	14.3	7.8	7.85	1	25	1.0	5	10.70	44139.03
2015	2.3	25.9	13.8	8.5	7.85	1	26	0.9	4.6	10.71	44933.72
2016	2.2	26	11	6.8	7.87	0	27		4.1	10.72	45321.40
2017	2	26	8.3	5.1	7.82	0	28		3.7	10.74	45959.57

#### Data Set Adjustment Notes:

Tertiary Unemployment rate (TerUnRt) changes made:

1990 uses the same as given for 1991

1993 uses the average of 1992 & 1994 for tertiary unemployment

1996 uses the average of 1995 & 1997 for tertiary unemployment

Parental Education rate (Parent\_Ed) and percent of the population over 25 with a tertiary education (PPwTerEd) changes made: Data for both variables was only available for every 5 years. The difference between the current and previous was calculated and the increase evenly distributed over the 4 years in between

#### Variable sources:

Barro, Robert and Jong-Wha Lee, 2013, "A New Data Set of Educational Attainment in the World, 1950-2010." *Journal of Development Economics*, vol 104, pp.184-198.

Fraser Institute. (2019). Economic Freedom Rankings. Retrieved from <https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&countries=DEU&page=dataset&filter=1&min-year=1985&max-year=2017&sort-field=year&sort-reversed=0&date-type=range>

FRED Economic Data. (2020). Recession Indicators for Germany. Retrieved from <https://fred.stlouisfed.org/series/DEUREC#0>

OECD. (2018). Public unemployment spending. Retrieved from <https://data.oecd.org/socialexp/public-unemployment-spending.htm>

OECD. (2018). Unemployment rates by education level. Retrieved from <https://data.oecd.org/unemp/unemployment-rates-by-education-level.htm>

The World Bank. (2019). GDP per capita (constant 2010 US\$) – Germany. Retrieved from <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD?end=2018&locations=DE&start=1989>

## First Differences Data Set

Year	TerUn Rt	GovEx pEd	PPwTe rEd	Parent_ Ed	EFWin dex	Rec_D um	PubUn Spd	TotalU nRt	LnRGDPp c_11	RGDPp c_11
1990										
1991	0	0.1	0.4	0	0.01	1	0.45	0.8	0.04	1352.28
1992	-0.2	0.2	0.5	-0.1	0.01	0	0.11	1	0.04	1409.04
1993	0.6	0.1	0.4	0	0.01	0	0.43	1.3	0.01	391.15
1994	0.7	0.1	0.5	0	0.01	-1	-0.08	0.5	-0.02	-557.28
1995	-0.5	0.8	0.4	-0.1	0.01	1	-0.21	-0.3	0.02	688.05
1996	0.4	0.4	0.4	0.3	0.04	-1	0.09	0.8	0.01	424.95
1997	0.4	-0.1	0.5	0.4	0.04	0	-0.05	0.9	0.01	184.19
1998	-0.2	0	0.4	0.3	0.04	1	-0.13	-0.6	0.02	571.66
1999	-0.6	0.2	0.5	0.3	0.04	-1	-0.06	-0.8	0.02	712.06
2000	-0.9	0.2	0.4	0.3	0.04	0	-0.06	-0.6	0.02	661.99
2001	0.2	0.3	0.1	0.2	-0.16	1	0.03	0	0.03	1017.30
2002	0.3	0.2	0.1	0.2	0.02	0	0.15	0.9	0.02	579.12
2003	0.7	0.3	0.2	0.1	0.08	0	0.17	0.9	0.00	-140.99
2004	0.3	0.2	0.1	0.2	-0.06	0	0.06	0.2	-0.01	-294.86
2005	0.1	0.2	0.1	0.2	0.04	-1	0.10	1.4	0.01	461.41
2006	-0.8	0.3	0.5	0.1	-0.05	0	-0.21	-0.9	0.01	300.21
2007	-1	0.2	0.5	0.1	-0.08	0	-0.28	-1.6	0.04	1526.91
2008	-0.5	1.3	0.6	0.1	-0.08	1	-0.11	-1.2	0.03	1260.06
2009	0.1	-0.3	0.5	0.1	0.04	0	0.39	0.2	0.01	480.50
2010	-0.3	0.8	0.5	0.1	-0.02	-1	-0.15	-0.7	-0.06	-2297.93
2011	-0.7	0.9	-0.5	0.7	0.09	1	-0.34	-1.2	0.04	1727.01
2012	0	-1.3	-0.4	0.7	-0.04	0	-0.10	-0.4	0.06	2437.33
2013	0	-0.3	-0.5	0.7	0.06	-1	-0.01	-0.2	0.00	101.66
2014	0.1	0.1	-0.4	0.7	0.01	1	-0.06	-0.2	0.00	68.11
2015	-0.2	-0.7	-0.5	0.7	0.00	0	-0.06	-0.4	0.02	794.69
2016	-0.1	0.1	-2.8	-1.7	0.02	-1		-0.5	0.01	387.68
2017	-0.2	0	-2.7	-1.7	-0.05	0		-0.4	0.01	638.17