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“How the unemployment rate in Spain affects university enrollment”

By

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Advisor: Dr. Claire Yan

An Honors Thesis in partial fulfillment of the requirements for the degree of Bachelor of
Science in Business Administration in Accounting

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INTRODUCTION:

This thesis aims to study how the economic measures of unemployment rates and national income in Spain correlate with the levels of enrollment in higher education at the university over the years 2000-2012. I will specifically measure the number of undergraduate students enrolled and doctoral students enrolled as well as the number of undergraduate and doctoral students who complete their degrees each year and how those trends relate to the economy during those times.

I will complete a Bachelor of Arts in Spanish Language along with my Accounting degree. I first became interested in this topic when I lived in Valencia, Spain for one semester. As I studied the language I saw firsthand the effects of the unemployment rate on young people's lives. When jobs aren't available, students are faced with fewer options upon graduation. I will examine the question, "Does a high unemployment rate motivate students to continue their education?"

Data was collected from the Spanish National Institute of Statistics, the CIA World Fact book, Spain's Ministry of Education, and World Bank. Regression analyses and the Granger Causality Test were completed via the statistics programs Stata and EViews, resulting in accepting the hypothesis that unemployment rate and university enrollment are positively correlated and rejecting the hypothesis that they are negatively correlated.

LITERATURE REVIEW:

Previous research has been conducted on the effects of graduating college during an economic recession and how the unemployment rate specifically affects college graduates at labor market entry and throughout their careers. Some studies examine high school graduates and the factors in their decision whether or not to attend college. These studies are relevant because the variables that affect the decisions of high school students also affect college students' decisions regarding whether or not to continue their education post-Bachelor's degree.

To the best of my knowledge, little research has been conducted on how the recent high unemployment rate in Spain effects young adults' decision making about their education. For this reason, the literature discussed in this paper is mainly from studies undertaken inside the United States, however Japanese and German researchers' global perspectives are included as well. Some studies noted that there are many other factors in the graduate school decision- some personal and unpredictable, such as family situation.

Graduation and further education:

Two studies in the literature review explore how graduating during a recession affects decisions on higher education and entrance to the labor market. Both Kondo's and Kahn's research show that an increase in unemployment can produce an increase in the probability of staying in school longer.

Ayako Kondo (2015) examined four different people groups (white women, white men, black women, black men) and the effect of the unemployment rate at labor market entry on their subsequent wage levels. She found the impact of a recession on earnings at job market entry is stronger for high school graduates than college graduates, and the effect is more persistent for groups with more labor force attachment. Since men have stronger labor force attachment (less likely to leave the workforce after entry) they experience longer lasting impacts from graduating during a recession than their female counterparts. This is due to women's increased likelihood to leave the workforce to care for a family. Kondo found that those who experience other types of economic disadvantage (women and minority populations) also experience a stronger effect of unemployment on their wages (Kondo, 2015).

The key finding of Kondo's research, as it relates to unemployment and university enrollment in Spain, is that a recession at labor market entrance can motivate some people to go back to college and/or obtain part-time employment. This positive effect of unemployment rate on obtaining college education is stronger for women than men. This means that labor market conditions can make women more likely to enroll in college. However, the effect is small: a one percent increase in unemployment showed a maximum of one percent increase in the likelihood of proceeding to college. Kondo found that even when people avoid entering the labor market by continuing school that this does not affect final degree attainment. This could be because they can take as much time as they want to finish their degree without changing the targeted goal. She found no evidence that people avoid graduating during a recession.

Lisa Khan (2010) used the National Longitudinal Survey of Youth (NLSY) to study the long-term implications of graduating college during the economic recession of the 1980s on white males in the United States. She used the sample of white males in her research because their labor market decisions are least influenced by other factors such as childbearing and discrimination. Using the NLSY she was able to trace their job records up to twenty-three years after graduation.

Khan found that a higher national unemployment rate does increase the probability of obtaining a graduate degree. Those who graduate during years with high and medium unemployment rates are twice as likely to be enrolled in school again one year after graduation as graduates during a low unemployment rate year. She found that local labor market conditions are not strong enough to influence the graduate school decision, but national unemployment rates are significant. For a high unemployment year (1981-1983), graduates are 7-14 percent more likely to obtain a higher degree. For graduates in high and medium unemployment rate years, 20 percent are enrolled in school one year after graduation compared with 11 percent of graduates during a low unemployment rate year (Khan, 2010). The graduates from the high unemployment rate year average approximately one-third of a year of schooling more than those graduates during a low unemployment rate year. Khan found that workers mitigate the effects of poor early experience early in their careers with increased educational attainment.

Graduation and successive wages:

Many studies have shown that economic factors at time of graduation and labor market entry can have negative effects on wage earning potential. Bowlus (1995), Kahn (2010), and Oreopoulos (2012) all find that negative wage effects exist, although they differ on theories about persistence.

Audra Bowlus (1995) used the NLSY to study the quality of job matching (how well suited a person is for a specific job) by using unemployment rate as the indicator of the cyclical labor market. She uses job tenure to measure the quality of the job and starting wages to measure market internalization. She found a decrease in job tenure with an increase in unemployment rate at the start of a job. During recessions, workers are more willing to accept jobs that won't last as long. She found that the greatest cyclical impact is on professional services jobs, such as financial services and real estate. Her second finding is that the market recognizes when there is a high level of job mismatching and the market compensates by lowering wages, due to employers expecting lower match quality. Kahn also found the effects on wage to be negative, up to 7-8 percent wage loss for every one percent increase in national unemployment. Even 13 years after college graduation this group experiences a 3-4 percent wage loss because of the economy when they entered the labor force (Khan, 2010).

Philip Oreopoulos (2012) examined the effects of graduating during a recession on Canadian college graduates' earnings, job mobility, and employer characteristics over the years 1982-1999. He used administrative university-employee-employer data to examine the effects of labor market conditions upon graduation and how the effects differ among individuals graduating with various skill levels. Oreopoulos found that graduating during a recession produces a 9 percent wage loss that diminishes to zero wage loss in ten years. They measured skill set by level of predicted earnings and found that graduates with lower predicted earnings suffer more prolonged wage loss. Graduates with higher skill or higher predicted earnings can recover from entering the job market during a recession because they have increased job mobility. Hershbein on the other hand, found that graduates with higher-level degrees and expected earnings, like Ph.D. and MBA graduates, suffer longer and more severe wage and placement losses on job market entry during a recession.

Using the NLSY data for the years 1972-1992, Gardecki and Neumark (1997) examine the relationship between early job market stability and adult labor market success outcomes (late 20s to early/mid 30s) by measuring wages, benefits, and full-time work. The research finds that adult labor market outcomes are largely unrelated to the early labor market experience for men. This paper studies the "chaotic" youth labor market in the U.S. and attempts to compare it to more "orderly" ones in Germany and Japan. Research on school-to-work programs shows some evidence that these programs discourage post-secondary education but that more research needs to be done on these programs. For women, on the other hand, there is weak evidence that shows benefits to early job market stability. The study suggests that greater interaction between employers and schools and improving young persons' information about labor market opportunities would be helpful. But overall, the study found little evidence to support youth labor market policies that create more "orderly" transitions of young people to work. Gardecki and Neumark's study (1997) presents the opportunity for further research on the structure of the transition from school-to-work at universities in Spain.

Long-term effects of teenage unemployment:

David T. Ellwood (1979) studied the long-term consequences of time spent out of work among male teenagers. He finds that teenage unemployment does not result in reduced employment later in life, however the lost experience has adverse effects on wage earning potential. The work experience in the second, third, or fourth year after high school has a 10-20 percent wage increase per year. The study did not determine how long these wage increases last. His study concludes that time out of work results in lost work experience which has a negative effect on wages earned. Ellwood's data does not show whether working generates better work habits or specific skills. He concludes that public policies and programs should be developed to assist young people with gaining necessary work experience. In the case of Spain, if young people are not getting the early job experience they need during adolescence to obtain their desired jobs after college graduation, then this could produce an effect on the trajectory of their professional career paths.

Gustman and Steinmeier (1981) use data from the 1976 Survey of Income and Education to examine school enrollment and teenagers' labor decisions. They find that in areas with lower youth unemployment rates, white males, nonwhite males, and white females are more likely to enroll in school. Nonwhite females are more responsive to job availability because employment helps finance their way through school. Both enrollment and labor force participation are higher in areas with lower unemployment. Nonwhite males appear to leave school to begin full-time work when jobs are available. Along with job availability, wages affect the probability of enrollment. With higher wage rates, probability of enrollment falls and probability of labor force participation increases for all groups except younger white males and females. The effect of wage on participation in labor force is greater for nonwhite males.

Effect of unemployment on initial college enrollment:

Brad Hershbein (2013) examines female high school graduates and their choice among working in the market, continuing education or engaging in home production. This is different from Khan's and Oreopolus's studies because Hershbein examines high school graduates with no higher education. Therefore, the cost of continuing education and forgoing wages for high school graduates is less than the cost for highly educated graduates, since the wages would be higher for college graduates. He found that for every one percent increase in unemployment upon graduation women are four percent less likely to be employed one year after graduation. He finds the effect diminishes and after five years women experience full recovery from graduating high school during a recession. His results are consistent with women having better alternatives to the traditional job market than men.

Hershbein finds that the unemployment rate has no effect on the rate of college enrollment for women. Men however are four to six percent more likely to enroll in college for every one percent increase in the unemployment rate upon high school graduation. Women's initial choice to go to college is relatively inelastic to the labor market but their decision to continue in college or go to graduate school is affected by the labor market. Another factor noted in the graduate school decision that differentiates it from initial college enrollment is debt accumulated during undergraduate.

Other factors that influence education:

Other studies have shown that economic measures are not the only factors that affect college enrollment. Total household wealth strongly affects an individual's decision to enroll. Michael Lovenheim explores the important question of whether family resources affect decisions to invest in higher education. Using data from the Current Population Survey, college-age individuals in the lowest income quartile have a 33.3 percent enrollment rate compared with 75.5 percent in the highest income quartile. The housing boom caused sizeable changes in college enrollment levels. Families with fewer resources have more of an increase in college attendance with increases in home equity. They find this wealth effect to be true: higher-income families consume more higher education. Housing wealth is important to study because the recent variation in home prices has an effect on the college attendance in middle-class families. This shows that family housing wealth (equity in the family's home) and household wealth (income and other assets), along with the influence unemployment has on enrollment, are important factors when considering graduate school. I will include per capita income as a measure of economic activity and analyze how it relates to enrollment and family education spending.

To summarize all of these findings, Kondo said that a one percent increase in unemployment could lead to a potential one percent increase in enrollment. However, she noted that this could also just mean students can take their time in completing their degree. According to Kahn, a high unemployment rate does increase the likelihood of one obtaining a graduate degree. She found a strong correlation between national unemployment rate and the likelihood of graduates re-enrolling the subsequent year. Oreopoulos found that graduating during a recession has a negative effect on wages for ten years after labor market entry.

Even though Kahn has already studied this topic and found that an increase in the unemployment rate does increase the probability of obtaining a graduate degree, more research needs to be done on the situation in Spain because there are various political and environmental factors that make it a different case than in the United States. For example, the cost of tuition to attend the university is much lower in Spain when compared with the United States.

EXPERIMENTAL DESIGN

HYPOTHESIS

I have one null hypothesis and two research hypotheses. I expect to reject the null hypothesis H_0 and will run statistical regression analyses on the program EViews to determine whether H_{1a} or H_{1b} is true.

Theoretically I hypothesize H_{1a} that higher unemployment results in higher enrollment based on the notion that there is a lower opportunity cost to investing time in education when jobs aren't as readily available.

Alternatively, it is possible that H_{1b} could be true because as people are increasingly unemployed, they have fewer resources to help fund their education, which could therefore result in lower enrollment levels.

H_0 : There is no correlation between unemployment rate and university enrollment at the undergraduate and doctoral levels.

H_{1a} : There is a positive correlation between unemployment rate and university enrollment. When unemployment rates rise, enrollment increases.

H_{1b} : There is a negative correlation between unemployment rate and university enrollment. When unemployment rates rise, enrollment decreases.

DATA AND METHODOLOGY

Data

This study uses time series data collected annually by various reporting institutions. Since most of the data show upward trends, the time series data is not stationary, i.e. median age increased over the years studied. Most of the data used in this research was taken from the Spanish National Institute of Statistics (*Instituto Nacional de Estadística, or INE*). This institute is the official organization responsible for collecting statistics about demographics, economics, and society in Spain. However, not all information necessary for this study was available on the INE website, therefore other sources were utilized. Unemployment rates were taken from The World Bank, an international development bank with a goal of ending extreme poverty and achieving shared prosperity.

The CIA World Fact Book measured the median age every five years. For the years in the gaps between their measurements I estimated the median age as the function of a calendar year (median age = $-386.989 + .212 \cdot \text{calendar year}$). This equation was derived using ordinary least squares estimation of the overall time trend. The fact book was produced for U.S. policy makers to provide facts about

every area of the world and share the free information with all people. Data on enrollment, education spending and average total scholarship money was taken from the Ministry of Education (mecd.gob.es). This is the government ministry responsible for the administration and preservation of public universities, non-university education and training programs.

Methodology:

Regression analysis

Regression analysis was used in this study to determine the relationships between variables. According to the text, "Basic Econometrics" by Gujarati, a regression analysis is a study of one variable's dependence on other variables, called explanatory variables. In my study the dependent variable is university enrollment and the explanatory variables are: total education spend, family education spend, scholarship amount, net national disposable income, gross national income, per capita income, population, median age, and unemployment rate. By connecting the averages of the dependent variable (enrollment) over a sample size of fifteen years, with the averages of each explanatory variable we can obtain a regression line that demonstrates the relationship between the two variables.

An Ordinary Least Squares (OLS) Regression is a method of regression analysis developed by a German mathematician named Carl Friedrich Gauss. This method draws a line between data that minimizes the sum of the squares of the error values or residuals. This paper used OLS regression in the statistical analysis.

Causation

Relationship does not necessarily mean causation. Even if the regression analysis shows a statistical relationship between two variables, there is not sufficient evidence to show the explanatory variable caused the change in enrollment. To say that one variable causes the other we must use other economic theory. The root of causality is very controversial, with different philosophical perspectives on the topic.

The Granger Causality Test

This test relies on the time series data of two variables to estimate the regressions, assuming the disturbances to each regression are uncorrelated. Again, it is difficult to prove causality but econometrician Edward Leamer prefers to use the term "precedence" and Francis Diebold "predictive causality" because specifically this test aims to show time series data where one variable occurred before another, meaning that an event that occurred prior to the other could possibly have caused or partially caused the later event but the later event could not have caused the prior event to happen. So, if variable X Granger causes variable Y, then a change in X should occur before a change in Y. To prove that X Granger causes Y, we include past or lagged values for X and see if those values help in predicting Y.

There are limitations to this test considering both X and Y could be caused by a third common variable, thus producing misleading causality.

RESULTS

Time Trend Analysis

1. Unemployment Rate

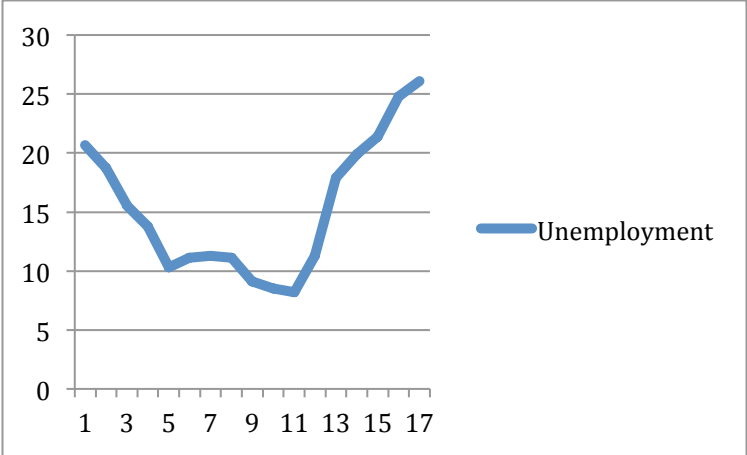


Figure 1: Time Trend for Unemployment

This graph shows the change in unemployment rate over the years 1997 to 2013. As you can see, the unemployment rate shows a decreasing trend from period one to five, or 1997-2001. After 2001 there was a slight increase in unemployment and then it started to decrease in 2005 and increased again in 2008. After the global financial crisis in 2008, the recession sparked a large increase in unemployment up to the 26.1% we see in 2013.

2. Enrollment

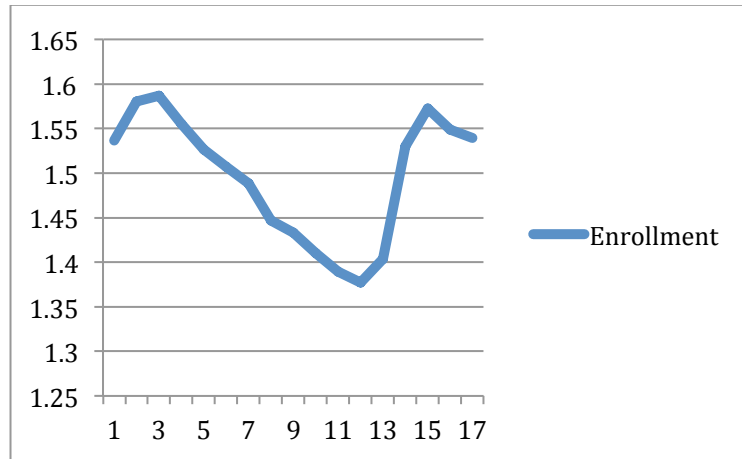


Figure 2: Time Trend for Enrollment

This graph shows the change in enrollment in millions from 1997 to 2013 (1-17). This graph illustrates a trend similar to the unemployment rate illustrated in Figure 1. After 1999 enrollment decreased up until the increase in 2009. During the same time when the unemployment rate was soaring in Spain we can see a similar increase in total university enrollment.

3. Unemployment Rate and Enrollment

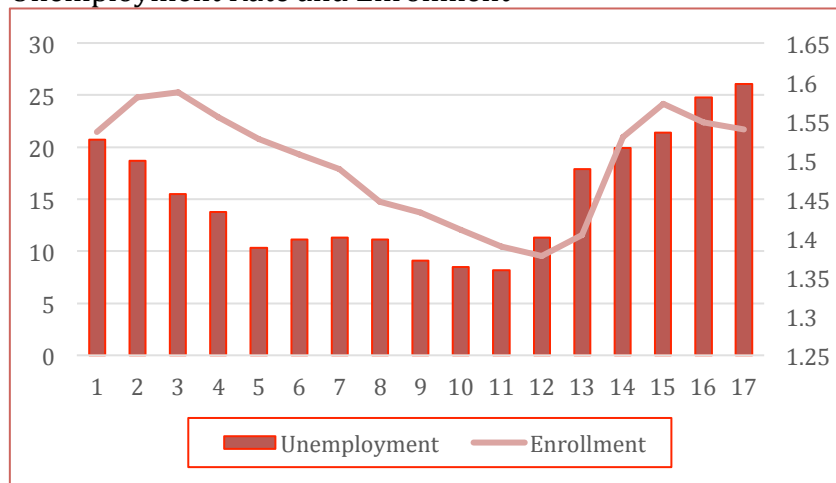


Figure 3: Time Trend for Unemployment and Enrollment

Note that during the years 11-14 (2007-2010), a small .1 increase in enrollment is actually an increase of over 100,000 people enrolled in the university for those years. Accounting for the different scales, note the similar trend in movement with the unemployment rate and the enrollment levels over the years.

Regression

We ran a regression on the dependent variable enrollment.

Enrollment = $c(1) + c(2)* \text{Unemployment rate} + c(3)* \text{Per capita income} + c(4)* \text{Gross national income} + c(5)* \text{Total education spend} + c(6)* \text{Median age}$

Variable definitions:

Enrollment is the dependent variable, which includes undergraduate and graduate students enrolled for the corresponding year in all public and private universities in Spain. These values were taken from the Spanish Ministry of Education website. This variable is measured to see how it varies with the unemployment rate, controlling for other variables that could also affect enrollment levels.

Unemployment rates obtained from The World Bank are found by calculating the share of the laborers without work but who are actively seeking employment. This is the key variable we are measuring against enrollment levels to see their correlation- but we have to control for other explanatory variables to see if the unemployment rate remains statistically significant.

Per capita income is defined as the average income per person. This can be found by dividing the national income by the population. Per capita income is a good indicator of the standard of living for the country. Per capita is included in the study as an explanatory variable because it could very well have a relationship with enrollment in universities. Based on what we know from previous literature, families with higher income consume more higher education. Theoretically this economic measure would have a positive relationship with enrollment, so we need to control for this variable to see if the change in enrollment is indeed influenced by the unemployment rate or if it is caused by an increase in per capita income.

Gross national income, according to Investopedia.com, is the total of: value from producers who are residents in the nation, product taxes that were not included in output, and income received abroad. Like with per capita income, we include this economic measure to control for the possibility that an increase in income is what drives more students to enroll and produces a higher enrollment figure that year.

Total education spending taken from Spain's ministry of education is the sum of government spending at the national, state, and local levels and private spending. This variable is important to include because if more public funding goes towards education, then students might have more opportunities to enroll versus years when spending was lower.

The CIA World Fact Book measured median age by, "a single index that summarizes the age distribution of a population." This number means that roughly half of the population is younger than this age and half the population is older. It is not the average age of the population, rather the middle age. This is an important variable

to consider in our study as to whether or not an increase in unemployment produces an increase or decrease in enrollment. We need to consider whether there was a large change in the median age of the population, which could account for more university aged people and subsequently more students enrolled.

Variable Predictions:

We hypothesize that the unemployment rate will have a positive or a negative correlation with enrollment, this is our hypothesis we are testing. We predict a positive relationship because there is a lower opportunity cost to investing time in education when jobs aren't as readily available. On the other hand, we can predict a negative relationship between unemployment rate and enrollment because as the number of unemployed increases, the number of people left with inadequate resources to fund their education also increases.

We predict that both per capita income and gross national income will have a positive relationship with enrollment based on the idea that as people gain access to resources, they are better able to enroll in university and graduate school.

SAS Statistics Program: OLS Least Squares Regression model

An Ordinary Least Squares Regression is a method of regression analysis developed by a German mathematician named Carl Friedrich Gauss. This method draws a line between data that minimizes the sum of the squares of the error values or residuals.

Regression results from SAS are as follows:

Variable	1 Enrollment	2 Enrollment	3 Enrollment	4 Enrollment	5 Enrollment
Unemployment	7429.08 *** (2.97)	18225 *** (10.59)	31866 *** (6.87)	600093 *** (2.49)	7132.44464 (1.81)
Per_Capita_Income		57.18573 *** (6.31)		49.53632 *** (5.77)	42.90951 *** (5.23)
Gross_National_Income			1.23914 *** (4.52)		
Total_Education_Spend				-0.0043 * (-2.02)	-0.00406 ** (-2.21)
Median Age					-28810 (-1.86)
Observations	17	11	11	11	11
Adjusted R-square	0.3278	0.9178	0.8618	0.9406	0.956

The dependent variable is Enrollment, which is the number of total students enrolled in the university each year in Spain. T Statistics are reported in parentheses. ***, **, and * denote significance at the 1, 5, 10 percent levels (two-sided), respectively.

In the first column of Table 1, I include only unemployment and enrollment. This coefficient result means a one percent increase in unemployment will lead to an increase in enrollment of 7,429.08 people, which is highly significant, denoted by the star symbols and based on the P-value. In column two we include per capita income, which indicates that with every one Euro increase in per capita income, there yields about a 57-person increase in university enrollment. This is highly significant at the one percent level based on the P-value. Controlling for per capita income, we still see a positive increase in enrollment for an increase in unemployment. Specifically a one percent increase in unemployment would produce an 18,225 increase in students enrolled while controlling for per capita income. In *column three* I test unemployment with gross national income and find that both are highly statistically significant with relation to enrollment. For every one percent increase in unemployment there is a 31,866-person increase in enrollment, and for every one Euro increase in GNI there is a 1.24 person increase in enrollment. In *column four* we tested unemployment, per capita income, and total education spending and found unemployment and per capita income highly statistically significant at the 1% level but total education spending to be only slightly significant at the 10% level. When we add the variable median age in column five, the unemployment rate becomes statistically insignificant against enrollment levels. Total education spending becomes a little more significant and per capita income remains highly significant.

Granger Causality- Table 2 from EViews

We must perform this causality test because a regression analysis only explains the dependence of one variable on another without implying causation. The Granger Causality test estimates the regression between unemployment rate and total enrollment, assuming the disturbances are uncorrelated.

Pairwise Granger Causality Tests			
Date: 03/22/16 Time: 17:19			
Sample: 18			
Lags: 2			
Null Hypothesis:	Observations	F-statistic	Probability
Unemployment does not Granger Cause Enrollment	16	3.74665	0.0574
Enrollment does not Granger Cause Unemployment	16	0.31612	0.7354

The P-values show significance when they are less than .1. Since $.0574 < .1$, this P-value for the first null hypothesis is significant. Therefore, I reject this hypothesis and conclude that unemployment does Granger cause enrollment. For the second hypothesis enrollment does not Granger cause unemployment, P-value $.7354 > .1$ is insignificant. This hypothesis is not rejected; therefore enrollment does not Granger cause unemployment.

SUMMARY

In this study I gathered data from the INE database and examined enrollment, unemployment, per capita income, gross national income, education spend, and median age for years 1997-2013. I used regression analysis tests and the Granger Causality test to find results that reject H_0 and accept H_{1a} and therefore reject H_{1b} . Using time trend analysis I found that unemployment and enrollment followed a similar trend, increasing and decreasing in relative unison over the years sampled (Figures 1 and 2). In the regression result we found a statistically significant positive correlation between unemployment rate and enrollment levels for all regressions except when median age was included. The final Granger Causality test produced a P-value that is statistically significant to support hypothesis H_{1a} . With the Granger Causality test we can see that unemployment causes enrollment to some degree. We can see in the Table 1 Regression Results that for every one percent increase in unemployment, enrollment increases by approximately 7,429 students.

LIMITATIONS

This research paper is limited because of the sample size. My sample size is very small; only seventeen observations were used in the regression analyses. I also used total enrollment because data for undergraduate enrollment, graduate enrollment, undergraduate completed, and graduate students completed was only available for ten years. I opted for a larger sample size and the more general data. I would have stronger conclusions if I had specific data but my results are more significant because of the larger sample size. Another limitation is the number of variables considered. There are potentially other variables that influence enrollment levels in Spain for which data is unavailable. Variable political, family and environmental factors influence one's decision on higher education, which is also difficult to measure. Another possible cause of these results is that GNP, income, spending, and enrollment should all increase over time due to population growth, inflation, and economic growth.

FUTURE RESEARCH

Future research would test more variables to see if there are other better explanations to changes in enrollment besides unemployment levels. Also, further research could study the other effects of unemployment such as tracking university graduates, their age, salaries, and labor force participation for years after graduation. This data would facilitate research on the true long-term impact of graduating during the economic crisis in Spain. Using "real" monetary measures would help with accounting for the natural increase in the enrollment with regards to population growth and inflation. Using education spending as a percentage of GDP and enrollment as a percentage of 18-30 year olds would improve this research in the future. More research can be done on what kinds of jobs these graduates are entering into upon graduation and any related job mismatching taking place. Another interesting point to trace for the same time period would be the average age of retirement to see if that fluctuates with the unemployment as well. Future research could possibly include survey data of students to uncover other potential factors in their decision-making.

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