

Research of the Influencing Factors on Unemployment Rate

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Abstract. The research primarily examines how the unemployment rate interacts with the other four indicators of economic development, demographic changes, educational attainment, and gender. Nowadays, people have found that more and more people lose their jobs and the unemployment rate increases over time. The paper collects relevant data and uses some methods (descriptive statistics, linear regression model) to study the relationship between the unemployment rate and other factors. According to a study of the unemployment rate, the most unique and significant macroeconomic issue affecting people is unemployment. A consequence of the financial crisis that the United States encountered in 2008 is rising unemployment rate. Additionally, non-economic events that are not often a part of the economy's dynamics might impact unemployment. Educational attainment and gender have a moderate influence on the unemployment rate; the unemployment rate of a person who achieves a doctoral degree is lower than that of another person who has less than a high school diploma. The difference in gender affects the unemployment rate in today's society. Nevertheless, the demographic transition has a slight effect on the unemployment rate.

Keywords: unemployment rate, economy, population, educational attainment, male, female.

1. Introduction

One of the most significant and most crucial social issues is unemployment. The proportion of the working population that meets the "unemployment conditions" is known as the unemployment rate. The number of jobless people actively seeking employment is difficult to estimate, particularly the number of those whose unemployment benefits have already run out before obtaining work. Unemployment has a high cost for both the person and the group. But unemployment also has other consequences. For instance, one of the socially damaging effects of widespread unemployment is that it minimizes the need to humanize the workplace [1].

Unemployment rates are becoming more and more erratic. The accumulation of physical and human capital, an increase in productivity, and the development of new goods due to technological innovation have long been seen as the main drivers of economic expansion. Increased specialization of labor is also essential for increasing productivity [2]. In human economic progress, economic growth has been directly fueled by the ongoing expansion in the total amount of capital over time. The favored strategy for economic growth in today's developing nations is still high accumulation and high investment for increased economic growth rates [3]. In contrast, in economics, a recession is a phase of the business cycle during which economic activity often slows and enterprises contract, typically as a result of substantial declines in consumer expenditure. Financial crises, friction in international trade, unfavorable market supply, or the fall of an economic bubble can all lead to recessions [4]. When there is a recession, there is an increase in unemployment and a fall in macroeconomic indexes including GDP, employment, capacity utilization, household income, corporate profits, and inflation.

Demographic change is a process in which the demographic situation changes over time as a result of influences from the population itself, the economy, and society. Natural changes, migration (mechanical) changes, and social changes are three categories used to describe population change that reflect distinct facets of the process. Because each population has unique contradictions, each change in the population is accompanied by a unique regularity [5]. Institutions related to the labor market have an array of distinct effects on unemployment rates. Regular worker employment protection raises unemployment rates, but temporary employment protection lowers them. It has been discovered that unemployment benefits have a displacement effect, whereas corporatism in pay

negotiation increases employment outcomes [6]. Two distinct effects on the unemployment rate can result from changes in the demographic makeup of the labor force. A change in the demographic proportions of the labor force can lead to a mismatch between unemployed workers and available jobs, or an increase in structural unemployment, if employers do not see workers from different demographic groups as suitable substitutes for one another and if there are wage rigidities at least in the short run [7].

Educational attainment refers to the highest level of education a person has completed. The completion of a level of education means the accomplishment of the learning objectives for that level, which are frequently confirmed through the assessment of gained knowledge, skills, and abilities. Empirical evidence shows that a good education promotes social outcomes, increases societal participation, and promotes stability. However, it is ambiguous to how much different forms of human capital affect societal results [8]. Some large enterprises choose people who have high education attained. Job competition could explain this conclusion: Employers choose probably workers who achieve better-educated education backgrounds over lower-educated people for positions that lower-educated individuals once held. The least educated consequently lose their jobs [9].

Gender bias, by definition, is a preference for or prejudice against one gender over another that leads to unequal treatment of personnel. Gender discrimination at work has been reported by 42% of American women. According to 40% of respondents, men are more entitled to employment than women when positions are in short supply [10,11]. Comparing men and women with the same qualifications and behaviors, males receive higher performance scores. Based on studies, people regard male leaders as less competent when they ask for assistance. They appear to be of lower rank when they admit to a shortcoming. According to research, males who request family leave—traditionally considered a "woman's role"—are perceived as being poorer employees [11]. The difference in gender leads to changes in the unemployment rate, especially among women. Likewise, the unemployment rate of gender should be discussed with classification.

2. Methodology

The relationship between changes in unemployment rates and four related factors is investigated in this study. Prior to doing the analysis, data must first be gathered from trustworthy sources, organized, and subjected to statistical computations and charting. The information from the graphs is the foundation for the analysis [12,13]. The paper describes the process's specifics.

2.1. Descriptive Statistics

Firstly, calculate the mean of mean for each index. The mean of a dataset serves as a representation of its average value. The mean is important because it comprises information from each observation in a dataset and indicates where the median value of the dataset is located. The formula is

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_N}{N} = \frac{\sum_{i=1}^N X_i}{N} \quad (1)$$

Where $\bar{X}$ shows the value of mean, X_N illustrates all of the data values, and N is the number of values.

How much data deviates from the mean are shown by the standard deviation. A low standard deviation means that the data are grouped around the mean, whereas a large standard deviation says that the data are more spread out. The equation of standard deviation is

$$\sigma = \sqrt{\frac{\sum_{i=1}^N (X_i - \bar{X})^2}{N}} \quad (2)$$

Where σ means standard deviation, X_i is a value in the data set, $\bar{X}$ is the mean of the data set, and N is the number of data points.

2.2. Linear Regression Model

Regression analysis makes it possible to pinpoint exactly which variables have an impact on a certain topic. When performing a regression, people can precisely determine which components are most crucial, which ones can be disregarded, and how these components interact. The regression equation's simplest form has one dependent variable and one independent variable

$$Y = a + bX \quad (3)$$

Where Y shows estimated dependent variable score, a is constant, b is regression coefficient, and X is score on the independent variable. The relationship between the unemployment rate and other variables is summed up and predicated if it is possible using the three approaches mentioned above.

3. Results And Discussion

The data and figures are examined from a variety of angles after learning more about the dependent variable, the U.S. unemployment rate, and the other four independent variables. Bar charts, line graphs, tables, and scatter plots were made for each independent variable to be investigated and analyzed in order to highlight the specifics of the study.

3.1. Analysis of unemployment rate in America between 1990 and 2021

The variation in the unemployment rate in the United States from 1990 to 2021 is depicted in this line graph. The unemployment rate for this thirty-year period was highest in 2010, reaching 9.6 percent, and lowest in 2019, at 3.7 percent, according to the statistics in the graph. The unemployment rate rose by around 2 percent from 1990 to 1992, but then things got better: it dropped to 4 percent in 2000. The fact that the unemployment rate in the United States essentially stayed at around 5 percent from 2001 to 2007 is a good sign. But from 5.8% in 2008 to 9.6% in 2010, the jobless rate skyrocketed, becoming the highest in the United States in these three decades. However, starting in 2011, the jobless rate fell to its lowest level, from 8.9 percent (3.7 percent). During this time, the unemployment rate fluctuated greatly, reaching a higher value of 8.1 percent in 2020 and a moderate value of 5.3 percent in 2021.

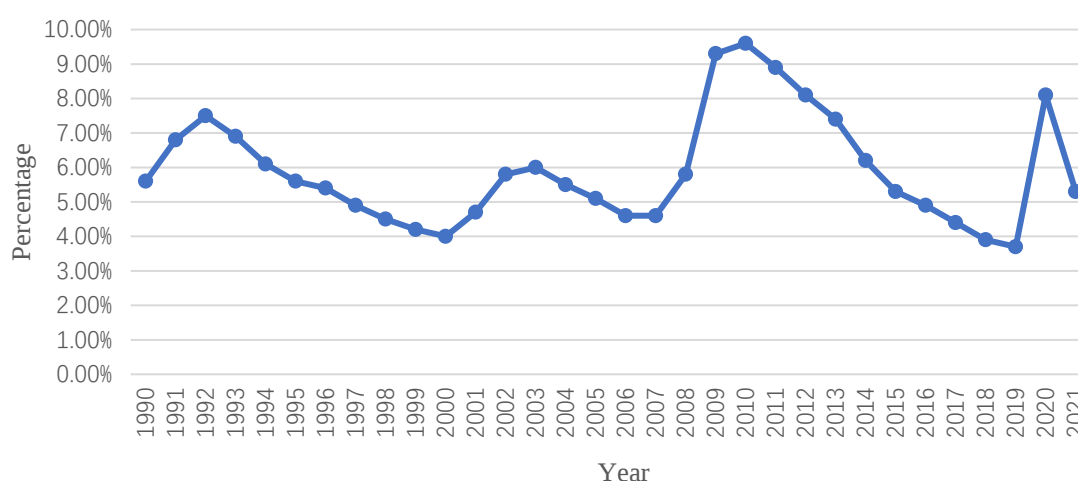


Figure 1. Line Graph of Unemployment Rate in the US from 1990 to 2021.

As was previously said, the total unemployment rate in the United States has been quite unstable during the past three decades, particularly between 2008 and 2010, when it dramatically increased, which had some significant ramifications for the state of the nation in the United States. Between 1992 and 2000 and between 2011 and 2019, the unemployment rate decreased steadily, during which period more factors affected the change in the unemployment rate.

3.2. Analysis of economic growth

Three negative economic growth rates are in 1991, 2009, and 2020 respectively, which occurred in the United States from 1990 and 2021. Between 1992 and 2000, the economic growth rate was rising and the unemployment rate in the United States was steadily declining. In 1991, the annual economic growth rate was -0.1 percent, which had no influence on the unemployment rate. The year of America economic crisis, 2009, had an economic growth rate of just 2.6 percent, and it was during this year that the unemployment rate in the country peaked at 9.3 percent. Right away, between 2010 and 2019, the unemployment rate decreased and the economy progressively recovered. However, in 2020 the economy had its highest level of negative growth in almost three decades (-3.4%), and the jobless rate also rose to a peak of 8.1%. According to the data in figure 2, when economic growth begins to increase for the first time following the end of the recession, the unemployment rate may not drop much.

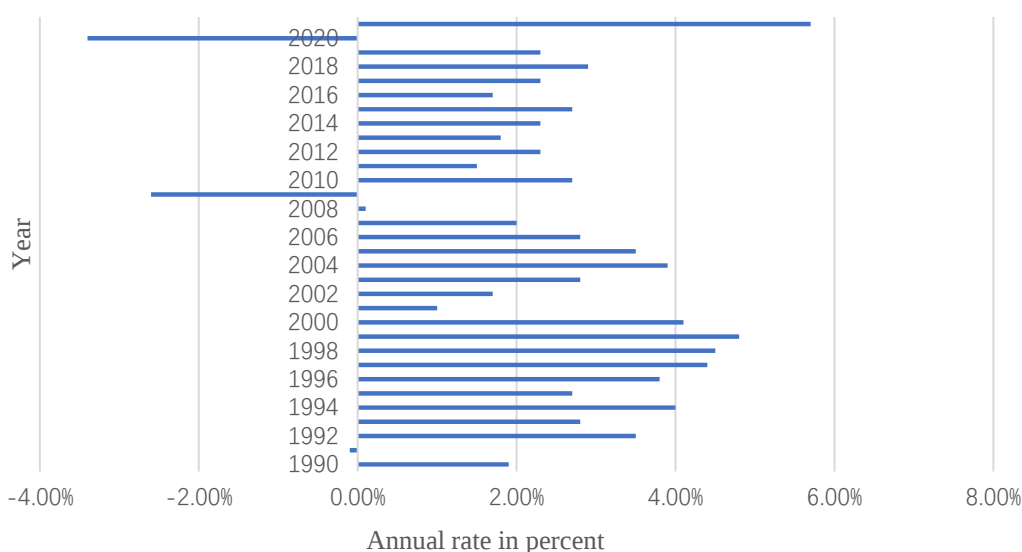


Figure 2. Annual growth of the economy of the US from 1990 to 2021.

A scatter plot of the annual economic rate of change from 1990 to 2021 is shown in Figure 3. Calculations allow for the determination of the mean (average growth rate) for these three decades, which is 2.39 percent, and the standard deviation, which is 1.88 percent. Because the standard deviation is less than the mean, a low standard deviation suggests that the data are clustered around the mean (more reliable). A regression line with a downward slope is seen in Figure 3 with its upper end at the plot's y-intercept (axis) and its lower end extending into the plot field in the direction of the x-intercept (axis). These two variables are negatively correlated, which means that if one variable's value increases, the other decreases. In other words, as time goes on, the rate of economic growth declines.

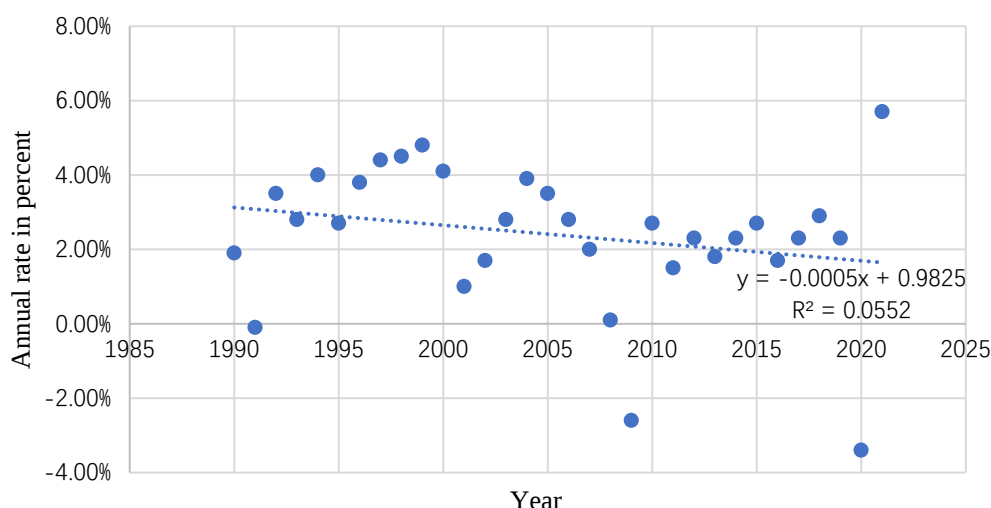


Figure 3. Scatter plot of economic rate in the US from 1990 to 2021.

3.3. Analysis of demographic shifts

The standard deviation is a measurement of how widely dispersed a set of data's mean is. A smaller standard deviation indicates that these values are nearer the mean, while a bigger standard deviation demonstrates that most values are more dissimilar from their mean. The standard deviation is low (0.079), which has huge difference with mean (0.439). The statistical minimum, also known as the low outlier limit, is the lowest value among a group of data, removing any outliers. The statistical maximum or high outlier limit is the greatest value in a set of data after removing any outliers. Both are computed using the interquartile rule or a statistical limit specified by the user. The interquartile rule is automatically applied when the outlier's control is set to automatic. The results indicate that the greatest and minimum values are 0.524 and 0.313, respectively. Based on all figures, the unemployment rate is high in USA. In comparison to the United States, the unemployment rates in the other four countries were not very high during that time. In truth, the unemployment rate is rising gradually in the UK, France, Italy, and Germany, but the change is not very noticeable because of the minimal influence of demographic changes.

Table 1. Relative size of population in different five countries from 1968 to 1994.

Country	Mean	Std. Dev.	Min	Max
USA	0.439	0.079	0.313	0.524
ITALY	0.375	0.024	0.314	0.407
FRANCE	0.400	0.038	0.324	0.465
GERMANY	0.355	0.042	0.261	0.406
UK	0.386	0.042	0.296	0.435

3.4. Analysis of educational attainment

According to table 2, we were able to find out the weekly salary and unemployment rate of different degrees after working. We also created figure 4. based on table 2. The y-axis on the left is based on the median usual weekly earnings. The y-axis on the right is created based on the unemployment rate. And the first one is Doctoral degree, 2 is on behalf of Professional degree. The third one is Master's degree. 4 is on behalf of Bachelor's degree. The fifth one is Associate's degree. The sixth means Some college, no degree. The seventh is High school diploma. The last one is Less than a high school diploma.

Table 2. The Unemployment Rate and Education Level in 2015.

Education attained	Median usual weekly earning (\$)	Unemployment rate (%)
Doctoral degree	1623	1.7
Professional degree	1730	1.5
Master's degree	1341	2.4
Bachelor's degree	1137	2.8
Associate's degree	798	3.8
Some college, no degree	738	5.0
High school diploma	678	5.0
Less than high school diploma	493	8.0

First of all, the unemployment rate has a huge impact on educational attainment. In this society, with the expansion of colleges and universities, college graduates are facing an increasingly serious employment problem. Research shows that there is a specific correlation between the education level of young workers and the unemployment rate. Statistics show that the higher the education level of young workers, the higher the unemployment rate. In fact, more than half of the students who enter college each year are dissatisfied with their majors. This has a direct impact on how well students learn and how emotionally they learn. This is a major reason why they are unable to meet employment needs when they enter college. Ultimately, most students choose their college majors based on the movies they like best. At the same time, parents emphasize only popular majors when planning for their children. Parents do not analyze whether the major is suitable for the students themselves and for their future development. Students do not gain enough knowledge and experience in college. Therefore, they cannot meet the requirements of the job position after graduation. If they fail to meet the requirements, they may be dismissed. This increases the unemployment rate.

At the same time, I can also apply the knowledge of statistics in mathematics to explain this phenomenon. Based on these some formulas and the data in the table, we can calculate that the mean unemployment rate is about 3.78. Meanwhile, the mean is between the Associate's degree and the Bachelor's degree. This reflects that only people with the higher educational background than Associate's degree can ensure that the unemployment rate is lower than the mean in the society. Education attainment affects the unemployment rate directly.

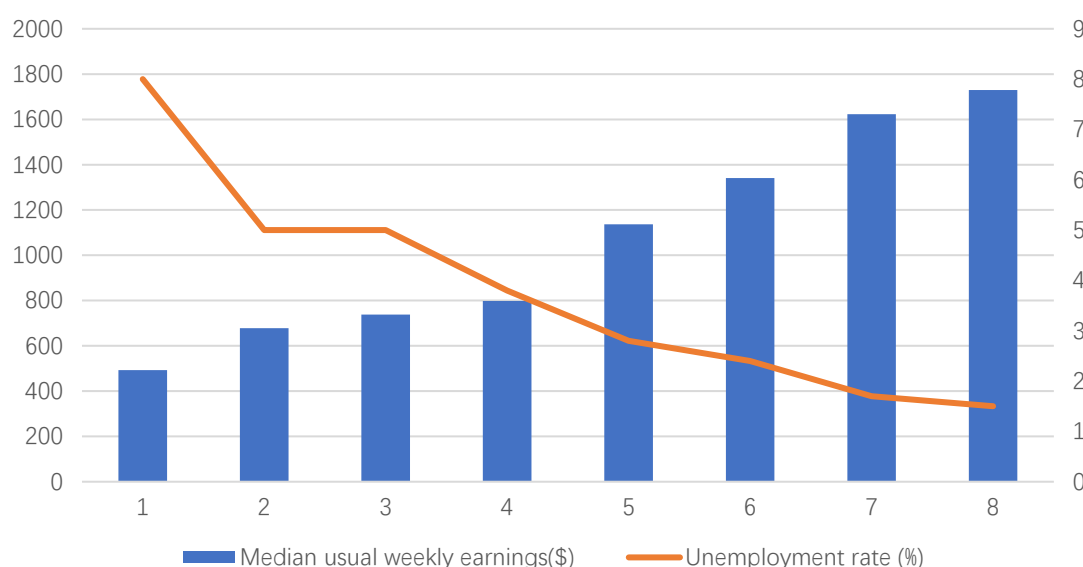


Figure 4. The Unemployment Rate and Education Level in 2015.

3.5. Analysis of gender

Employment inequality refers to gender discrimination in employment, which leads to fewer employment opportunities for female. Currently, many employment hires have varying degrees of gender restrictions. In some large job fairs, almost half of the units have gender requirements. Recruiting male is often the most basic requirement for some organizations. It is because of these unequal employment conditions that the unemployment rate for female is much higher than that for male. At the same time, it is difficult for laid-off female of lower age and literacy to rejoin the workforce. Due to the fierce competition in the labor market and the fact that laid-off female is generally older and less educated, laid-off female have many difficulties in seeking re-employment. This makes the unemployment rate of female significantly higher than that of men. Few laid-off female workers are re-employed. Although some females have returned to work, they still feel embarrassed by some problems. For example, job insecurity, low wages, sexual harassment, etc. This will lead to more disappointed female employees.

Table 3. The relationship between the unemployment rate and gender with the ages of 25 and 34

Sex	Less than high school completion	High school completion	Some college, no bachelor's degree	Bachelor's or higher degree
Male	11(1.9)	10(0.7)	9(0.8)	4(0.4)
Female	11(2.0)	11(1.0)	8(0.6)	4(0.4)

As figure 5 shows, the first one is Less than high school completion. And the second one is High school completion. 3 is on behalf of Some college, No bachelor's degree. The last one is bachelor's or higher degree. The mean unemployment rate is 8.5 for both male and female. There are some differences between male and female. Male need a Bachelor's or higher degree to ensure that their unemployment rate is less than half of the people in the society. Women need Their unemployment rate is less than half that of the general population because they have some college experience, no bachelor's degree, and a bachelor's or higher degree.

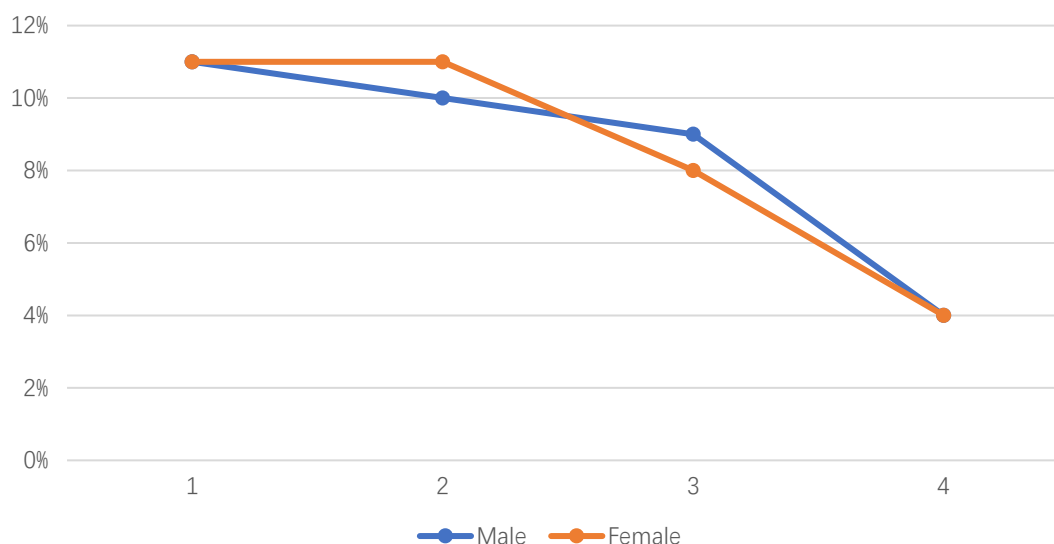


Figure 5. The relationship between the unemployment rate and gender with the ages of 25 and 34 [16]

4. Conclusion

The relationship between economic growth and the unemployment rate can be shaky in the short term. It is common for the unemployment rate to continue to drop after other major indicators of economic activity have started to improve. As a result, it is often called a lagging economic indicator.

The fact that some businesses may have underutilized employees on their payrolls due to the costs associated with firing employees when product demand declines and rehiring them when product demand improves is one reason why unemployment rate might not decline observably when economic growth first yields after a recession.

The job market will be greatly impacted by demographic change. The percentage of youthful workers is reducing while the workforce's average age is growing. However, this does not indicate that the employment options for senior workers would improve or their working years would be prolonged.

Education is very important to job requirements in society. The knowledge people possess depends on their education. In society they use enough knowledge to stick to their jobs. If they don't have enough knowledge to do their job, they will lose their job. Unemployment will increase. This also reflects the importance of education out.

References

- [1] Jahoda, M., "Employment and unemployment," Cambridge Books (1982).
- [2] Kreishan, Fuad, M., "Economic growth and unemployment: An empirical analysis," Journal of social sciences, 7.2: 228-231, (2011).
- [3] Kaufman and Roger., "Why the US unemployment rate is so high," Challenge, 21,2: 40-49, (1978).
- [4] Greg, M., "The Data of Macroeconomics," Principles of Economics (9th ed.). SSBH. p. 504, (1997).
- [5] Lee, Ronald, D. and David, S. R., "Introduction: The landscape of demographic transition and its aftermath," Population and Development Review, 1-7, (2011).
- [6] Biagi, Federico, and Claudio, L., "Demographic and education effects on unemployment in Europe," Labour Economics, 15.5: 1076-1101, (2008).
- [7] Reid, Frank, and Douglas, A. S., "The impact of demographic changes on unemployment," Canadian Public Policy/Analyse de Politiques, 7.2: 348-351, (1981).
- [8] Vera, T., Esperanza, Margarida, R., and Patricia, C., "Beyond educational attainment: The importance of skills and lifelong learning for social outcomes. Evidence for Europe from PIAAC," European Journal of Education, 52,2: 217-231, (2017).
- [9] Wolbers and Maarten, H. J., "The effects of level of education on mobility between employment and unemployment in the Netherlands," European Sociological Review, 16,2: 185-200, (2000).
- [10] Grogan and Kathleen, E., "How the entire scientific community can confront gender bias in the workplace," Nature Ecology & Evolution 3,1: 3-6, (2019).
- [11] Dunham and Catherine, R., "Third generation discrimination: The ripple effects of gender bias in the workplace." Akron L. Rev. 51: 55, (2017).
- [12] "COE - Employment and Unemployment Rates by Educational Attainment." Nces.ed.gov, May (2022), nces.ed.gov/programs/coe/indicator/cbc/employment-unemployment-rates.
- [13] Vilorio and Dennis, "Education Matters: Career Outlook: U.S. Bureau of Labor Statistics." Bls.gov, 29 Mar. (2016), www.bls.gov/careeroutlook/2016/data-on-display/education-matters.htm.