

Labor Markets and Unemployment

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Abstract: As science and technology advance by leaps and bounds, they are gradually penetrating into every aspect of people's lives. Then currently, science is making giant strides in artificial intelligence growth at an astounding rate. In view of this trend, it shows with the current maturity of artificial intelligence technology, more and more low labor is replaced by machines. Based on the trend of future development above, model can be analyzed the maximum unemployment rate of the current market, and predict the relatively low future unemployment rate to help more people choose a occupation more conveniently. This article mainly analyzes some industries with the most unemployment rate and the industry with the smallest future unemployment rate through some of the readings of unemployment literature and industry unemployment data. In terms of research methods, the article's analysis is based on the multivariable linear regression model, calculation formula for unemployment rate, market hypotheses, and through the specific career data of doctor, lawyer and technician in recent years. With the total tendency to select the occupational population as the dependant variable, the occupational tax rate in US, the labor participation rate, and the risk coefficient are used as an independent variable, and the multi-linear regression model analysis is performed through data quantitative verification to calculate the actual number of people. Afterward used the unemployment population as a dependent variable, and the actual labor population is used as an independent variable, and the actual unemployment rate is derived through an unemployment calculation formula.

Keywords: Artificial intelligence, Unemployment formulation, Occupational tax rate

1. Introduction

Occupation, that is the work that individuals serve society and serve as the main source of life. The word career plan was proposed by Frank Parsons. It originally originated in the United States in 1908. Frank Parsons, known as the "father of career guidance", established the world's first vocational consulting agency -Boston Local Employment Bureau for a large number of young people and proposed the concept of "career consultation". Unemployment rate refers to the ratio of the unemployed population (the labor number of all employment population in a certain period of time). The month of unemployment data can be appropriately reflected in economic development. Starting from the Great Depression in 1929, the overall US unemployment rate continued to increase. In the most serious time in the Great Depression in the United States, the overall unemployment rate was about 25%. The impact of unemployment rate on the masses is reflected in: a large number of unemployed people reduce social interaction and lose self-esteem; inverse of urbanization and the

public loses confidence in the future. Therefore, we can derive that the unemployment rate has a serious impact on us through the US history.

The cause of career planning comes from the increase in unemployment rates, and the unemployment rate is a very difficult problem in the past and even now. For ordinary people, it may be hard for us to solve this conundrum, but we can try to avoid it which means is magnificent to choose a suitable job.

2. Literature review

2.1. Definition of unemployment rate

Card suggested that the modern definition of unemployment emerged in the late 1930s from research by the Works Improvement Administration and the Census Bureau in 2011[1]. Under this definition, people who do not have a job but are actively looking for work are considered unemployed. Sources indicate that the concept was first used in the Enumeration Check Census (a follow-up sample to the 1937 Unemployment Census) and continued in the December 1939 Labor Force Monthly Survey Report, begun by the Works Progress Administration.

2.2. Factors affected by the unemployment rate

In the early days, Feng have collected household unemployment data for most countries different income levels to infer that the average unemployment rate will change as the per capita income level is different in 2018[2]. Then compare the two major departments models, predict that when the productivity is improved, the shrinkage of the traditional department will gradually shrink and the unemployment rate will become higher.

Additionally, Chen used ARDL and unit root testing and enhanced Dickey Fuller (ADF) testing and other methods to explore the unemployment variables in 2017[3]. In the end, it was found that when the unit root test and the ADF test passed, the domestic GDP and the unemployment rate changed obvious which means it can be inferred that there is a certain connection between them.

2.3. Other scholars' experimental methods for semiconductor research

There are also some behavioral factors affecting the unemployment index, such as the diversity of industry, operating efficiency and marketing methods.

From 2000 to 2010, the scale of the development of the Japanese semiconductor industry gradually increased, and the animal husbandry, animal husbandry, and handicraft industry gradually moved to the world market. Therefore, many scholars wanted to study the situation of the unemployment rate at that time.

Mizuno have discovered that the more graduates of university colleges and universities in urban areas, the lower the unemployment rate in 2006[4]. It is speculated that the unemployment rate is reduced due to industrial diversity. Therefore, scholars collected data tables in 118 cities and regions for calculation and statistics. Eventually, the impact of industrial diversity on the unemployment rate was insignificant, but it still played a certain role.

Puspadjuita have found that urbanization, industrialization, labor level and elasticity will also affect the unemployment rate in 2018[5]. By describing linear regression and calculating $\alpha=5\%$, it indicates that the elasticity of labor has little effect on the unemployment rate, and the change of labor has a great impact on the unemployment rate.

3. Method

3.1. Multivariate linear regression model

The multivariate linear regression model establishes a correlation between a dependent variable and multiple independent variables. It analyzes two or more autonomous variables related to one dependent variable, using multiple statistical analyses as the theoretical basis to establish a multivariate linear regression model in economic activity.

This research aims to analyze the risk factor of the risk of unemployment in the future and the lowest unemployment rate in the future. Based on SPSS statistical analysis, the multiple regression model calculates the data of different variables of three occupations, and analyzes three cause variables and one independent variable. These variables include the occupational tax rate in US, the labor participation rate, the risk coefficient and the occupational population. Historical price information is collected to obtain an information set that effectively collects predictive values conforming to the prediction model of real-life data for comprehensive analysis to ensure the accuracy of the analysis.

3.2. Efficient Markets Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) posits that the price of securities in the market always reflects all available information, and thus, the market price represents the true value of the securities. In a valid capital market, asset prices adjust immediately based on new information, including the current and future values of enterprises.

The formula derivation process is

Let E = number of worker who enter unemployment in period t . X = number of worker who exit in period t . U = stock of unemployment at the beginning of period t . The dynamic path of unemployment is $(\text{cita})U = E - X$.

Next, express the model in terms of rates. Let L = constant labour force size. S = job separation rate. f = job finding rate. Then the total entry into unemployment during the period is $E = S(L - U)$ and exit from unemployment $X = fU$.

Consider the rate of unemployment: $u = U/L$. The change in u is $(\text{cita})u = (\text{cita})U/L$. Therefore $(\text{cita})u = (\text{cita})U/L = (E - X)/L = S(1 - u) - fu$. Define steady state: $(\text{cita})u = 0$. Thus $u^* = S/S + F$.

4. Analysis of results

According to the linear regression data of SPSS software, each occupational population have the following responses to the occupational tax rate in US, the labor participation rate, and the risk coefficient.

Through calculation, we can derive the histogram (Y axis is frequency, X axis is number) and regression standardized residual normal graph (Y axis is expected cumulative probability, X axis is actual cumulative probability).

Histogram indicates that the value tends to rise at a constant rate to the peak point and decline at the same rate, the peak rate almost at 6.149, the average is 1.84E-14, standard deviation is 0.945 and number of case is 29.

Regression standardized residual normal graph implies that an upward trend, although the rate of growth varies over time.

Table 1: Doctor SPSS linear regression analysis results.

Influencing factors	BETA
Occupational tax rate in US	0.487
Labor participation rate	0.516
Risk coefficient	-0.029

Through calculation, we can derive the histogram (Y axis is frequency, X axis is number) and regression standardized residual normal graph (Y axis is expected cumulative probability, X axis is actual cumulative probability)

Histogram indicates that the value tends to rise at a constant rate to the peak point and decline at the same rate, the peak rate almost at 6.149, the average is 5.56E-15, standard deviation is 0.945 and number of case is 29.

Regression standardized residual normal graph implies that an upward trend, although the rate of growth varies over time.

Table 2: Lawyer SPSS linear regression analysis results.

Influencing factors	BETA
Occupational tax rate in US	-0.405
Labor participation rate	0.133
Risk coefficient	-0.516

Through calculation, we can derive the histogram (Y axis is frequency, X axis is number) and regression standardized residual normal graph (Y axis is expected cumulative probability, X axis is actual cumulative probability)

Histogram indicates that the value tends to rise at a constant rate to the peak point and decline at the same rate, the peak rate almost at 4.256, the average is -1.19E-14, standard deviation is 0.945 and number of case is 29.

Regression standardized residual normal graph implies that an upward trend, although the rate of growth varies over time.

Table 3: Technician SPSS linear regression analysis results.

Influencing factors	BETA
Occupational tax rate in US	0.603
Labor participation rate	0.004
Risk coefficient	-0.187

5. Specific analysis of numerical values

Through the above data, we can analyze the lowest risk factor of the lawyer, only -0.516, the most risk coefficient of the doctor, is -0.029. The technician risk coefficient is medium, is -0.187. From this calculation, we can analyze that doctors are often accompanied by risk of infectious diseases in the work process, threatening their own lives, hence the risk of work will be relatively high. The lawyers have more working hours to prepare and collect evidence and statement information, so the corresponding situation is less in danger. Although technician most of the working time is in the program editing. Nevertheless, it may cause damage to their body due to long-term work. Since doctors and technicians occupational tax rate in US and the labor participation rate are positive ,

however, the lawyers occupational tax rate in US is negative which means the tax it should pay is much more than ordinary occupations with the high wages and stability.

6. Unemployment rate calculation

Thus, we have now calculated the specific data on labor. The picture below is the unemployment rate from different occupations.

Table 4: Unemployed data collected in 2022.

Occupation	UNEMPLOYED DATA (Hundred million)
Doctor	0.0237875
Lawyer	0.955
Technician	0.0817
Total unemployed	1.91

Evidence of the unemployment rate formulation:

$$\text{Unemployment rate} = \text{Unemployed/Labor force} \quad (1)$$

Hence we can calculate the unemployment rate value of different occupations.

Table 5: Unemployment rate.

Occupation	UNEMPLOYMENT RATE
Doctor	0.00014
Lawyer	0.0745
Technician	0.007301

7. Conclusion

According to the analysis of multiple linear data and the calculation of unemployment rate, we can infer that the lawyer unemployment risk coefficients are the largest and doctor is the smallest. Combined with the current actual situation, the spread of the epidemic in recent years has led to the increasing number of people needed for medical care. Therefore, doctors are indispensable in recent years. Additionally, in the context of increasingly more and more high-tech industries in the field of information technology, its market has gradually become saturated, hence the demand for the number of people has also changed from the original quantity to the pursuit of quality. Subsequently, the lawyer is due to the accumulation of the previous number, which led to the number of people in the industry exceeding the original prediction number, so most people were unemployed.

References

- [1] Card, David. "Origins of the unemployment rate: the lasting legacy of measurement without theory." *American Economic Review* 101, 2011.
- [2] Chen, Li Xuen, et al. *Macroeconomic factors affecting unemployment rate in China*. Diss. UTAR, 2017.
- [3] Feng, Ying, David Lagakos, and James E. Rauch. *Unemployment and development*. No. w25171. National bureau of economic research, 2018.
- [4] Mizuno, Keizo, Fumitoshi Mizutani, and Noriyoshi Nakayama. "Industrial diversity and metropolitan unemployment rate." *The Annals of Regional Science* 40 (2006): 157-172.
- [5] Puspajuita, Erna AR. "Factors that Influence the rate of unemployment in Indonesia." *International Journal of Economics and Finance* 10.1 (2018): 140-147.