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From New Energy Vehicles to Structural Unemployment

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ABSTRACT

In this paper, due to the inspiration of the future fuel policy change in The Formula One, I explain and evaluate that rise in unemployment is caused by the decrease in oil price, vice versa. The explanation part involves the analysis of the change in demand and supply, how it relates to the aggregate demand and hence how it influences the unemployment by using demand and supply model and phillips curve. The evaluation part includes the OLS regression analysis in order to calculate the regression line and significance test which aims to check the validity of the linear relationship. Overall, this model can be used to make prediction for the future, either oil price or unemployment by each other. I believe this research will contribute to the prediction for future unemployment. Therefore, it is beneficial for the governments' macro policies enaction that satisfies country's macroeconomic aims.

KEYWORDS

New energy vehicles; Structural unemployment; Fuel policy

1. INTRODUCTION

As being limited by the global energy crisis and requirements of constructing friendly environment, domestic new energy vehicles proliferate. In 2022, its production exceeded 7 millions. Also, consumers enthusiasm of purchasing new energy vehicles boost, which lead to ¥6887000 transactions and has over a quater of the market share. Similarly, this phenomenon not only happened in China, but also happened abroad. Many car sellers with well reputation, for example Mercedes and Porsche etc, are going to use biochemical fuels to replace fossil fuels. It is coincidental that The Formula One, the most influential car racing tournament, would use biochemical fuels, such as electricity or even hydrogen fuel, instead of fossil fuel after 2030. Consequently, Porsche aimed to enter The Formula One such that they could preferentially test the validity of its own developed biochemical fuels and then utilize it in the quantitatively produced vehicles which are going to sell to the public. Thus, they can get prior attention by customers. Moreover, due to the report, Audi plans to cease the use of fossil fuels since 2033. All of these clues about the abandonment of fossil fuels may be the signal that more and more car manufacturing companies tend to give up fossil fuels. However, this might cause the butterfly effect happened.

2. CONJECTURE

2.1. Micro Analysis: Demand and Supply

In recent, most new energy companies expand in a high speed and new energy vehicles has traits-low energy consumption, low contamination and high technological advancement-that contribute a lot to

the proliferation of the economy. As the leader of the Lithium battery industry, CTAL received a net profit of ¥22.8 billion in the first half year in 2024, which increased 10.37% to the previous half year. This transition elaborates that demand for new energy vehicles boost. Therefore, as a substitute of new energy, fossil fuel, especially petroleum, has a positive XED (cross elasticity of demand) and have a fall in demand since burning them creates climate changes and release pollutants that lead to early death, heart attacks, respiratory disorders, stroke, asthma, absenteeism at school and work, autism spectrum disorder, and Alzheimer's disease. This is disastrous to the oil industry since producers are not able to earn same profit as usual. Due to the increasing awareness of health by the public, demand for fossil fuels will fall.

2.2. Macro Analysis

2.2.1. AD-AS Model

Under this circumstance, for countries that survive through oil industry, less demand for oil influence three components that are counted in aggregate demand: 1. less demand indicates the leftward shift of demand curve which intersect with supply curve at a new equilibrium point with both lower price, hence, consumer consumption (C) will fall; 2. Due to lower quantity consumer consumed, oil manufacturers who are selfish and aiming for profit maximization, especially the private businesses, will earn a relatively lower revenue, therefore, investors will be less incentive to invest oil industry as there are less profit, which would lead to the decrease in the investment (I); 3. Since the global demand for oil falls, countries that are not self-sufficient with oil will import less oil from other countries for the reason that they can utilize new energy instead, which results a lower net export (export - import) in oil suppliers countries. Consequently, countries'AD will shrink. As aggregate demand refers to the quantity of overall production, contradiction in AD will lead to decrease in both price level and quantity of output.

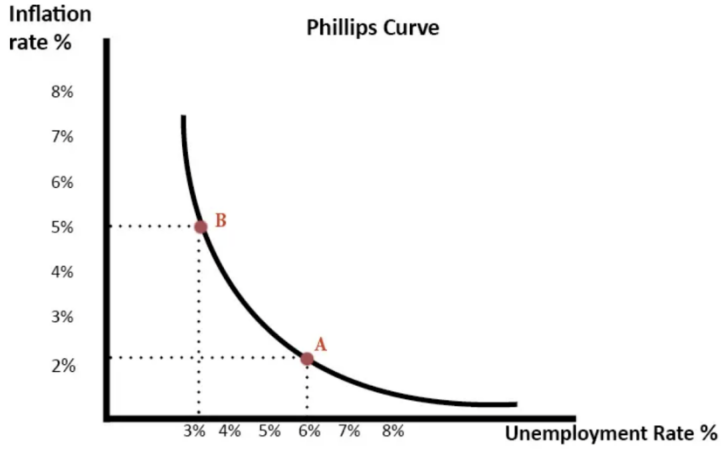

Figure 1. Phillips Curve

2.2.2. Contribution to unemployment

As a result, less labors are essential for the oil industry, which means more structural unemployment. However, even there are more demand for labor in the new energy industry, labors who are discarded from oil industry have no sufficient fundamental skills in the new energy industry and they are not able to be recruited. Under this circumstance, total unemployment will increase. This trend of inverse relationship between inflation and unemployment is shown in Figure 1, from B to A, where inflation rate decrease while unemployment rise simultaneously.

3. DATA ANALYSIS

3.1. Data Collection

The annual oil price below is calculated from the weekly oil price collected from the website “trade economy”. The annual oil price is calculated from the weekly oil price from 2016 to 2023. For the unemployment data collection, it is directly collected from the official website of “international labour Organization” also from 2016 to 2023.

3.2. The Least Sqaure Regression Analysis

Due to the previous theoretical analysis, hypothesis can be asserted that oil price and unemployment has negative relationship.

Table 1. For oil price and unemployment record

year	2016	2017	2018	2019	2020	2021	2022	2023
oil price	43.63	51.11	64.77	57.36	39.44	68.02	92.70	77.45
unemployment	6.10	5.60	5.50	3.19	6.57	6.18	5.40	5.10

However, in order to get more precise result, calculate Q1, Q3 and IQR of oil price and unemployment is necessary. By using theorem that outlier < Q1 - 1.5 × IQR or outlier > Q3 + 1.5 × IQR

For unemployment:

Q1: 5.325

Q3: 6.12

IQR: 0.795

As a result, 3.19 is an outlier

Hence, a new table that without outlier would be created.

Table 2. Without outlier

year	2016	2017	2018	2020	2021	2022	2023
oil price	43.63	51.11	64.77	39.44	68.02	92.70	77.45
unemployment	6.10	5.60	5.50	6.57	6.18	5.40	5.10

By analysing data in table 1.2, perceiving oil price as x and unemployment as y, the least square regression line can be presented as:

$$y = -0.02x + 6.98$$

Figure 2 shows the result of least sqaure regression line and the scatterplot as well. Also the correlation coefficient is -0.71.

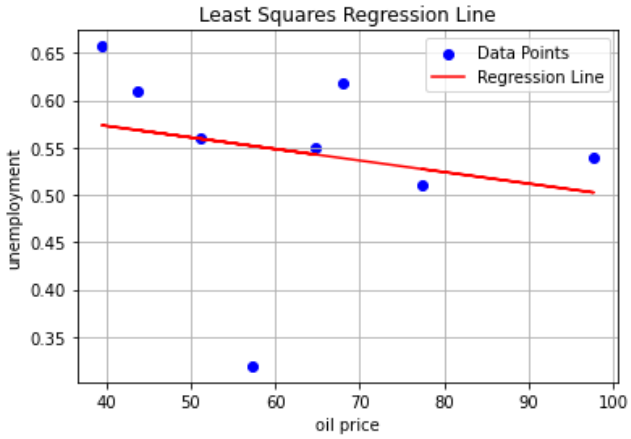

Figure 2. Least Square Regression Line

3.3. Verification

However, significance test should be taken in order to verify the accuracy of the linear relation.

Set H_0 (null hypothesis); oil price and unemployment has no linear relation.

Set H_a (alternative hypothesis): oil price and unemployment has linear relationship.

$$t = \frac{\beta_1}{SE(\beta_1)}$$

So:

$$t = \frac{\beta_1}{\sqrt{\frac{\sum_{i=1}^{n}(residue)^2}{n-2}}} = (-2.3576)$$

By using the value of t, p = 0.065 < 0.1. Hence, the null hypothesis H_0 can be rejected, which means there are linear relation between oil price and unemployment.

4. STRENGTH AND WEAKNESSES

4.1. Strength

Firstly, the inspirations and opinions are based on the real world example, therefore, this research is meaningful since it may contribute to the society; moreover, the data used in constructing regression and time series model is highly accurate and is from authorized officials; at last, the proof of the hypothesis is been checked by significance test which is one of te most renowned statistical method to guarantee the hypothesis stands.

4.2. Weaknesses

The theoretical analysis use the assumption of ceteris peribus, which refers to that I choose to ignore factors other than change in oil price that may akso contribute to the alternation of unemployment, therefore, the circumstances that only one factor changes is unlikely to happen in the real world.

5. CONCLUSION

In conclusion, as the demand and manufacture of new energy vehicles proliferate nowadays and concerns about detrimental environmental impacts caused by the carbon emission released by combination of oil burgeon, the impacts to the economy become severe. Based on the conjecture and modeling, I concluded the inverse relationship between oil price and unemployment, which I believe might assist government's macro policy making, in order to satisfy their macroeconomic aims, such as providing training of other skills for unemployed oil industry workers. Moreover, this can provide manufacturers and investors an instruction for their further investment.

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