Applied Science and Innovative Research
ISSN 2474-4972 (Print) ISSN 2474-4980 (Online)
Vol. 6, No. 2, 2022
www.scholink.org/ojs/index.php/asir

Original Paper

Trump and Biden, Whose Policy is "Better"?

Yinuo Liu[1], Xiaorong Liu[1], Jiaxuan Li[1] & Rui Yu[2]

[1] Queen Mary University of London Engineering School, Northwestern Polytechnical University, Xi'an, Shaanxi 710072, China

[2] Chongqing University of Technology, Chongqing, 400054, China

Received: January 20, 2022 Accepted: February 15, 2022 Online Published: March 10, 2022

doi:10.22158/asir.v6n2p12 URL: http://doi.org/10.22158/asir.v6n2p12

Abstract

2020 is the year of US presidential election, with Republican candidate Donald Trump and Democratic counterpart Joe Biden running for president. In this paper, we focus on different president's policy especially on economic field. In addition, "the different policies affect both America and China's economy" is considered. This paper also gives some responds and suggestions for China to deal with different economic policies in America. Based on the instruction, we mainly solved three questions.

To analyze different candidates' economic policies and explore the impact in the U.S, we establish four series of factors by using Multiple Regression (MR) and then use Analytic Hierarchy Process (AHP) to build a whole model of general factors. Specially, we choose "COVID-19 fighting measures" to be the area we will explore, and we select Susceptible Exposed Infectives Recovered (SEIR) model to predict the impact caused by COVID-19. After that, all the advantages and disadvantages can be analyzed. If Donald Trump continues his political career, the development of American economy will be predicted by Gray model according to the GDP in previous years. Oppositely, if Joe Biden successfully runs for the president, some policies will be changed, and it is helpful to predict the GDP by using MR method. The conclusion shows that Biden's policy is better than Trump's for economy in the U.S.

We build a new model to predict the possible impact of different candidates elected on China's economy. The influence caused by different economic policies can be typically shown through several specific companies such as Huawei. Annual reports from different companies are collected and some data particularly related to international trade can be analyzed. Additionally, it is helpful to use Gray model and MR method to predict the companies' economic situation on behalf of some significant parts of Chinese economy.

From a historical point of view, the connectivity of the world economy, the collaborative division of labor among countries and the exchange of personnel are irreversible historical trends. No matter who the candidate is, our strategic approach to economic policy will not change, but some details may be

changed. For Donald Trump's policies, we will take national protection measures in some high-tech areas. But for Biden, the policy in China must be changed.

Keywords

SEIR model, Gray model, MR method, Policy Analysis and Prediction

1. Overview

1.1 Background

The US presidential election is held every four years. 2020 is the year of US presidential election, with Republican candidate Donald Trump and Democratic counterpart Joe Biden running for president. The candidates of both parties have different political stands and administrative programs in finance and trade, economic and financial governance, and some other different key development areas such as COVID-19 fighting measures. The election of different candidates will shape different strategic patterns of global economic and financial development and have a greater impact on the U.S. economy and the global economy including China's economy.

As a Chinese citizen, it is not sufficient to be familiar with the internationally economic situation. How does our country deal with the complex situation? Especially the unilateralism and hegemonism in several country such as the U.S, who gets China into trade war, is a very intractable problem that China faces. It is necessary for us to estimate and evaluate the situation and think of some good solutions.

1.2 Restatement of the Problem

- For question 1: Establish a mathematical model and use relevant data to quantitatively analyze the possible impact of different candidates elected on the U.S. economy. In this way, we choose the "COVID-19 fighting measures" and other 8 factors to be the area we will explore. In other words, we will build a model that mainly considers the impacts caused by the COVID-19 to answer this question.
- For question 2: Establish a mathematical model and use relevant data to quantitatively analyze the possible impact of different candidates elected on China's economy. In this way, we choose the annual report of Huawei company to be the main reference we rely on. In other words, we will build a model that mainly considers the impacts caused by the policies in Huawei company to answer this question.
- For question 3: Based on the solution of both question 1 and question 2, give the suggestions that make to China's economic countermeasures and policies in related areas in both cases.

2. Question Analysis

2.1 Analysis of Question 1

For question 1, it asks us to build up a new mathematical model by using relevant data to analyze different candidates' economic policies and explore the impact in the U.S.

No matter what factors we will finally select, it is obligatory to collect economic data both in the U.S. and China before doing modeling.

We establish four series of factors by using Multiple Regression (MR) (Wang, Zhang, & Yuan; Li & Ding; Jia, Guo, Xiao, Ye, Gu, & Liao; Li & Wang; Tsubouchi; Okano & Kumagai) and then use Analytic Hierarchy Process (AHP) (Chen, Hu, & Wang) to build a whole model of general factors. Considering the specialization of the impact caused by COVID-19, we choose "COVID-19 fighting measures" to be the area we will explore. In this paper, we select (SEIR) model to predict the impact caused by different candidates' policies (Nino, Fernandez, De la Sen, Alonso-Quesada, Nistal, Garrido, & Ibeas, 2019; Upadhyay, Kumari, & Misra, 2017).

After that, all the advantages and disadvantages for each candidates' policies can be analyzed. The different policies will impact different economic areas. For instance:

If Donald Trump continues his political career, the development of American economy will be predicted by Gray model according to the GDP in previous years. Oppositely, if Joe Biden successfully runs for the president, some policies will be changed, and it is helpful to predict the GDP by using MR (Multiple Regression) method. The different impact between two candidates' policies can be shown directly (Nino, Fernandez, De la Sen, Alonso-Quesada, Nistal, Garrido, & Ibeas, 2019).

2.2 Analysis of Question 2

For question 2, it asks us to build a new model to predict the possible impact of different candidates elected on China's economy.

The influence caused by different economic policies can be typically shown through several specific companies such as Huawei. Annual reports from different companies are collected and some data particularly related to international trade can be analyzed.

Additionally, it is helpful to use Gray model and MR method to predict the companies' economic situation on behalf of some significant parts of Chinese economy.

3. Model Assumptions and Notations

3.1 Assumptions and Justifications

1) All the selected data is true and based on the governmental system.

2) The policies will not change in the predicted years. It means the policies are stable and the development is continuable.

3) Some world-wide disasters such as financial crisis and some damageable nature disaster will not happen in the predicted year. The only mentioned and considered factor is the impact of COVID-19 in question 1.

4) In fact, the whole economy in China will not be drastic influenced by the policies in the U.S. The result in question 2 is only on behalf of the impact on series of companies that have international trades and high-technology products.

5) The suggestions in question 3 are just based on the result and analysis in question 1 and question 2.

4. Establishment and Solution of The Model

4.1 The Model of Question 1

4.1.1 Model Analysis

For question 1, it can be divided into four sections as following:

The first part is data collection and data process. It is necessary to collect data from the governmental website and find the relationship in different series of factors.

The second part is establishing a model that can **analyze all the factors** in the first part. Here, we plan to use MR method firstly, and divide all the factors into four series. Then use AHP to create a formula to describe the relation between different series.

The third part is establishing the other model that can **describe the impact of COVID-19** perfectly. In this part, we choose SEIR model to predict the number of infected people, and then calculate the cost caused by the COVID-19.

The Last part is doing comprehensive analysis of the models established in part 2 and 3 and **getting conclusion**. It is relatively easy to do comparation of two candidates' policies by using two models above.

4.1.2 Model Establishment with Solution

Step 1: Data collection and process

Generally, there are several factors that influence the economy directly. In other words, all the factors can reflect the situation of one country's economy. The factors are: "Total unemployment rate", "Total tax", "Customs and other import taxes", "Net immigration", "Trade balance", "Total exports", "Fuel consumption", "Coal consumption", "Power generation", "Medical expenses", "Public highways and streets", "Number of households with broadband Internet access".

Because of the accuracy of MR (in this model, the accuracy value is also shown by R-square), it is unstable and lowly-accurate if there are many variables in one formula. According to the daily knowledge, we divide the factors above into four series:

1) "Total unemployment rate" and "Net immigration" (Series 1)
2) "Fuel consumption" and "Power generation" (Series 2)
3) "Total tax" and "Trade balance" (Series 3)
4) "Medical expenses" and "Public highways and streets" (Series 4)

The relationship between other several factors is not clear, so the data of them will not participate in the model establishment.

5) Search for the principles and make the prediction.

Table 1. The Principle of Trump and Biden

	Donald John Trump	Joe Biden
Infrastructure	Trump is preparing a scale of nearly $1 trillion infrastructure proposal, which are mainly on roads, bridges, tunnels, 5G equipment and the construction of rural broadband.	Democratic Party launched a 10-year infrastructure plan, a total of which was $1.3 trillion. Biden planned to reduce greenhouse gas emissions in the United States and create jobs to expand the scale of the middle class. Expenditure include: clean energy research and innovation, modernization of schools, roads, bridges and highway maintenance, rural broadband construction, and public traffic.
Revenue	Maintain current policy.	Fully raise tax rate.
Medical treatment	Significantly reduce health care exports over the next decade. Reduce prescription drug prices.	Provide insurance to over 97% of American people. Price prescription drugs reasonably.
Trade	Continue the trade war with China. Emphasize America first and punish countries with a trade deficit with the United States.	Deepen alliances with Allies on intellectual property and technology transfer instead of unilateral tariff.
America manufacturing	Support for local manufacturing.	Buy American, make it in American, innovation in America, invest in all of America, stand up for America, and supply America.

Step 2: Model establishment of all factors in step 1

For series 1, by curve fitting and MR model establishment, the formula relationship between "Total unemployment rate (x_1)" and "Net immigration (y_1)" is:

$$f(x_1, y_1) = 1.083 * 10^{14} - 2.014 * 10^{13}x_1 - 1.721 * 10^{7}y_1 + 3.943 * 10^{6}x_1y_1 - 0.03779{y_1}^2 \quad (1)$$

And the value of $R^2 = 1$, which shows the formula fits the two variables very well that is shown in Figure 1.

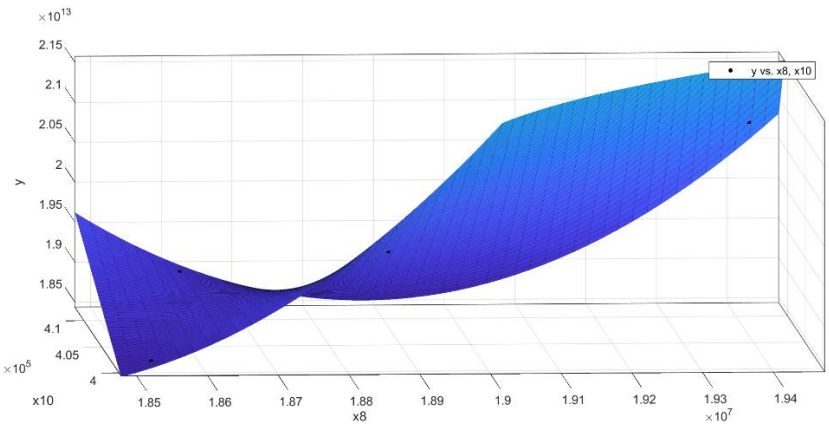

Figure 1. The Fitting Result of Series 1

For series 2, by curve fitting and MR model establishment, the formula relationship between "Fuel consumption (x_2)" and "Power generation (y_2)" is:

$$f(x_2, y_2) = -2.076 * 10^{15} - 1.256 * 10^7 x_2 + 1.087 * 10^{10} y_2 + 6.707 x_2 y_2 - 583.6 {y_2}^2 \quad (2)$$

And the value of $R^2 = 1$, which shows the formula fits the two variables very well that is shown in Figure 2.

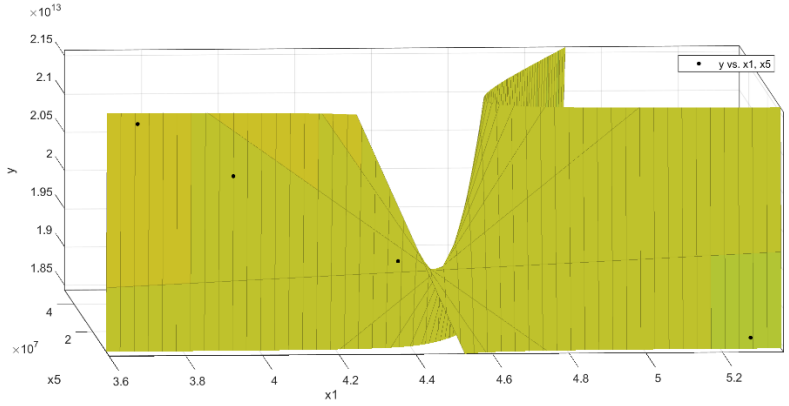

Figure 2. The Fitting Result of Series 2

For series 3, by curve fitting and MR model establishment, the formula relationship between "Total tax (x_3)" and "Trade balance (y_3)" is:

$$f(x_3, y_3) = 9.945 * 10^{13} + 137.4 x_3 + 5.301 * 10^6 y_3 - 8.82 * 10^{-11} x_3 y_3 - 2.644 * 10^{-6} {y_3}^2 \quad (3)$$

And the value of $R^2 = 1$, which shows the formula fits the two variables very well that is shown in Figure 3.

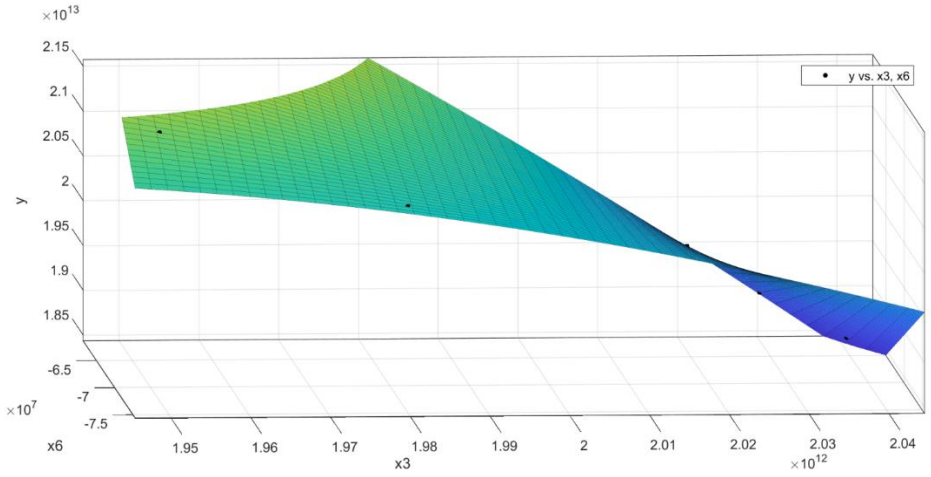

Figure 3. The Fitting Result of Series 3

For series 4, by curve fitting and MR model establishment, the formula relationship between "Medical expenses (x_4)" and "Public highways and streets (y_4)" is:

$$f(x_4, y_4) = -1.132 * 10^{14} - 5.343 * 10^4 x_4 + 4525 y_4 + 6.834 * 10^{-7} x_4 y_4 - 3.736 * 10^{-8} {y_4}^2 \quad (4)$$

And the value of $R^2 = 1$, which shows the formula fits the two variables very well that is shown in Figure 4.

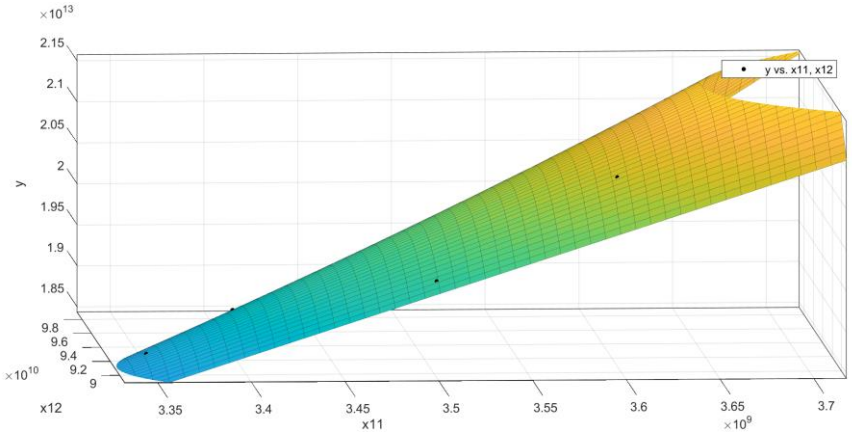

Figure 4. The Fitting Result of Series 4

For formula (1) to (4), each of them can predict the value of GDP in the next year. For instance, when $x_1 = 18000000, and\ y_1 = 412000$, the value of GDP is:

$$f_1(x_1, y_1) = 2.145 * 10^{13}\ (dollar) \quad (5)$$

Similarly, using each formula can predict the value of GDP. But obviously, the weight of each series is different, so we decide to use AHP to analyze the weight of four series.

The judgment matrix A_1 between four series is shown in Table 2:

Table 2. $O - f_i$ Judgement Matrix A_1

O	f_1	f_2	f_3	f_4	ω_i
f_1	1	$\frac{1}{3}$	5	1	0.1516
f_2	3	1	5	1	0.3598
f_3	$\frac{1}{5}$	$\frac{1}{5}$	1	$\frac{1}{5}$	0.0577
f_4	5	1	5	1	0.4309

Further calculation, the maximum eigenvalue of matrix A_1 is $\lambda_{1max} = 4.2640$, and through the check consistency, the formula for check consistency is:

$$CR = \frac{\lambda_{max} - n}{n - 1} \quad (6)$$

The check consistency value for matrix A_1 is $CR_1 = 0.0978 < 0.1$. If the matrix passes the check,

the weight matrix is the relationship between all variables. So, the weight matrix A_1 be the relationship between all variables f_i.

The weight matrix ω_1, which shows the relationship of four series is:

$$O = 0.1516f_1 + 0.3598f_2 + 0.0577f_3 + 0.4309f_4 \quad (7)$$

The GDP in Biden's policy can be calculated by formula (7):

$$O_{Biden} = 2.2721 * 10^{13} \quad (8)$$

By the previous data, the GDP in Trump's policy can be predicted by Grey Model directly:

GM(1,1) model is one of the most effective GM. By using the data in the referencing website, the original sequence can be written as:

$$X^{(0)} = \{x^{(0)}(1), x^{(0)}(2), x^{(0)}(3), x^{(0)}(4)\} \quad (9)$$

By accumulation, the new sequence can be written as:

$$X^{(1)} = \{x^{(1)}(1), x^{(1)}(2), x^{(1)}(3), x^{(1)}(4)\} \quad (10)$$

The differential equation of $X^{(1)}$ is:

$$\frac{dx^{(1)}}{dt} + a'x^{(1)} = b' \quad (11)$$

The solution for equation (12) is:

$$x^{(1)}(t+1) = \left[x^{(0)}(1) - \frac{b'}{a'}\right]e^{-a't} + \frac{b'}{a'} \quad (12)$$

The coefficients can be calculated using the least square method:

$$\hat{a} = [a' \quad b']^T = (B^T B)^{-1} B^T y_n \quad (13)$$

Finally, the GDP in Trump's policy can be calculated by formula (9)-(13):

$$O_{Trump} = 2.24793 * 10^{13} \quad (14)$$

Obviously, $O_{Biden} > O_{Trump}$, it means that the country will have more GDP under Biden's policy.

Step 3: Model establishment of COVID-19

The number of different types of people shown in Figure 5 is collected.

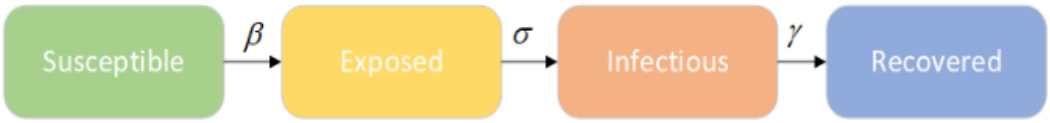

Figure 5. Different Types of People during COVID-19

After that, we use SEIR model to have a better prediction of the number of different types of people. People who are susceptible to infection will experience an incubation period at the beginning, and symptoms will appear after a period. The latent person is transformed into an infected person according to the probability formula α. Modify the differential equation as following:

$$\begin{cases} \frac{dE}{dt} = \frac{r\beta IS}{N} - \alpha E \\ \frac{dS}{dt} = \frac{-r\beta IS}{N} \\ \frac{dI}{dt} = \alpha E - \gamma I \\ \frac{dR}{dt} = \gamma I \end{cases} \quad (15)$$

For Trump, the main policies are nature development and maintaining the policies right now. Obviously, the situation will not be better in a short time.

But for Biden, the policies are changed. Firstly, he wants to improve the proportion of medical insurance and import medicines from foreign countries, which can reduce the impact more effective than Trump's.

The recovery rate of Trump's policy is 0.48, and Biden's is 0.8. In addition, for the number of people who are infected with susceptible people: Trump is 20 but Biden is only 5. The two important factors above are used in the formula (15).

Set the same initial date, and input two different series of factors. Then after 40 days, the number of recovered people is shown in Figure 6.

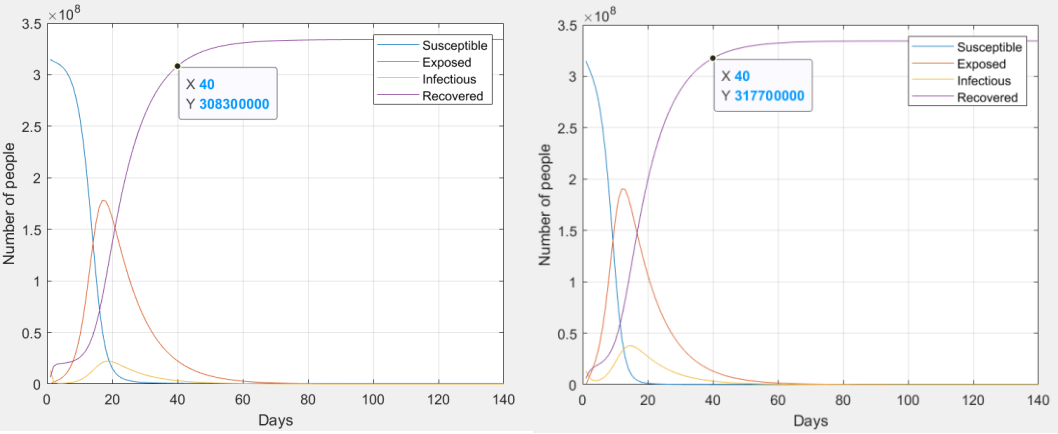

Figure 6. The Number of Recovered People (Biden Left, and Trump Right)

It is reported that the average value of recovery cost is 20292 dollars, and we set the total cost for recovery is Y. The costs are:

$$Y_{Biden} = 6{,}256{,}023{,}600{,}000\ dollars, Y_{Trump} = 6{,}479{,}235{,}600{,}000 \quad (16)$$

And $Y_{Biden} < Y_{Trump}$, it means that the country will save costs on COVID-19 protection and recovery treatment if Biden runs for the president.

Step 4: Comparison and analysis

By direct comparison in both step 2 and step 3, it is obvious that Biden's policies will lead the U.S.'s economic be better in the future. Two main series of comparison proved this conclusion.

To have more details, Biden's policies are more suitable for the middle class. For instance, the policy will give more insurance to citizens which means the middle class will become the widest group in the U.S. Furthermore, Biden will support "made in America" much stronger than Trump, which will increase GDP of the U.S.

All in all, **Biden's policies in economy is better than Trump's** by using the models in question 1. Although the difference between two results is not large, it is obviously proved in two ways with dozens of factors.

4.2 The Model of Question 2

4.2.1 Model Analysis

Step 1: Data collection and process

With the development of China's comprehensive national strength, China's economy is becoming increasingly independent. Among the factors mentioned above, only tax policies, trade policies, and infrastructure such as 5G would influence China's economy. Huawei is one of the largest multinational companies in China. According to Figure 7, American situation is an important influence factor of Huawei, so the possible impact on the leading company can reflect the impact on China's economy.

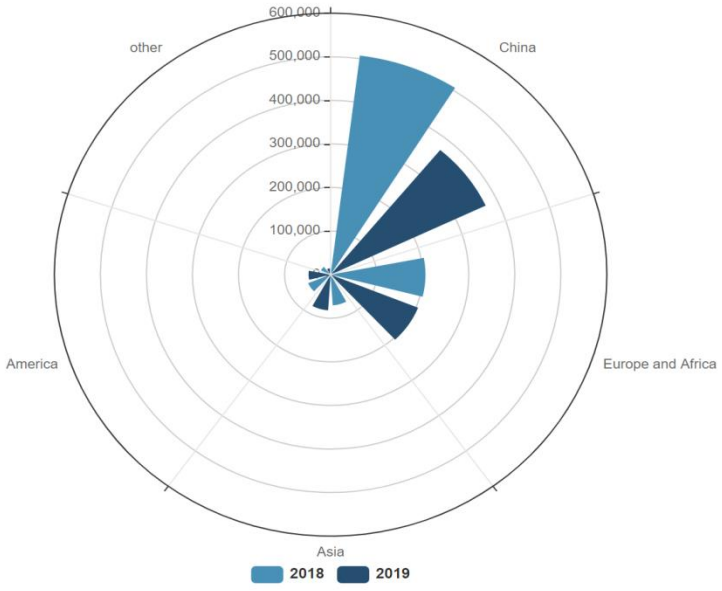

Figure 7. The Rose Figure of Huawei Market

When a large company grows to a large order of magnitude, the rate of growth is more important than the amount of increase.

Figure 8. 2015-2019 Profit of Huawei Technologies Co., Ltd

Figure 9. 2015-2019 Retained Profit of Huawei Technologies Co., Ltd

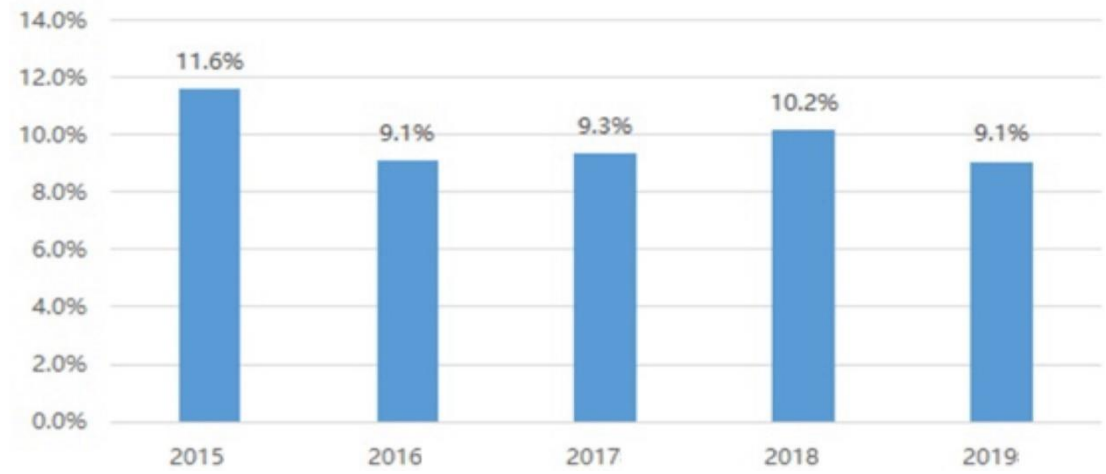

Figure 10. 2015-2019 Profit Margin of Huawei Technologies Co., Ltd

Since the trade war started in 2019, the month-to-month changes of profit has decreased sharply. The profit margin in 2019 is the lowest in five years.

4.2.2 Model Establishment

For technology and trade, Trump claimed to develop 5G equipment and continue the trade war with China. However, Biden claimed to restrict China's economy by deepening alliances with Allies on intellectual property and technology transfer instead of unilateral tariff. Both two candidates plan to strengthen infrastructure. Only Trump plans to punish countries with a trade deficit with the United States on tariff. Therefore, the impacts of Biden's policies in China's economy is better than Trump's policies.

5. Suggestions to China's Economic Countermeasures and Policies

From previous two questions' solving, no matter who the candidate is, our strategic approach to economic policy will not change, but some details may be changed. For Donald Trump's policies, we will take national protection measures in some high-tech areas. But for Biden, the policy in China will still maintain stable. All the data in previous two questions shows that the difference between two candidates is not big, and our policies will not change directly due to several improved policies in the U.S.

At the mid-year Politburo meeting held not long ago, the central government emphasized that "the current economic situation is still complex and severe, with great instability and uncertainty. Many of the problems we encounter are medium and long-term and must be addressed from the perspective of protracted war.

Understand and accelerate the formation of a new development pattern in which the domestic big cycle is the main body, and the domestic and international double cycles promote each other".

The final word of the meeting officially clarified the new ideas for the development of the national economy in the next few years, and "internal circulation" immediately became a hot word and was frequently mentioned by all parties. Market observers generally believe that the internal circulation framework will profoundly affect China's economic development during the "14th Five-Year Plan" period and beyond. Because of this, it is extremely necessary to understand the connotation and extension of the inner loop.

Firstly, for a long time, my country's economic growth has been driven by the "double cycle", that is, the inner and outer cycles complement and promote each other.

From the perspective of the "troika", we can roughly classify consumption and investment as internal circulation and foreign trade as external circulation. The former focuses on domestic demand and the latter focuses on external demand. It is worth noting that external circulation has played a vital role in the rise of China's economy.

Since the reform and opening, my country has been committed to the development of an export-oriented economy, relying on the advantages of domestic abundant and cheap labor, and

continuously participating and integrating into the global division of labor and specialization system. On the one hand, it introduces advanced capital, technology, and management from abroad. To inject momentum into the development of the local economy, on the other hand, it actively expands export markets, gives full play to my country's international competitive advantages in labor-intensive industries and manufacturing, and seizes the major opportunities of economic globalization and international industrial transfer. Practice has proved that this "outer circulation" model has brought huge economic benefits to my country. It not only accelerates the process of industrialization and forms a complete industrial system, but also greatly improves the technical foundation and innovation capabilities of local industries. It has become a veritable "world factory".

Secondly, it is not conducive to domestic industrial upgrading and economic security.

For a long time, due to the comparative advantages in labor-intensive product exports, my country's main export products have been concentrated in light industrial products such as textiles, clothing, footwear, toys, and imports are capital-intensive and technology-intensive products.

The long-term result is the continuous expansion of low-value-added industries. This is not conducive to the optimization and upgrading of my country's domestic industrial structure. It also increases the difficulty for my country to improve its competitive advantage in foreign trade and seize the upper reaches of the global value chain. The "stuck neck" of Western developed countries may even threaten national economic security.

Thirdly, it must be pointed out that consumption and investment alone cannot be "circulated". The transformation and upgrading of the industrial side are needed to cooperate to be effective. The core driving force behind it is technological innovation.

The importance of scientific and technological innovation to economic development is self-evident: by virtue of the inherent multiplier effect, scientific and technological innovation can not only be directly transformed into actual productivity, but also can amplify the productivity of various production factors through the penetration of technology, and significantly improve production efficiency and overall social productivity level, reduce resource energy consumption and improve the ecological environment. In addition, promoting the formation of emerging leading industries with technological innovation can promote the upgrading of industrial structure and the further optimized allocation of resources, thereby bringing the economy into the track of high-quality sustainable development.

Fourthly, of course, internal circulation is by no means the same as "closing the country" or "anti-globalization."

China cannot develop without the world, and the world cannot develop without China. Looking at the world, the practice of almost all countries has repeatedly proved that only by unswervingly opening to the outside world can the economy achieve substantial development. Therefore, we emphasize the "domestic cycle as the main body", but also bring the "domestic and international dual cycle mutual promotion."

From a historical perspective, the interconnection of the world economy, the cooperation and division

of labor and personnel exchanges between countries are irreversible historical trends. Although there will be ups and downs on the way forward, integration is a general trend, especially in the face of risks and challenges, solidarity and cooperation are ultimately the most powerful weapon, and it is the right way to promote the building of a community with a shared future for mankind.

References

Chen, Y., Hu, J., & Wang, B. Analytic hierarchy-based data processing method, involves determining common index range according to clustering process, and calculating data index range and weight rate according to analytic hierarchy process. CN104142983-A.

Jia, R., Guo, S., Xiao, F., Ye, H., Gu, Y., & Liao, G. Multi-linear regression based nonlinear data processing method, involves combining converted explanatory variables, and performing linear regression analysis process on linear regression equation to derive target regression equation. CN109815444-A.

Li, J., & Wang, M. Multiple linear regression modeling method for substation energy consumption benchmark correction, involves introducing corresponding variable into regression equation, and performing regression test on regression equation. CN109753684-A.

Li, Q., & Ding, X. Method for automatically identifying meteorological fronts based on multiple regression, involves removing grid points in constant temperature zone in meteorological element data set, and performing regression equation identifying process. CN111414991-A.

Nino, I., Fernandez, M., De la Sen, M., Alonso-Quesada, S., Nistal, R., Garrido, A., & Ibeas, A. (2019). In *A Comparison Between SEIADR versus SEIR Discrete Epidemic Models*. IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Macao, MACAO, 2019 Dec 15-18; Macao, MACAO, pp. 615-621. https://doi.org/10.1109/IEEM44572.2019.8978906

Okano, Y., & Kumagai, M. Multiple-regression analyzer has regression-model coefficient acquisition/test value calculation unit calculates statistical inspection value based on regression-model coefficient and moment which are updated. JP2015225454-A.

Tsubouchi, T. Multiple regression analysis apparatus for performing multiple regression analysis on data sets, has acquisition unit that acquires integrated multiple regression equation in which results of multiple regression analysis are integrated. US2020111029-A1; JP2020057261-A; CN110990778-A.

Upadhyay, R. K., Kumari, S., & Misra, A. K. (2017). Modeling the virus dynamics in computer network with SVEIR model and nonlinear incident rate. *Journal of Applied Mathematics and Computing*, *54*(1-2), 485-509. https://doi.org/10.1007/s12190-016-1020-0

Wang, X., Zhang, Q., & Yuan, P. Integrated multiple linear regression algorithm, involves learning multiple linear regression algorithm of sub model, where multiple linear regression algorithm is predicted by using leaf section output values of multiple linear regression. CN106909719-A.