

Analysis of Economic Forecast Trend Based on ARIMA method

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Abstract: Based on the import and export trade, this paper collects a large number of policies and related data about the two candidates in recent years, including the import amount of the United States, the export value of the United States, the gross industrial product, the employment rate and other official information, as well as the import and export trade volume of China GDP. Using relevant data to quantitatively analyze the possible impact of election of different candidates on the economy. American future economic analysis model. The principal component analysis method is used to deal with many data such as unemployment rate, employment number, total import and export amount, government revenue and so on. The main influencing components are analyzed and summarized, and the changes of American economy on different time nodes are analyzed based on this. The quadratic curve fitting is used to evaluate the economic impact of different policies on the United States, and the ARIMA prediction model is used to predict the possible impact of different candidates on the United States economy.

1. Introduction

The year 2020 is the year of the US presidential election, with Republican candidate Donald Trump and Democratic candidate Joe Biden competing for the presidency [1]. The election of different candidates will form different strategic patterns of economic and financial development and have a profound impact on the American economy [2]. Based on the understanding that international economy and international politics are closely related, that is, there must be an objective law of interaction between the mode of economic linkage and the distribution of power structure [3]. Therefore, different candidates will have a significant impact on China's economy.

Based on the analysis of the policy tendency of the two candidates in the United States in recent

years and the processing and analysis of trade-related data, this paper establishes a reasonable prediction model, and through SPSS quantitative calculation. On this basis, the principal component analysis and other scientific methods are used to predict the economy and trade of the United States.

2. Principal component analysis

The problem requires the establishment of mathematical models and the use of relevant data to quantitatively analyze the possible impact of election of different candidates on the American economy. This paper mainly covers the impact of employment rate, unemployment rate and total import and export on the United States during Trump and Biden. Given that Biden is still in transition without clear data, and that former US President Barack Obama is a Republican (who publicly supported Biden's political and economic initiatives and personally canvassed him during the election), we use Obama's data trends to predict what will happen after Biden takes office. By SPSS calculation, this paper analyzes the factors affecting the employment population, total import and export, unemployment rate, total export and employment rate during the period of Obama and President Trump, and obtains the highest proportion of the influence on the American economy through principal component analysis-total import and export trade.

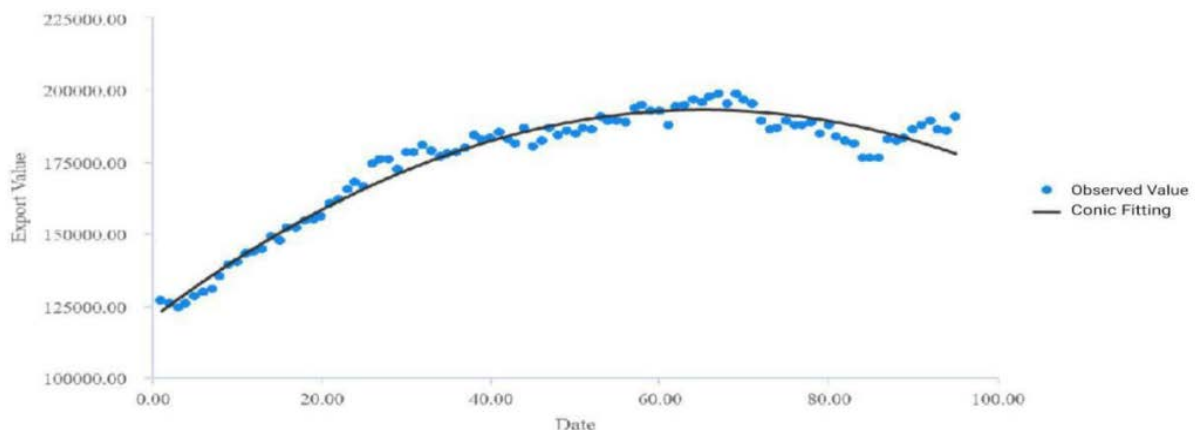


Figure 1: A fitting diagram of the regression curve of import and export trade during

Trump's coming to power.

Data on exports showed a steady upward trend in the first half of Trump's tenure, and since 19 years there has been a marked downward trend due to Trump's incessant "retreat", the "US priority" strategy and the trade war between his largest trading country — China. This trend is expected to continue in the years since Biden took office but must slow.

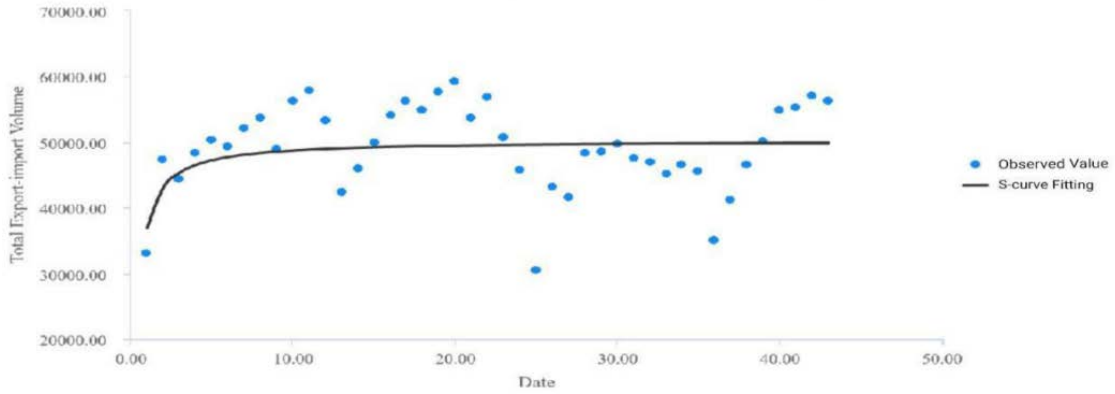


Figure 2: Trump import and export trade total S curve fitting chart.

In the two years before Trump came to power, the total import and export volume of the United States had been growing steadily. After withdrawing from the six-party Iran Nuclear Agreement in May 2018 and the United Nations Human Rights Council in June 2018, the international trade of the United States was hit. After a short twists and turns, and then back on track. The real setback to the total import and export volume of the United States is the challenge of 7 the trade war with China and the new crown pneumonia, which makes the import and export volume of the United States reach the lowest value in 20 years, and finally causes dissatisfaction from all walks of life.

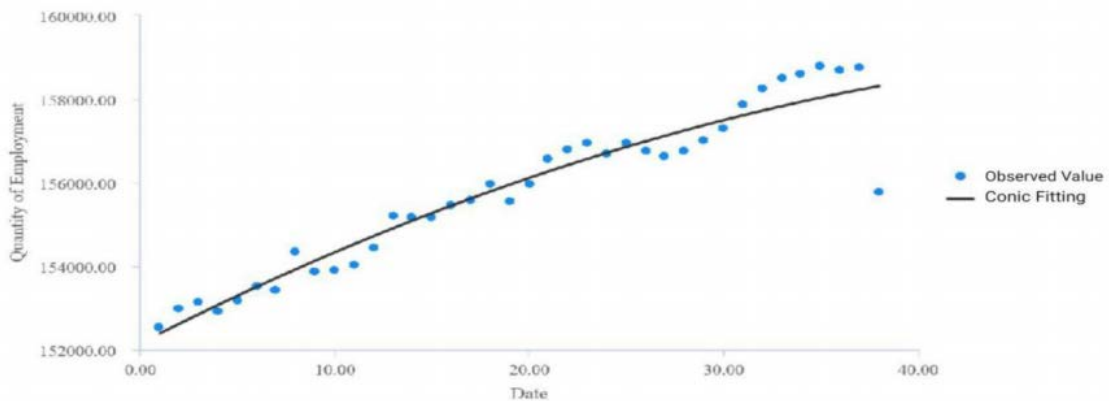


Figure 3: Trump employment return curve fit

Trump's working population has been on the rise, thanks to the tax relief and employment bill signed by President Trump at the end of 17 years, which, according to the Joint Commission on Taxation of the United States Congress, is expected to increase the federal deficit by \$1.456 trillion over the next 10 years and reduce government tax revenue, a clear strong tax cut. However, it should also be noted that the data do not take into account the dynamic effects of tax reform, that is, the growth of jobs generated by tax reform to stimulate the economy. The biggest tax cuts and employment promotion measures in the past 30 years have kept the number of employed people in the United States rising well, creating the highest employment rate and the lowest tax revenue since the beginning of the 21st century. The corresponding decline in the unemployment rate to the lowest value can also be explained.

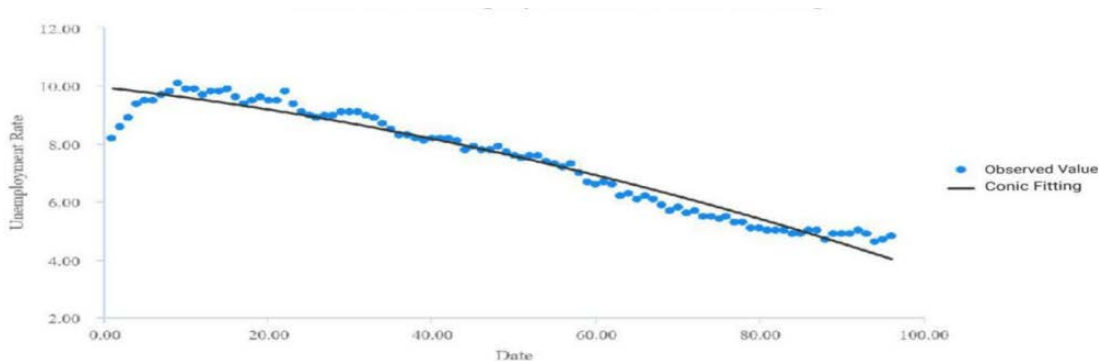


Figure 4: Fit of the Return Curve to the Unemployment Rate under Trump

Biden's campaign data show that Biden will reduce the poor foreign trade, strengthen the exchange of economic and trade policies outside the United States, thereby enhancing the international position of the United States in foreign trade, and further strengthen the leading position of the United States in the world economy.

3. ARIMA forecasting model trend forecasting

The prediction object is arranged in chronological order to form a so-called time series. From the past change law of this group of time series, the possibility of future change, the change trend and the change law are inferred, which is the time series prediction method. Time series model is also a kind of regression model, which is based on the principle that, on the one hand, we can infer the development trend of things by recognizing the continuity of the 13 development of things and using the data of past time series. ARIMA model is one of the methods of time series prediction and analysis. ARIMA (p, d,q), AR is "autoregressive", p is the number of autoregressive terms; MA "sliding average ", q is the sliding average, d the number of differences made to make it a stationary sequence (order). The nonstationary time series shows certain homogeneity after eliminating its local level or trend, that is, some parts of the sequence are very similar to other parts. This kind of non-stationary time series can be converted into stationary time series after differential processing, which is called homogeneous non-stationary time series, in which the number of differences is the order of homogeneity.

Table 1: Total Export-import Volume

AR(1)Model parameters table		
nape	symbol	value
constant term	c	48250.325
AR parameter	α_1	0.617
Qstatistical quantity	Q6(p value)	0.858 (0.354)
	Q12(p value)	3.880 (0.693)
	Q18(p value)	13.735(0.318)
	Q24(p value)	17.079(0.518)
	Q30(p value)	32.769(0.109)
Information guidelines	AIC	703.969
	BIC	708.635
* $p < 0.05$ ** $p < 0.01$		

Table 2: Jobless rate

ARIMA (3, 1, 2)Model parameters table		
Nape	Symbol	Value
constant term	c	-0.031
AR parameter	α_1	0.440
	α_2	-0.485
	α_3	-0.530
MA parameter	β_1	-0.992
	β_2	0.999
Qstatistical quantity	$Q_6(p \text{ value})$	0.042(0.837)
	$Q_{12}(p \text{ value})$	1.145(0.980)
	$Q_{18}(p \text{ value})$	16.839(0.156)
	$Q_{24}(p \text{ value})$	24.346(0.144)
	$Q_{30}(p \text{ value})$	34.430(0.077)
Information guidelines	AIC	-61.447
	BIC	-50.362
* $p < 0.05$ ** $p < 0.01$		

Table 3: Quantity of employment

ARIMA (1, 1, 1)Model parameters table		
nape	symbol	value
constant term	c	173.494
AR parameter	α_1	0.539
MA parameter	β_1	-1.000
Qstatistical quantity	$Q_6(p \text{ value})$	0.012(0.912)
	$Q_{12}(p \text{ value})$	6.069(0.416)

4. Conclusion

With Total Export-import Volume, combination of AIC information criteria (the lower the value, the better), the SPSSAU automatically models and compares multiple potential alternative models, and finally finds out the optimal model as follows: AR (1). The results of Q statistics show that if the p value of the Q6 is greater than 0.1, the original hypothesis can not be rejected at the significant level of 0.1. The residual error of the model is white noise, and the model basically meets the requirements.

With Unemployment Rate, combination of AIC information criteria (the lower the value, the better), the SPSSAU automatically models and compares multiple potential alternative models, and finally finds out the optimal model as follows: ARMA (3,1,2). The results of Q statistics show that if the p value of the Q6 is greater than 0.1, the original hypothesis can not be rejected at the significant level of 0.1. The residual error of the model is white noise, and the model basically meets the requirements.

With Quantity of Employment, combination of AIC information criteria (the lower the value, the better), the SPSSAU automatically models and compares multiple potential alternative models, and finally finds out the optimal model as follows: ARMA (1,1,1). The results of Q statistics show that if the p value of the Q6 is greater than 0.1, the original hypothesis can not be rejected at the significant level of 0.1. The residual error of the model is white noise, and the model basically meets the requirements.

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