Research on the impact of weather on China's market yield

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Abstract: This paper selects the return rate of the Shanghai Composite Index to replace the market index, and uses the temperature index, humidity index, and sunshine duration index to describe the weather. This paper selects data from two databases: one is the data of the Shanghai Composite Index, which is from the Guotaian database, and the selection range is from October 1, 2016 to September 30, 2017. The second is the weather data, which is from the website http://www.wunderground.com, because China's climate can basically be divided into seven regions, the climate of each region is basically the same, according to the information from the Shanghai Stock Exchange to the regional distribution. The size of the exchange members, select representative cities that have a greater impact on the stock market.

1. Introduction

This paper selects the return rate of the Shanghai Composite Index to replace the market index, and uses the temperature index, humidity index, and sunshine duration index to describe the weather. This paper selects data from two databases: one is the data of the Shanghai Composite Index, which is from the Guotaian database, and the selection range is from October 1, 2016 to September 30, 2017. The second is the weather data, which is from the website http://www.wunderground.com, because China's climate can basically be divided into seven regions, the climate of each region is basically the same, according to the information from the Shanghai Stock Exchange to the regional distribution. The size of the members of the exchange selects representative cities that have a greater impact on the stock market. Therefore, this paper selects the representative regions of North China, Northeast China, South China, East China, Central Plains, Southwest China and Northwest China: Beijing, Shenyang, Shenzhen, Shanghai, Wuhan, Chongqing. Daily weather data for Lanzhou from October 1, 2016 to September 30, 2017, including average temperature, average humidity, and duration of sunshine.

Table 1 Main variables

variable	Variable name	Variable construction method
$Retindex_t$	Return on index return	(The closing price of the Shanghai Composite Index in the current period - the closing price of the previous period) / the closing price of the previous period
$Temperature_{i,t}$	City temperature index	(Average temperature in the current period - average temperature in the previous period) / average temperature in the previous period
$Humidity_{i,t}$	City humidity index	(Average humidity in the current period - Average humidity in the previous period) / Average humidity in the previous period
$SunDuration_{i,t}$	City sunshine duration index	(current sunshine duration - last sunshine duration) / last sunshine duration

2. Unit root test

Because the data used in this time is time series data, in order to avoid the phenomenon of

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"pseudo-regression", the unit root test is first performed on the data by Evviews. The test results show that all the variables satisfy the first-order difference by using the ADF test, and the models are stable under the three models of the existing trend of the ADF, the intercept term, the intercept term, and the above. It is a single order. Therefore, as long as the residual sequence of the model satisfies the 0-order single integer, the model is (1,1)-order cointegration, and there is neither "pseudo-regression".

3. Correlation analysis

In this paper, the temperature index and humidity index of seven characteristic cities are correlated with the yield of Shanghai Composite Index respectively. The regression results are as follows:

Table 2 Correlation analysis between the return rate of Shanghai Stock Index and the weather index of 7 cities

Exponential return					
Temperature index		Humidity index		Sunshine duration index	
Beijing	0.125*	Beijing	-0.041	Beijing	-0.018
Shanghai	-0.001	Shanghai	-0.083	Shanghai	-0.129**
Shenzhen	-0.137**	Shenzhen	0.021	Shenzhen	0.009
Wuhan	-0.000	Wuhan	0.002	Wuhan	-0.083
Shenyang	-0.077	Shenyang	-0.087	Shenyang	-0.000
Chongqing	-0.120*	Chongqing	-0.103	Chongqing	-0.054
Lanzhou	-0.105	Lanzhou	-0.072	Lanzhou	-0.149**

4. Least multiplication regression result

Since the weather data used is only one year, and the weather often has abnormal fluctuations, when modeling and parameter estimation of numerical values containing outliers, the influence of abnormal values on the model should be minimized. If the prediction is performed using the standard least squares method, the square value is relatively larger due to the large deviation of the abnormal points. Without suppressing the sum of squares, it will increase the influence of the data with large residuals on the regression line, so that the abnormal point will make the regression line deviate from the real situation, resulting in poor accuracy of the regression line. The least squares criterion can just overcome the least squares above. Disadvantages. The results of LAD estimation with Eviews are as follows.

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.001449	0.000734	1.974103	0.0509
C(2)	-0.000863	0.000951	-0.907043	0.3664
C(3)	0.001592	0.003329	0.478236	0.6334
C(4)	-0.009681	0.009621	-1.006262	0.3165
C(5)	0.000941	0.001433	0.656591	0.5128
C(6)	-0.000161	0.001160	-0.139266	0.8895
C(7)	-0.001529	0.000600	-2.550447	0.0121
C(8)	-0.000586	0.000850	-0.688966	0.4923
C(9)	-0.002589	0.002332	-1.110483	0.2692
C(10)	-0.004784	0.004476	-1.068817	0.2875
C(11)	0.000707	0.007055	0.100257	0.9203
C(12)	-0.000262	0.004282	-0.061067	0.9514
C(13)	-0.001895	0.002455	-0.771841	0.4419
C(14)	-0.002891	0.008764	-0.329864	0.7421
C(15)	-0.000405	0.003901	-0.103796	0.9175
C(16)	0.009654	0.101596	0.095022	0.9245
C(17)	-0.127290	0.299413	-0.425133	0.6716
C(18)	-0.138686	0.092940	-1.492213	0.1385
C(19)	0.116292	0.134700	0.863337	0.3898
C(20)	-0.043557	0.067804	-0.642404	0.5220
C(21)	-0.115981	0.198614	-0.583949	0.5605
C(22)	-0.102800	0.132928	-0.773354	0.4410

Pseudo R-squared	0.126288	Mean dependent var	0.000246
Adjusted R-squared	-0.042041	S.D. dependent var	0.006260
S.E. of regression	0.006460	Objective	0.272956
Quantile dependent var	0.000695	Restr. objective	0.312410
Sparsity	0.014344	Quasi-LR statistic	22.00385
Prob(Quasi-LR stat)	0.399288		

Figure 1 LAD estimation results

The results of the coefficient estimation are counted as follows.

Table 3 Parameter estimation results

parameter	Regression coefficients	parameter	Regression coefficients	parameter	Regression coefficients
Constant	0.001449				
Beijing Temperature Index	-0.000863	Beijing Humidity Index	-0.002589	Beijing Sunshine duration index	0.009654
Shanghai Temperature Index	0.001592	Shanghai Humidity Index	-0.004784	Shanghai Sunshine duration index	-0.127290
Shenzhen Temperature Index	-0.009681	Shenzhen Humidity Index	0.000707	Shenzhen Sunshine duration index	-0.138686
Wuhan Temperature Index	0.000941	Wuhan Humidity Index	-0.000262	Wuhan Sunshine duration index	0.116292
Shenyang Temperature Index	-0.000161	Shenyang Humidity Index	-0.001895	Shenyang Sunshine duration index	-0.043557
Chongqing Temperature Index	-0.001529	Chongqing Humidity Index	-0.002891	Chongqing Sunshine duration index	-0.115981
Lanzhou Temperature Index	-0.000586	Lanzhou Humidity Index	-0.000405	Lanzhou Sunshine duration index	-0.102800

Then the ADF test is performed on the residual sequence, and it is found that the three models are consistent, that is, the residual sequence is 0-order single integer, and the model is (1,1)-order cointegration, so there is no pseudo-regression problem.

Therefore, from an empirical point of view, China's market rate of return is indeed related to weather conditions.

5. Conclusion

The data of this paper is derived from 12 years' data of 22 provinces and cities from 2004 to 2015, including China statistical yearbook, China financial statistical yearbook, China energy statistical yearbook and Wind database. The purpose of this paper is to study the internal correlation between carbon control, financial development and technological innovation. In this paper, in order to do the panel unit root tests, panel cointegration test, VAR analysis and causal analysis (DAG), regulation, financial development on carbon and the transmission path analysis of technology innovation, now have the following main conclusions: (1) by the results of unit root test of panel data for carbon controls, financial development and technology innovation two long-term stable equilibrium relationship between the two. (2) carbon control is introduced to the development of financial development mainly through the policy effect, and carbon emission reduction constraint can also guide the development direction of financial institutions through the government making some policies, which has a positive effect on financial development, and is significant at the 1% statistical level, indicating that carbon emission reduction constraint has a promoting effect on financial development. (3) carbon control can lead to technological innovation development through indirect effects. Carbon control first promotes the development of financial institutions, and then promotes technological innovation of enterprises through the development of financial institutions, all of which are statistically significant at the level of 1%. Financial development has a significant positive effect on R&D investment, and R&D investment has a significant positive effect on scientific research results. (4) the direct effect of carbon control also leads to technological innovation of enterprises. The degree of carbon emission reduction constraint has a positive effect

on technological innovation, and is significant at the 1% statistical level, indicating that carbon emission reduction binding has a promoting effect on technological innovation of enterprises. In conclusion, the empirical results show that carbon control policy directly promotes technological innovation in various ways. Carbon control intensity has a direct positive effect on financial development, and financial development has a direct positive effect on technological innovation. Carbon control policies directly contribute to technological innovation in various ways.

The empirical results of the study not only help to theoretically understand the internal influencing mechanism between carbon regulation, financial development and technological innovation, but also help relevant government departments to formulate and implement relevant policies and measures. First of all, the intensity of carbon control to play a direct role in promoting financial development, the future direction for China's financial institutions also play a role in guiding, results demonstrate the validity of the carbon control policies of our government to get a good play, can continue by promoting the development of financial institutions, financial institutions to give full play to the government plays a important role in the mediation, the financial institutions to build Bridges between the government and enterprises, the government for financial institutions to create a good environment for development, promote the financial development, also want to strengthen the supervision of financial institutions and maintain the stability of financial markets, so as to better promote economic development; Financial development plays an promoting role in technology innovation, the enterprise technological innovation needs a large number of long-term financing, financial institutions to provide financing support and direction guide, show that in various areas of our country should actively promote the development of financial institutions, in order to boost the development of low-carbon economy, bank credit need for environmental protection projects, strengthen the role of green credit, through the support of financial institutions, to promote industrial institutions accelerating ascend, foreign investment project is in line with the requirements of environmental protection to be the key evaluation, actively introduce foreign environmental technology projects, never play a role of technology spillover of foreign investment; Carbon controls to play a direct role in promoting technological innovation, the strengthening of carbon control can increase the cost of enterprise, enterprise in order to increase profits, must increase investment in technology innovation, suggests that provinces in our country can implement low-carbon economy development goal, actively formulate relevant policies to reduce emissions, such as energy price controls, the implementation of a carbon tax, strengthen the enforcement of carbon regulation.

Creating a competitive atmosphere and other indirect ways to promote other members to improve efficiency

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