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The Introduction on Business Climate Survey in China

Shouguo Hou
National Bureau of Statistics of China

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Department of Service Statistics,

National Bureau of Statistics of China

Summary

This paper briefly introduces the background of Business Climate Survey in China, the calculation methods of Business Climate Index and an empirical analysis of Business Climate Index and economic growth.

A. Background

Business Climate Survey is collecting information on the status of the business from the enterpriser using the survey technology of public opinion. This information is mostly qualitative, which is usually the judgment of the operating conditions from the enterpriser and the expectation to the future operation. In order to grasp the economic operation and predict the trend of economic development , Summing up the microcosmic information from the businesses, then getting a description of the macroeconomic situation.

Since enterprisers do not need to have accurate accounting and statistical records when they answer these questions, this kind of

information is more accessible to obtain than the traditional quantitative data, and can be gotten faster. In addition, the data processing steps and calculations of the business climate survey can transfer the qualitative information of individual enterprises to the corresponding figures of every industry, which is relatively simple. This method of quick and easy data processing makes the business climate survey as an important and useful tool for analyzing short-term economy.

In order to reflect the status of macro-economy operation and enterprise production timely and accurately, National Bureau of Statistics of China(NBS) compiles Business Climate Index according to the judgment and expectation on the operating conditions and industrial situations from the enterprisers, and provides reference and advice for the party and government leaders at all levels to have macro-management & decision-making and business operation.

In 1994, NBS set up the system of business climate survey, which is carried out quarterly, the surveying time is March, June, September and December every year. According to the national industry standards, NBS adopts the method including emphasis and sampling survey to select about 20000 enterprises as the samples from different industries, different sizes and different registration types.

B. The Calculation Method of Business Climate Index

a、The Degree of Business Climate is Described by the Balance

The balance is described as the difference between the percent of forward answers and the one of backward answers.

The survey result of the degree of business climate is described by the balance, that is, the difference between the percent of the enterprises which select the answer "optimism" and the one of the enterprises which select the answer "no optimism". This kind of changing index can be used to compare different economic cycle, compare the trends over time and compare different indexes.

For the survey questions of three options, the balance is calculated as follows.

Balance=（"optimism"）-（"no optimism"）

In the formula, （"optimism"）+（"constant"）+（"no optimism"）=100

（"optimism"）meaning the percent of the answer "optimism"

（"constant"）meaning the percent of the answer "constant"

（"no optimism"）meaning the percent of the answer "no optimism"

b、The Weighted Calculation of Business Climate Index

The basic formula for calculating climate index:

Climate index=$\sum R_i W_i - \sum D_i W_i + 100$

In this formula, Ri means the proportion of the enterprisers whose answer is "optimism", Di means the proportion of the enterprisers whose answer is "no optimism", Wi is the weight after comprehensively measuring the natural property or economic property of the enterprise.

Business Climate Index is calculated using the method of two-weighted model.

(i) Calculating the Business Climate Index of every industry by the weight of prime operating revenue.

According to the method of selecting samples of business climate survey, in the process of calculating Business Climate Index for every industry, NBS adopts different methods for different scale enterprises. For large-scale enterprises, which are all select as samples, so NBS uses prime operating revenue as the weight when sum up the options of the questionnaire. For middle-scale and small-scale enterprises, which are selected by the sampling method of Probability Proportionate to Size(PPS) that has taken into account the size of enterprises, so NBS sums up the options of the questionnaire without the weight.

(ii) Weighted by the Proportion of Industrial Value-added

On the basis of Business Climate Index of every industry, NBS weights again by the proportion of value-added of every industry, then gets an integrated climate index. The integrated climate index of business

climate survey is an indicator which reflects generally the economic trend and future development for the survey population.

c、The Range of Business Climate Index

The Business Climate Index is expressed by the positive value, whose range is the scope from 0 to 200, and 100 is the critical value. When the Business Climate Index is in the scope from 100 to 200, it indicates that enterprisers judge the economic situation is in a booming range, which means the economic status tending to increase or improve. When the Business Climate Index is equal to 100, which indicates that enterprisers judge the economic situation is at the critical point between the booming range and the recession range, and the economic status keeps constant. When the Business Climate Index is in the scope from 0 to 100, it indicates that enterprisers judge the economic situation is in a recession range, which means the economic status tending to decline or worsen.
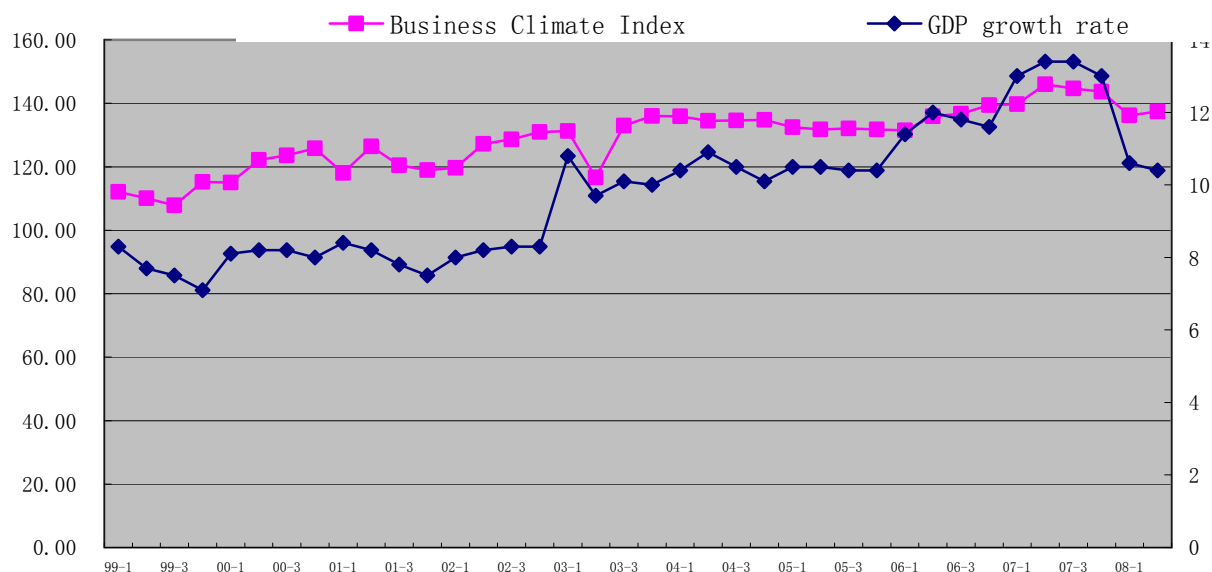
C. The Empirical Analysis of Business Climate Index and Economic Growth

NOTES: The following research is done by myself, the result only represents my personal views, not NBS'.

The period of data：from the first quarter in 1999 to the second quarter in 2008.

a. The Trend Analysis of Business Climate Index and GDP Growth

Rate

figure 1 the trend of Business Climate Index and GDP growth rate

The Overall Trend

Figure 1 shows that the basic trend of Business Climate Index and GDP growth rate is similar, but the route of Business Climate Index is smoother than the one of GDP growth rate. Figure 1 indicates that enterprisers' judgment on the operation of enterprises is basically consistent with the overall trend of national economy growth.

b. The Correlation of Business Climate Index and GDP Growth Rate

The correlation of Business Climate Index and GDP growth rate is up to 0.88, which indicates the higher correlation of the two indexes.

c. Stability Test

We have a unit root test for the Business Climate Index and GDP growth rate. The result indicates that the ADF statistical value of the two time series are both greater than the critical value at 10% significance level(see table 1), So they are non-stationary time series.

Table 1 Unit Root Test Result

variables	ADF statistical value	ADF critical value at different significance level		
		10%	5%	1%
GDP growth rate	-1.1279	-2.6105	-2.9446	-3.6228
Business Climate Index	-2.0149	-2.6105	-2.9446	-3.6228
∇ GDP growth rate	-7.8258	-2.6118	-2.9472	-3.6289
∇ Business Climate Index	-7.9844	-2.6118	-2.9472	-3.6289

We have the first difference for the two time series, then get the other two time series of ∇ GDP growth rate and ∇ Business Climate Index. Then we have a unit root test on the two news time series, which indicates the ADF statistical value is much smaller than the critical value at 1% significance level(see table 1). So ∇ GDP growth rate and ∇ Business Climate Index are both significantly stationary time series, that is , GDP growth rate and Business Climate Index are first-difference stationary time series.

d. Cointegration Test and Error Correction Model

The basic form of Error Correction Model(ECM) is brought forward by Davidson, Hendry, Srba and Yeo in 1978, which is called DHSY model.

For the ADL（1,1） model

$$y_t = \beta_0 + \beta_1 x_t + \beta_2 y_{t-1} + \beta_3 x_{t-1} + \varepsilon_t \qquad (1)$$

After moving the variables, we can obtain

$$\nabla y_t = \beta_0 + \beta_1 \nabla x_t + (\beta_2 - 1)\left(y - \frac{\beta_1 + \beta_3}{1 - \beta_2} x \right)_{t-1} + \varepsilon_t \qquad (2)$$

Formula (2) is ECM, $y - \dfrac{\beta_1 + \beta_3}{1 - \beta_2} x$ is the term of error correction and denoted by ecm, which reflects the deviating degree of the variables from long-term equilibrium in the short-term fluctuations. In general, $|\beta_2| < 1$, which reflects the effective controlling of equilibrium error to y_t.

e. Cointegration Test and Error Correction Model of GDP Growth Rate and Business Climate Index

The two time series of GDP growth rate and Business Climate Index are both first-difference stationary. Now we test whether the cointegration exists between them. We take GDP growth rate as the dependent variable, and Business Climate Index as the independent variable, then establish the regression equation whose residual series is e. In the end we have a unit root test on e, see table 2. The

statistical value of the test is -3.6374,which is smaller than the

critical value at 1% significance level. So the residual sequence e is

stationary, which illustrates that there is cointegration relationship

between GDP growth rate and Business Climate Index. We can create

the error correction model between them.

Table 2 The ADF Test Result of Residual Sequence e

ADF Test Statistic	-3.6374	1% Critical Value*	-3.6228
		5% Critical Value	-2.9446
		10% Critical Value	-2.6105

The variables of ∇GDP growth rate(Ggr), ∇Business Climate

Index(BCI) and e are taken into the formula (2),and we use the

least squares method to get the following expression.

$$\nabla Ggr_t=0.0036+0.0867\nabla BCI_t\text{-}0.3108\,e_{t-1} \qquad （3）$$

The goodness of fit of regression equation (3) is equal to 0.6692,

F=33.38，DW=2.127，D_L=1.35<DW<4-D_U=4-1.59=2.41，the value

of DW falls into the scope of non-autocorrelation through the test. So

the equation on the whole is desirable. Here, $e_{t-1}=Ggr_{t-1}-\alpha-\beta BCI_{t-1}$,

taking them into the formula (3),and get the following equation.

$$Ggr_t=-2.4275+0.6892Ggr_{t-1}+0.0867BCI_t-0.0465BCI_{t-1} \qquad （4）$$

f. Using Business Climate Index to predict GDP Growth Rate

We take the data from the second quarter in 1999 into the

formula (4), then obtain the predictable value of GDP growth rate

from the third quarter in 1999. And we get the relative error by comparing the predictable value with the actual value. The descriptive statistics of the relative error is as table 3.

Table 3 The Descriptive Statistics of the Relative Error

statistical indicators	the corresponding value
Mean	2.58%
Median	1.94%
Minimum	0.1%
Max	7.7%
upper limit of confidence interval (95%)	3.28%
lower limit of confidence interval (95%)	1.89%

As can be seen from Table 3, the statistical indicators of the relative error are relatively small, which are in an acceptable scope. So we can use Business Climate Index to forecast GDP growth rate.

D. The Main Conclusions

a. GDP growth rate has the character of autoregressive. That is, current GDP growth rate is positively related to the one of the last period, which explains the overall upward trend of GDP growth rate in recent years.

b. There is a long-term equilibrium relationship between GDP growth rate and Business Climate Index. When short-term deviation occurs, the term of error correction can adjust it to achieve the

long-rum equilibrium.

c. The opinions of enterprisers on economic trend are comparatively accurate and predictable, which is based on the actual operation of enterprises. So it can be used as a reference of economy early warning.

d. Business Climate Index can be used to predict GDP growth rate. According to the error correction model(ECM), we can use Business Climate Index to predict GDP growth rate, which is available because the predictable error is in the acceptable range. Moreover, the released time of Business Climate Index is about half a month earlier than the one of GDP growth rate, so the time is also available.