

# Application Analysis of Short-Term Statistical Forecast of Macroeconomic Data

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**Abstract:** with the Rapid Development of Economy and Information Technology, the Construction of Macroeconomic Monitoring and Forecasting System is Becoming More and More Important. Various Forecasting Methods, Including Econometric Methods, Input-Output Analysis Methods, System Dynamics Methods and Optimization Methods, Have Been Widely Used in National Economic Analysis and Forecasting. the Impact of Data Defects on Evaluation and Prediction Results Cannot Be Effectively Solved Only by Improving Methods and Models. Judging the Quality of Economic Growth by Scientific and Reasonable Evaluation and Prediction Methods Can Provide Support for Policy Decisions. Evaluating and Predicting the Trend of Economic Growth Quality Can Provide Reference and Basis for Government Decision-Making, and is the Premise and Basis for Ensuring the Steady Improvement of Economic Growth Quality. This Paper Will Mainly Study How to Combine Internet Data with Statistical Data, Give Full Play to the Respective Advantages of the Two Types of Data, and Achieve Accurate Evaluation and Short-Term Forecast of Economic Growth Quality.

## 1. Introduction

With the Increasingly Close Combination of Modern Western Economics and Mathematics, Economic Statistics, Quantitative Economics and Other Disciplines Have Developed Rapidly, and Quantitative Analysis Methods and Ideas Have Gradually Become the Mainstream of Macroeconomic Research [1]. after Long-Term Development, Macroeconomic Prediction Research Has Made Great Progress in Establishing and Using Quantitative Prediction Models and Qualitative Prediction Models [2]. Judging the Quality of Economic Growth by Scientific and Reasonable Evaluation and Prediction Methods Can Provide Support for Policy Decisions. in Order to Meet the Needs of Economic Development, Provincial Development and Reform Committees, Government Decision-Making Departments and Relevant Units Have Established Macroeconomic Monitoring and Forecasting Systems with Positive Effects in Real Life to Varying Degrees [3]. If We Can Accurately Evaluate and Predict the Changes in the Quality of Economic Growth, Timely and Appropriate Policy Adjustments, Rational Allocation of Resources, and Control of the Direction of Economic Operations, We Can Avoid Falling into the Quagmire of Low-Quality Development [4]. Various Forecasting Methods, Including Econometric Methods, Input-Output Analysis Methods, System Dynamics Methods and Optimization Methods, Have Been Widely Used in National Economic Analysis and Prediction [5]. the Short-Term Forecast is Relatively Easy to Make Macro-Predictions At Any Time. the Relative Credibility is Very High, and the Practicality of Short-Term Forecasting is Stronger Than the Long-Term Forecast.

In the Past Few Decades, China's Economic Growth Has Shown Obvious Characteristics of Inconsistent Growth in Quantity and Quality, and the Problem of Economic Growth Quality Lags Behind the Number of Economic Growth [6]. Finding out Existing Relationships and Rules from Macroeconomic Data to Make Corresponding Predictions and Decisions Has Become an Important Means for Provinces, Municipalities and Regions to Gain Competitive Advantage in the Market Economy [7]. Because of the Impact of the Defects of the Data on the Evaluation and Prediction Results, It is Impossible to Effectively Solve the Problem by Simply Relying on Improved Methods and Models. It is Very Difficult to Make Macroeconomic Forecasts and Even Predict an Economic Indicator. It is Very Difficult to Use a Model to Describe Its Change Law or Use an Algorithm to Calculate Better Prediction Values [8]. Although Macroeconomic Monitoring and Forecasting Has

Already Experienced Relatively Large Development in China, There Are Still Some Problems in the Process of Macroeconomic Monitoring and Forecasting, Especially the Heterogeneous and Decentralized Problems of Macroeconomic Data, Which Need to Be Further Integrated and Improved [9]. This Paper Will Mainly Study How to Combine Internet Data with Statistical Data, Give Full Play to the Respective Advantages of the Two Types of Data, Achieve Accurate Evaluation and Prediction of Economic Growth Quality, and Make Up for the Shortcomings in the Existing Research.

## **2. Short-Term Statistical Forecasts Based on Statistical and Econometric Models**

Macroeconomic Forecasting Model System is a Set of Dynamic Recursive Model Series with Input-Output Model and Artificial Neural Network Model as the Core, Combined with Optimization Technology. Price Level is Also an Important Aspect of Monitoring Macro-Economic Operation. the Main Indicators Include Consumer Price Level, Ex-Factory Price Index of Industrial Producers, Purchase Price Index, Real Estate Price Index, Etc. Data Integration Means That Different Quality and Different Types of Data in Heterogeneous Information Management Systems Are Logically or Physically Purposefully Gathered Together, So That the Representation and Operation of Data Can Be Unified. from the Demand side, Consumption Mainly Looks At Retail Sales of Consumer Goods, Consumer Spending, Etc. Its Leading Indicators Include Employment, Residents' Income, Consumer Confidence, Etc. [10]. in the Past, Most of the Input-Output Optimization Models Were Single-Objective Optimization Models, Focusing on the Development Scale and Economic Structure in National Economic Planning and Forecasting. the Evaluation of the Quality of Economic Growth is Not the Same as the Measurement of the Quantity of Economic Growth. the Quantity Can Be Directly Obtained through Statistical Investigation and Other Methods, While the Quality Involves the Problem of Value Judgment. the Data Integration Method Based on Data Warehouse is to Copy Data from Heterogeneous Database Management Systems and Store Them in Data Warehouse, Eliminating the Differences and Unstable Factors of Heterogeneous Data and Providing Users with a Centralized and Unified Query Service Platform.

The Evaluation of Economic Quality is to Judge the Prospect, Result and Sustainability of Economic Growth and is a Comprehensive Judgment of Economic Growth. So as to Discover Problems in Economic Growth in Time for Policy Adjustment and Improvement. the Synthesis of Leading Indexes Generally Selects Leading Indexes Such as Stock Market, Contract Order, License, New Employment and Money Supply. Growth Efficiency Shows the Efficiency of Transforming Various Input Factors into Output, That is, the Amount of Input and Output of the Same Factors. as the Current Economic Model Requires Timely and Reasonable Prediction of the Overall Development Trend, It Requires Government Departments and Research Institutions to Build More Prediction Models. through the Collection of Internet Public Opinion Index Data, It Can Give Full Play to Its Advantages Such as Large Amount of Data, Easy Collection, Timeliness and So on, But It is Also Necessary to Carry out Data Competition and Selection for Such a Large Amount of Collected Data [11]. Each Component of the Model Respectively Reflects the Planned Objectives and Tasks as Well as the Constraints and Measures to Realize This Task.

Heterogeneous Data Sources Are Effectively Integrated through Data Warehouse, and Finally the Problem of Heterogeneity and Dispersion between Data Sources is Solved. However, Because the National Economic System is a Complex Dynamic System, the Pursuit of a Single Goal without Considering Other Goals May Lead to Abnormal Social and Economic Development. Comprehensive Economic Strength is All the Economic Strength and Development Potential, as Well as Economic Status and Influence in the Region. If Only One of the Variables is Considered to Replace the Original Two Variables in Order to Reduce the Dimension, It is Obviously Not Ideal. Because No Matter Which Variable is Considered to Be Retained, a Large Amount of Information Contained in Another Variable Will Be Lost. Each Group after Grouping Represents a Structure Respectively, But This Structure is Represented by an Unobservable Invisible Comprehensive Variable. Figure 1 Shows the Multivariate Analysis Process in Financial Analysis and Management.

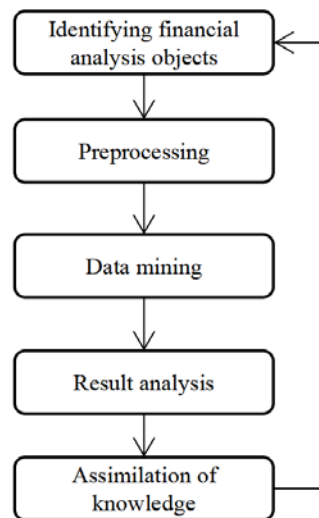


Fig.1 Multivariate Analysis Process in Financial Analysis and Management

### 3. Application of Short-Term Statistical Forecast of Macroeconomic Data

The index selection of economic growth quality should be reasonable to enhance the credibility of the evaluation results of growth quality. The principle of availability means that the time series data of the selected basic indicators should be completely available, and indicators that cannot obtain data should not be added to the indicator system. When selecting basic evaluation indicators, try to prevent overlapping of indicators examining the same content. The establishment of the index system should be systematic and a multi-dimensional evaluation system should be established. The indexes must be independent and unrelated to each other. The advantage of network big data lies in its low acquisition cost and timeliness, which can make up for the shortage of statistics and survey sampling. The design of economic growth quality evaluation index system and the selection of evaluation indicators must be based on the specific connotation and theoretical analysis of the quality of economic growth. The construction of the indicator system should conform to the norms to ensure reliable data sources. The econometric model of short-term statistical forecasting of macroeconomic data involves a large number of directions in the use of data, and the information obtained is relatively complete. Provide users with a unified and transparent data usage platform, which can speed up the query and ensure the quality of the data.

Due to the complexity and diversity of economic indicators, the following principles should be adopted for each indicator selection: the selected indicators can objectively reflect the main aspects of the economy of each province and city. The regional differences of indicators should be obvious, and the indicators are basically independent of each other. At the same time, the new variables are independent, and the user can decide whether to perform distribution statistics. Convert multiple metrics into one or more composite metrics, and these small metrics can contain most of the information from multiple metrics. Its purpose is to simplify the statistics and reveal the relationships between the variables. Based on the matrix with the original indicator data, the internal structure of the matrix is studied. In turn, look for independent new factors that dominate the structure to locate specific factors that can affect the variables. In the experiment, the data was divided into training set and test set by two different methods to obtain the classification experiment results. The training set and test set capacity of the data are shown in Table 1.

Table 1 Capacity of Each Test Set and Training Set in the First Set of Experiments

Dataset category	Test set (strip)	Training set (strip)
1	7644	3269
2	10252	2846
3	12279	3987
4	16792	4631
5	14874	5422

Based on the generation of frequent itemsets, we study the association rules between the items. At this stage, if the rule is:

$$x_1^{(0)}(k) + az_1^{(1)}(k) = \sum_{i=2}^N b_i x_i^{(1)}(k \in K, K = 1, 2, \dots, n, \dots) \quad (1)$$

Rule confidence:

$$E_{Rx}(l) = E_{Rx-elec}(l) = lE_{elec} \quad (2)$$

In a transactional database, an item set is a collection of items that appear together in some transactions. And in the item set, the frequency of occurrence of other items can be inferred by the frequency of occurrence of certain items:

$$W = \alpha(\beta(\frac{E_{i-current}^2}{E_{i-init}^2}) + (1 - \beta)\frac{d_i}{d_{max}}) \quad (3)$$

The association rules are like:

$$E[d_{toCH}^2] = \frac{1}{2\pi} \frac{M_1 * M_2}{k} \quad (4)$$

Measure the significance of this rule by comparing the lift values of different rules and determine the size of the meaning of the rule. Its calculation formula is as follows:

$$E_{non-CH} = lE_{elec} + l\xi_{fs} \frac{1}{2\pi} \frac{M_1 M_2}{k} \quad (5)$$

Statistical prediction based on single statistical index or composite leading index has the characteristics of easy operation, but there are also obvious problems. The selection of key words for economic growth quality prediction must be scientific and reasonable, and the boundaries between basic key words in different dimensions should be clear to ensure that the characteristics and conditions of different aspects of economic growth quality can be accurately reflected. In order to carry out reverse mapping, the mapping model designed must be easy to read and manipulate, and various constraints of relational database data can be well expressed. From the theoretical analysis of economic structure, the economic structure needs to examine industrial structure, investment and consumption structure, financial structure, balance of payments structure, urban and rural dual structure and other aspects [12]. Compared with the data standard required for long-term prediction, the data required for short-term prediction should be more complete and more comparable. The data is the basis for the reliability of short-term statistical prediction of the whole macro economy and the top priority of the whole macro control. Therefore, the authenticity, timeliness and integrity of data must be the key points that the entire data collection department and the prediction department need to pay attention to. If multiple rules match the facts at the same time, the one with the highest priority will be triggered first. New facts may be generated when a regular action is triggered, and the working memory will add the new facts.

#### 4. Conclusion

With the development trend of global economic integration in today's society, China's economy is combined with the world economy, and the development trend of the economy requires relevant staff to make more systematic and authoritative predictions. Macroeconomic data integration itself is a huge and complicated system engineering, involving many technologies and related knowledge. Internet data often contain other information that traditional statistical survey data do not have, and Internet data are updated in real time, with better timeliness than statistical data. Based on the research on the integration of heterogeneous macroeconomic data encountered in the construction of the macroeconomic monitoring and forecasting platform, this paper analyzes the current situation

of heterogeneous data in macroeconomic departments and the problems faced in the integration of heterogeneous data. In the process of statistics or econometric modeling, we should not only use the conventional statistical data, but also make full use of the advantages of prosperity survey data. For the macroeconomic monitoring and forecasting system, the next step is to increase the coverage of integrated information as much as possible to make the macroeconomic information more complete. The evaluation and prediction of future growth quality should consider Internet data as a new data source to improve the timeliness and accuracy of economic growth quality evaluation and prediction.

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