

Research on Economic Growth Factors of Support Vector Machine Algorithm Based on Intelligent Network Security

Yanxin Zhang

Sichuan Vocational College of Finance and Economics, Chengdu, Sichuan, China
Corresponding author

Abstract:

Economic fluctuations affect financial development and even national development trends. A variety of forecasting methods are generally used to demonstrate the rationality and scientificity of economic development guidelines and policies. Among various forecasting techniques, the combination of *Error Correction Model* (ECM) and *Support Vector Machine* (SVM) is the most representative and effective. This paper introduces the basic principles and application methods of ECM and support vector machine (SVM) methods, applies this forecasting technology to the research of financial development and economic fluctuation factors, and finally explores the factors affecting economic growth.

Keywords: Economic forecasting; ECM; Support vector machine; Financial development; Network Security

1 INTRODUCTION

Demand-based finance has gradually become dominant nowadays. Groundbreaking research began with Goldsmith. In 1969, he put forward the initial concept of financial development from the perspective of financial structure for the first time, and pointed out that financial development is extremely important to economic growth. In 1973, McKinnon and Shaw analyzed the economic development of developing countries, created a modern theory of financial development, thus making up for the neglect of currency in the previous economic growth theories. And the lack of financial factors. Finance and economy influence and interact with each other in the supply-demand relationship of quantitative financial resources and qualitative financial resources.

The financial market and financial intermediaries jointly explain the future economic growth, but the financial functions provided by the financial system have different comparative advantages. Whether the financial system promotes economic growth depends on the adaptation efficiency of the financial system and the real economy [1], in different developments Under the conditions of different stages and national conditions, only a financial structure suitable for economic development can promote economic growth. The financial system promotes economic development through the realization of its functions. According to Levin's definition of financial system functions, the financial system promotes economic development through the following functions: producing information, evaluating and screening valuable investment projects; supervising enterprises and imposing corporate governance, Diversify risks, pool savings and promote the fluidization of savings; promote the exchange of products and services [2].

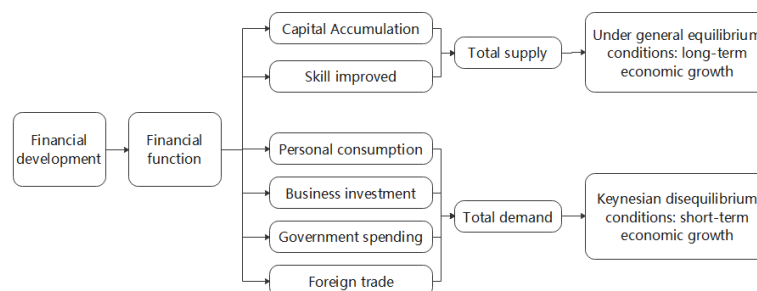


Figure 1 The role of financial development

2 THE INDICATORS OF FINANCIAL DEVELOPMENT

2.1 Financial intermediary development indicator system

The financial development level indicator is also called financial depth, which refers to the comparison between the formal financial system and economic activities. This type of indicator reflects the monetization degree.

There are three levels [3], the first one is *Currency depth*, it is the depth of money in the narrow sense, that is M/GDP , which reflects the function of money as a payment intermediary, and its value depends on changes in the total social transaction volume. As the level of financial transaction technology improves, the index value will generally decrease, but in developing countries, due to the expansion of the transaction volume due to social and economic development, the index shows a clear upward trend. The second is the depth of broad money, namely M/GDP , which reflects the saving function. It is sensitive to the degree of financial deepening. The second is *Overall financial depth*, it is the ratio of liquid liabilities to GDP, it can reflect the process of economic monetization sensitively. The third is *Non-monetary financial depth*, it is represented by $(M-M)/GDP$. The quasi-liquidity index eliminates the monetary part of the financial scale and can more accurately reflect the scale of financial intermediary.

2.2 The development index system of the securities market

In addition to considering the indicator system of financial development from the perspective of financial intermediaries, you can also start from the perspective of the financial market. The construction of the securities market development indicator system is based on this perspective, including securities market scale indicators, securities market efficiency indicators, and securities market integration. Institutional indicators for the development of the securities market.

Table 1 Indicator names and codes

Indicator name	Corresponding code
Economic growth indicators	GDP
Financial development scale	FIR
Depth of financial development	M
Banking system efficiency	PRI
Development of other financial institutions	INSU
Degree of securitization	STOCK

3 THE ROLE OF FINANCIAL DEVELOPMENT AND ECONOMIC DEVELOPMENT

3.1 The relationship between financial development and economic development

This equilibrium growth state of the economy can be represented in Figure 4. Under the circumstance of certain capital allocation efficiency, the real capital stock and structure of an economy at a certain stage of development form a specific demand and qualitative finance for quantitative financial development, it determined by the ratio of financial capital to physical capital k . The specific role of function is the basic determinative role of the economic system on financial development. If the financial capital of the financial system can match the real capital in a desirable ratio, the economy can reach a stable and balanced growth state.

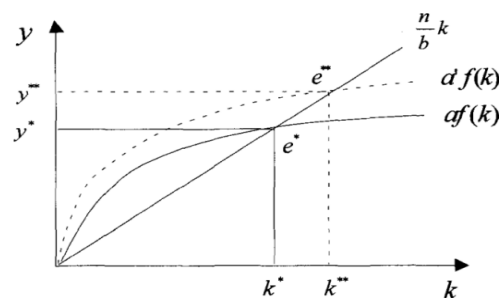


Figure 2 The relationship between financial development and balanced economic growth

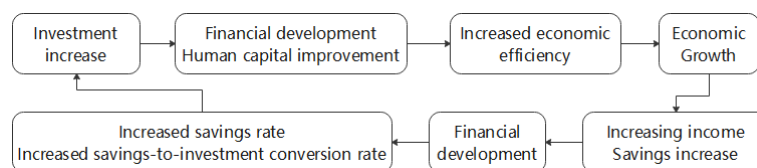


Figure 3 Growth correlation mechanism diagram

3.2 The effect of financial development on economic development

Financial development has a growth effect on economic development. The financial market and intermediaries explain the future economic growth together. However, the financial functions provided by the financial system have different comparative advantages. Whether the financial system promotes economic growth depends on the adaptation efficiency of the financial system and the real economy. Under different development stages and national conditions, only a financial structure suitable for economic development can promote the economy. increase. The financial system promotes economic development through the realization of its functions [4]. In the era of economic monetization and financialization. Economic development first puts forward the actual needs of quantitative financial development and qualitative financial development, which play a fundamental decisive role in financial development. The financial system has a stabilizing and improving effect by providing supply information, with the purpose of promoting economic efficiency.

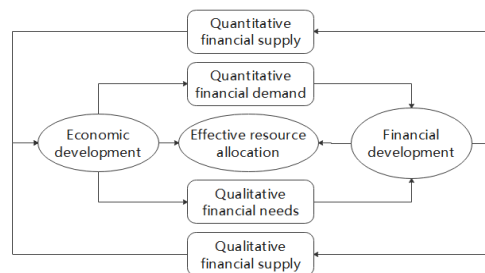


Figure 4 The relationship between economic and financial development

3.3 The fundamental decisive role of economic development on financial development

With the development of the economy, the economic system has put forward different requirements on the financial system. At different stages of economic development. The financial system must provide different services for the economic system and realize different functions. This process is also the process of continuous development and evolution of the financial system. Therefore, in a sense, it is the requirements of the financial system in different stages of economic development that are compatible with the requirements that promote the evolution of the functions of the financial system. Development is achieved [5]. According to different stages of economic development, the role of finance can be roughly divided into four points. The functions of the financial system of these four points are progressive, with the connotation gradually expanding and enriching. The fundamental decisive effect of economic demand on financial development is shown in Figure 5.

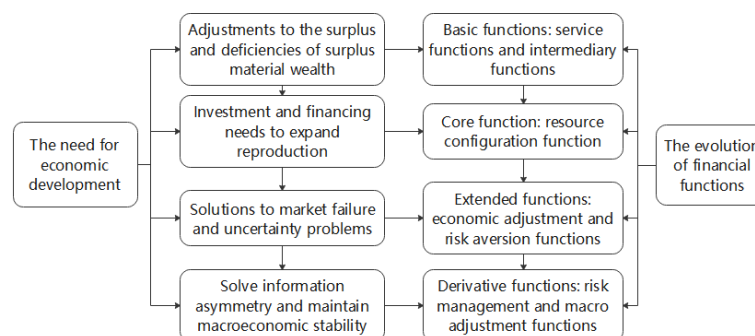


Figure 5 The fundamental decisive effect of economic demand on financial development

4 ERROR CORRECTION MODEL

ECM is one of the six mainstream models of modern econometrics. It is composed of differential variables, unbalanced errors, and random error terms of N variables that are modeled [6]. It has a sensitive correction function, can accurately predict the dynamic trend of data, and has a long-term impact on economic development trends..

4.1 ECM Model

ECM is a VAR model, it is strongly binding, suitable for non-stationary data correction. In the research process

of this article, the VECM representation is as follows:

$$\Delta y_t = \beta_0 + \beta_1 \Delta x_t + (\beta_2 - 1) \left(y - \frac{\beta_1 + \beta_3}{1 - \beta_2} x_{t-1} \right) + \xi_t \quad (4-1)$$

In the formula of $y - \frac{\beta_1 + \beta_3}{1 - \beta_2} x_{t-1}$ represents the error correction term, denoted as ECM. It reflects a kind of equalization error.

4.2 Granger Test

Granger (1969) and Sims (1972) proposed variable causality tests. The specific regression equation is as follows:

$$x_t = \sum_{i=1}^n a_i x_{t-i} + \sum_{j=1}^n b_j y_{t-j} + \mu_{1t} \quad (4-2)$$

$$y_t = \sum_{i=1}^n c_i y_{t-i} + \sum_{j=1}^n d_j x_{t-j} + \mu_{2t} \quad (4-3)$$

The F test is performed on the joint significance of b_1, b_2, \dots, b_n and d_1, d_2, \dots, d_n in the equation, and a series of conclusions about the causality of the variable Granger can be obtained. The ADF stationarity test equation is as follows:

In this regard, a stationarity test should be carried out. Specifically. The cointegration theory can be used. The unit root test must be performed before cointegration analysis. The ADF test equation is as follows:

$$Y_t = a + b + (c - 1)Y_{t-1} + \sum_{i=1}^n X_i Y_{t-i} + \mu_t \quad (4-4)$$

4.3 Selection of indicators and data and establishment of models

4.3.1 Indicators. Selection of data

Two indicators, the degree of monetization and the degree of securitization, are selected to measure the current level of financial development in Jiangsu Province (God-sm ith 1969; Tan Ruyong, 1999). The degree of monetization index is M/GNP , which refers to the ratio of bank monetary liabilities to gross national product. The higher the degree of monetization, the more obvious the characteristics of financial deepening and the faster the financial development. Mz in China's current financial statistics includes: market currency circulation, namely cash, unit demand deposits, unit time deposits, resident savings deposits and other deposits. Taking into account the availability of data, and because cash, unit deposits, and household savings deposits account for the vast majority of Mz, when measuring the degree of monetization in Jiangsu Province, we define Mz as cash, corporate deposits (including current deposits). And fixed-term) and the sum of household savings deposits.

Securitization (denoted as S below for Securitization) can be divided into broad and narrow sense. Broad sense securitization refers to the use of stocks, bonds, funds, etc., as direct financing methods to replace bank indirect financing methods represented by bank loans; that is, financing securitization; narrow sense Securitization refers to the transformation of the already formed non-securities form of asset stock into securities assets, that is, asset securitization [7]. The securitization mentioned in this article mainly refers to financing securitization. The degree of securitization refers to the proportion of the amount of financing obtained through stocks, bonds, funds, etc., in the GDP, that is, S/GDP . The higher the degree of securitization, the more developed the securities market, the stronger the scale and capacity of financial activities, and the faster the financial development. When we measure the degree of securitization in Jiangsu Province, we take into account the availability of data and ignore the fund part. Therefore, securities mainly include stocks and bonds. At the same time, we replace $GNPGDP$ with the annual GDP of Jiangsu Province as the nominal GDP calculated at the current price. The annual GDP chain growth rate is used as an indicator to measure economic growth and expressed as $RGDP$. This is to more clearly illustrate the statistical characteristics of the model variables and establish statistical analysis on the model variables.

Table 2 Statistical analysis of model variables

Variable	Mean	Max	Minimum	Standard deviation	Skewness	Kurtosis
RGDP	118.82	140.36	106.91	10.70	0.62	2.01
M ₂ /GDP	91.25	139.70	59.60	24.95	0.57	2.14
S/GDP	128.89	214.10	70.70	38.57	0.38	2.63

It can be seen from the statistical analysis table of the variables, the average, maximum, and minimum values of RGDP are greater than the value of M₂/GDP; in terms of the degree of change, RGDP is lower than M₂/GDP, which can be determined by the standard deviation. The value shows that the standard deviation and degree of change of S/GDP are the largest. By establishing a measurement model, the quantitative relationship between variables can be reflected more accurately.

4.3.2 Model establishment

(1) Unit root test

In order to predict the trend of data more accurately and reduce the impact caused by the difference in data, especially heteroscedasticity, relatively data processing should be carried out, including RGDP, monetization degree and securitization degree 3 sets of indicators, Use the ADF test method to test the three groups of time series. The test results are as follows.

Table 3 ADF results

Variable	Inspection type(c,t,n)	ADF value	Critical value($\alpha=0.01$)	Conclusion
InRGDP	(c,t,1)	-2.99	-3.92	Unstable
Δ InRGDP	(c,0,1)	-3.91	-3.82	Smooth
InM ₂ /GDP	(c,t,0)	-1.57	-3.93	Unstable
Δ InM ₂ /GDP	(c,0,1)	-4.47	-3.97	Smooth
InS/GDP	(c,t,1)	-1.69	-3.92	Unstable
Δ InS/GDP	(c,0,1)	-3.89	-3.96	Unstable

(2) Correlation test

Detecting the correlation of variables can better analyze the correlation of the sequence and the coefficient matrix. The closer the absolute value of the coefficient is to 1, the greater the correlation of the sequence. Since hRGDP and nS/GDP are not single-integral time series of the same order, only the correlation test of these two variables is carried out below. The correlation coefficient is as high as Q78, indicating that there is a strong negative correlation between hnRGDP and nS/GDP.

Table 4 Correlation coefficient matrix of InRGDP and InS/GDP

	InRGDP	InS/GDP
InRGDP	1	-0.78
InS/GDP	-0.78	1

(3) Cointegration test

Since hRGDP and hnM₂/GDP are first-order single integer I(1), the co-integration test can be performed. This article uses the EG two-step method to test.

Table 5 Cointegration test results of InRGDP and InM₂/GDP

Variable	Residual ADF value	Critical value	Long-term equilibrium equation	F value	DW value
InRGDP InM ₂ /GDP	-3.21	-3.11	InRGDP=5.5-0.16 InM ₂ /GDP+ μ	4.9	0.73

As shown in this Table, the ADF test of the residual of the regression equation shows that because the residual test value 321 is less than the critical value 311, the equation also passed the F test and DW test, It shows that there is a long-term synergy between the development of finance and economy.. Cointegration relationship. It can be seen from the long-term equilibrium equation that InRGDP and IhM₂/GDP have a long-term stable

negative relationship. The error correction term is:

$$ECM_{t-1} = (\ln RGDP - 5.5 + 0.16 \ln M_2 / GDP)_{t-1} \quad (4-5)$$

(4) Establish ECM model

The above research has proved the exist relationship of co-integration between the sequence RGDP and M_2/GDP , and ECM can be established. The dependent variable is $\ln RGDP$ $\Delta \ln RGDP$, the difference of $\ln M_2/GDP$ $\Delta \ln M_2/GDP$, and the one-period lagging error correction term ECM as the independent variables, the error correction model obtained by regression through Eviews3.1 is:

$$\Delta \ln RGDP_t = 5.3 - 0.13 \Delta M_2 / GDP_t - 0.33 ECM_{t-1} + \sigma_t \quad (4-6)$$

(1.55) (5.61**) (-2.31*)

$R^2=0.8$ $DW=1.21$ $F=14.36$

In the above formula, "***" and "*" stand for the tests under the significance level of $\alpha=1\%$ and $\alpha=5\%$ respectively.

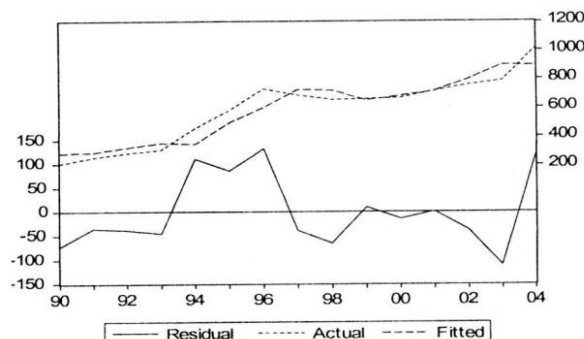


Figure 6 Fitting effect of ECM model

(5) Granger causality test

Take this approach when investigating that the sequence M_2/GDP is the cause of the sequence RGDP: Estimate the degree of RGDP value affected by the lag period, and verify the degree of influence of the introduction of the sequence M_2/GDP . If the sequence can be changed to a large extent, it is called the sequence W. (M_2/GDP is the G ranger cause of RGDP; at the same time, it should also be considered whether the sequence RGDP is the Granger cause of M_2/GDP . Passed The empirical test of the correlation between RGDP and S/GDP has concluded that RGDP and S/GDP are highly negatively correlated. The degree of securitization is negatively correlated with economic growth rate, indicating that the securities market has a major role in economic. It comes from the expansion of the absolute amount of financing in the capital market.

5 SUPPORT VECTOR MACHINE TECHNOLOGY

5.1 Theoretical background of support vector machines

SVM can accurately move in data classification and regression. It specifically achieves the isolation of data change trends through the construction of classification planes, and can minimize structural risks. It depends on the error rate and Vapnik-Chervonenkis dimension for sub-mode processing [8] , It has excellent generalization performance and accuracy..

5.2 Architecture of Support Vector Machine

The inner product check between the support vector $x(i)$ and the vector x extracted by the input control is very important to the algorithm, and a small subset of the training data is extracted to build a support vector machine. The specific architecture is shown in the figure below, where K is the kernel function.

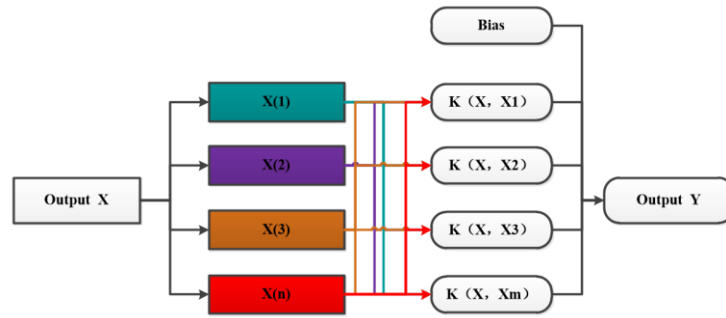


Figure 7 The architecture of the support vector machine

5.3 Principles of the regression method of support vector machines

When using linear support vector machine, using linear regression function:

$$y = \omega x + b \quad (5-1)$$

Assume that the training sample set D is composed of n samples (x_i, y_i) ($i=1, 2, \dots, n; x_i \in X, y_i \in Y$). Ensure the smoothness of the 4.1 curve, one must be found The smallest value. To this end, minimize the norm of the Euclidean space, use the duality principle, Lagrangian multiplier method and other algorithms to obtain the regression function:

$$y = \sum_{i=1}^n (x_i - a_i^*) + b \quad (5-2)$$

In the formula, the corresponding sample data when $x_i - a_i^*$ is not equal to 0 is the support vector.

When using nonlinear support vector machine [9]. The algorithm is as follows:

$$y = \max \left[-\frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n (a_i^* - a_i)(a_i - a_i^*) k(x_i, x_j) - \xi \sum_{i=1}^n (a_i^* + a_i) + \sum_{i=1}^n y_i (a_i^* + a_i) \right] \quad (5-3)$$

$$\sum_{i=1}^n a_i^* = \sum_{i=1}^n a_i, a_i \in [0, C] (i = 1, 2, \dots, n) \quad (5-4)$$

C is a penalty factor. If the value of C is large, it represents the penalty value corresponding to the fitting deviation, and the regression function is as follows:

$$y = \sum_{i=1}^n (a_i^* - a_i) k(x_i, x_j) + b \quad (5-5)$$

When $a_i \in [0, C]$

$$b = y_i - \sum_{i=1}^n (a_i^* - a_i) k(x_i, x_j) + \xi \quad (5-6)$$

When $a_i^* \in [0, C]$

$$b = y_i - \sum_{i=1}^n (a_i^* - a_i) k(x_i, x_j) - \xi \quad (5-7)$$

The kernel function is the focus of the support vector machine, and it is very important for the choice of parameters. Assuming that X is a finite-dimensional input space and $K(x, z)$ is a symmetric function on X , then the sufficient and necessary condition for the symmetric function $K(x, z)$ under X to be a kernel function is the following matrix formula:

$$(K(x_i, y_j))_{i,j=1}^n \quad (5-8)$$

According to the Mercer condition, the continuous symmetric function $K(x, z)$ is as following:

$$K(x, z) = \sum_{i=1}^{\infty} \alpha_i \phi_i(x) \phi_i(z), \alpha_k > 0 \quad (5-9)$$

$K(x, z)$ is the inner product of $F \ni \phi(x)$, and $\sum_{i=1}^{\infty} \alpha_i \phi_i^2 < \infty$

, it implicitly derives a space of feature vectors.

The different kernel functions and their parameter selection in SVM have an important influence on the algorithm. At present, the four types of kernel functions that are most studied and used in SVM are mainly linear

kernel functions, polynomial functions, radial basis functions and Sigmoid functions [10]. The specific function forms are as follows:

$$K(x, x') = x^T x' \quad (5-10)$$

$$K(x, x') = (\gamma x^T x' + r)^g, \gamma < 0 \quad (5-11)$$

$$K(x, x') = \exp(-\gamma \|x - x'\|^2), \gamma < 0 \quad (5-12)$$

$$K(x, x') = \tanh(\gamma x^T x' + r), \gamma > 0 \quad (5-13)$$

Among them, γ , r and g are the parameters of the kernel function.

5.4 Using SVM model to predict economic growth

Based on the basic principles of SVM, the SVM regression method is used to predict GDP. The steps and purpose of establishing the prediction model are to use the regression model established by SVM to perform regression fitting on GDP. The algorithm flow chart is shown in Figure 8.

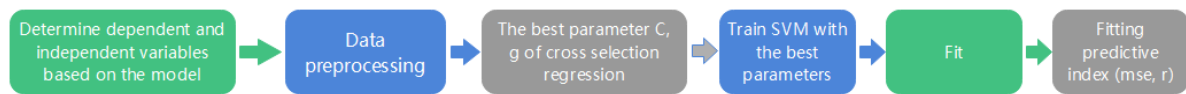


Figure 8 The overall flow chart of the model

Determine the independent variables and dependent variables according to the model design, and select the degree of monetization and the degree of securitization from 1982 to 2009 as the independent variables. Select GDP from 1983 to 2009 as the dependent variable, normalize the training and prediction set data, and use the *SVMcgForRegress.m* function to optimize parameters, find the best parameters in a broad range, Carry out SVM training and regression prediction, perform regression prediction on the original data. The running results are:

$$\text{MSE}=1.86224\text{e-}005 \quad (5-14)$$

$$\text{R}=99.977\% \quad (5-15)$$

MSE and R respectively are the mean square error and correlation coefficient. Using the SVM model to make specific predictions on GDP and constructing a model of the relationship between image factors and economic growth can well illustrate the relationship and degree of influence between economic growth and other influencing factors.

5.5 Economic growth model

Since the mid-1980s, the "endogenous technological change theory" has emerged, which mainly believes that people have achieved growth in real GDP per capita in the process of pursuing profits, and have the effect of continuous growth [11]. This theory have proved that economic growth rate is not a constant. It changes with time and exhibits a certain cyclicity. The new economic growth theory introduces time variables into the parameters, which can better reflect the cycle of economic development. At the same time, it better reflects factors such as innovation mechanism and human resource cost, which is more suitable for China's national conditions [12]. The new economic growth theory helps us to more deeply understand the necessity and urgency of the transformation of China's actual economic growth mode, it shows that the development of technology is very important to increase the input of factors and contributes to the promotion of long-term economic development. This theoretically shows that the extensive economic growth model is not sustainable [13]. The production function form of the new economic growth theory model:

$$A(t) = z(t)^\theta \cdot B(t)^\alpha \cdot C(t)^\beta \cdot D(t)^\gamma \quad (5-16)$$

Among them, A, B, C, D, and t are the total output, physical capital stock, labor input, human capital stock and time, respectively.

Regardless of long-term considerations or short-term plans, economic growth is crucial to the expansion of

financial aggregates. The expansion of China's financial aggregate may be more adapted to the development [14]. Based on the basic principles of ECM and SVM, we can find the talent structure, national and local policies, national politics, import and export foreign trade, financial market environment, regulatory system, currency, taxation, productivity, Culture and other factors all affect financial development and economic fluctuation trends [15-19], and ultimately have an impact on economic growth. Therefore, the country should carry out positive interventions on various factors based on economic forecasting methods to promote sustainable development.

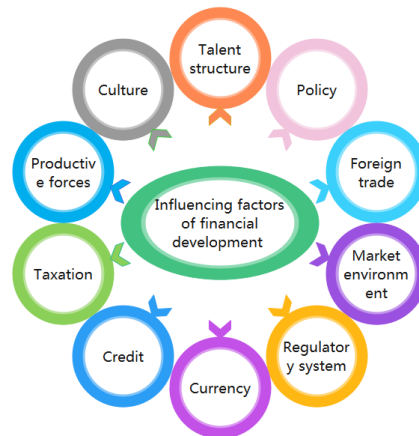


Figure 9 Influencing factors of financial development and economic fluctuations

6 INFLUENCING FACTORS OF FINANCIAL DEVELOPMENT AND ECONOMIC FLUCTUATION TRENDS

6.1 Impact of foreign trade

The import of production factors can increase a country's factor supply. For most countries, due to differences in resource endowments, it is impossible to have all the production factors needed for production. Importing domestically scarce factors is undoubtedly positive for economic growth. Continuous import products produce a "competitive effect", accelerate the elimination of low-efficiency enterprises, and at the same time encourage surviving enterprises to improve technology and management, and develop a reasonable enterprise scale, thereby optimizing the domestic market structure and improving the economic main body-enterprise. Importing new products can promote the rapid formation of industries, realize the adjustment and reality of a country's industrial structure, and promote economic growth. The import of technology and capital goods directly promotes the increase of domestic productivity and becomes a source of cheap technological progress.

Export development directly drives the increase of domestic investment or foreign capital investment in the country. According to experience, the factor income of a country's export sector is much higher than the factor income of the import sector. Under the premise that the factor flow mechanism is more effective, the high income will definitely increase. The investment absorbed by the export sector, whether it comes from the import competition sector or the capital transfer from the non-trade sector, or pure investment increase, will promote the utilization rate and optimal allocation of the country's capital. In addition, the inflow of foreign capital will also bring about The selected technology and management knowledge all constitute factors that promote growth. Generally, when not participating in foreign trade, a country's comparative advantage can only be manifested among the various regions within a country, and resource allocation can only be "sub-optimal allocation" according to domestic demand. Foreign trade enables resources to be allocated within the industry. In line with the comparative advantages in the world market, the optimization of resource allocation naturally promotes economic growth; exports mean the expansion of the market faced by domestic manufacturers, so that enterprises can enjoy economies of scale, increase production efficiency, and reduce unit costs. In 1986, Romer published a paper in the "Journal of Political Economy" expounding the ways that foreign trade promotes a country's technological progress: First, the development of trade between countries can enable the rapid accumulation of knowledge and specialized human resources in trading partners. Therefore, it is helpful to increase the total output level of trading countries. Secondly, international trade stimulates the power of

enterprise research and development [20]. Due to the existence of foreign competitors, the monopoly cycle of new products and differentiated products will be shortened, and enterprises will increase their investment in research and development departments in order to maintain their competitive advantages.

6.2 The role of finance

Finance plays an important role in economic growth, therefore, in order to promote economic growth from the financial aspect, a good financial market environment should be established to promote fair competition in the financial industry and allow more economic growth. More private capital enters the financial industry, encourages the introduction of funds into private enterprises and other private sectors through financial institutions, improves the efficiency of financial resource allocation, improves the vitality of economic development, and promotes employment. Promote the development of their respective industries in the financial industry and encourage financial innovation. Ensure the efficient operation of the banking, securities, and insurance industries, encourage other legal financing models, speed up capital operations, promote information exchanges, and reduce adverse selection and moral hazards caused by the widespread information asymmetry in the financial industry. Build an effective financial supervision system, strengthen the prior supervision and process supervision of financial supervision, and the risk spread control mechanism should be strengthened.

6.3 Adjusting the structure of the talent industry

We should take forward consciousness and overall concept, fully consider the different needs of talents in different regions, encourage the scientific and rational flow of talents, make the human resources reasonable layout in various industries, gradually narrow the gap between regions, and stabilize the balance of development. Carry out the regional structure adjustment of human resources, starting from the characteristics of regional development, adjusting the surplus to make up for the vacancies, adapting the talent structure to the economic structure, proposing targeted implementation of development strategies, and actively developing various industries, including equipment manufacturing and high-tech industries as its representatives. In accordance with the needs of talents, various industries will be standardized, large-scale and formalized, and the reasonable flow of talents should be promoted. Further intensify education and training, improve the quality of human resources, start from the system, mechanism, and system, comprehensively improve the talent development environment, and promote the national economy from the source to show a sustained growth trend [21].

6.4 The impact of credit and money

Since economic growth and the scale of bank credit are Granger causality with each other, expanding the scale of bank credit and broadening corporate financing channels, especially the financing scale of small and medium-sized enterprises, can effectively promote economic growth. Money supply is also the Granger reason for economic growth. Therefore, adopting a looser monetary policy and maintaining a stable and reasonable growth of money supply will also promote economic development. There is no Granger causal relationship between economic growth and tax revenue. The traditional supply school uses tax cuts to stimulate the economy, and the effect may not be significant. Economic growth will have an effect on the disturbance of money supply, credit scale and tax revenue, and these disturbance effects will in turn affect economic growth. Therefore, it is undoubtedly a more effective way to stimulate economic growth through financial policy measures such as money supply and credit scale. Among them, the internationalization of currency has promoted the integration of finance, brought about the reduction of financial risks. A large amount of money flows out, and the degree of financial integration is deepening. This will improve the domestic financial system, deepen the competitiveness of the financial system, and promote financial stability. Currency internationalization, financial stability, and economic growth are mutually restrictive and mutually reinforcing. Currency internationalization is an indispensable link in the development of the financial system. A stable financial market can help promote economic growth; conversely, financial The instability of the system will have a huge negative effect on economic growth, and even make economic development regress [22]. In order to maintain financial stability and development, it is necessary to continue to improve the settlement centers of international currencies. This requires the formation of banks, securities, insurance, futures, trusts, funds and intermediaries with international currencies as intermediaries in offshore financial markets in different regions. The gathering place of business headquarters forms a cluster of financial industry. In this way, it is conducive to the growth of the trade volume of countries that issue internationalized currencies and countries that use internationalized currencies, is

conducive to expanding the business scope of commercial banks to trade customers in various regions, is conducive to improving the international business of multinational commercial banks, and the issuance of international currencies. Economic and trade exchanges between countries and countries that use international currencies.

7 CONCLUSION

Through the analysis of financial forecasting methods, based on methods of ECM and SVM, the application of the combined forecasting technology and economic fields and the exploration of factors affecting economic growth found the following conclusions:

- (1) Facing today's multi-objective, multi-variable, non-linear, complex and open economic system, an error correction model should be used to correct the data analysis results. ECM energy cointegration analysis is to test the long-term equilibrium relationship between variables , To avoid the occurrence of imbalances, link short-term behaviors with long-term behaviors, and correct the imbalances. SVM technology, as a very promising classification technology based on statistical learning theoretical models, has high recognition accuracy. ECM and SVM methods can predict the development process, changing trends and influencing factors of the economic system, play an important role in the formulation and role of development plans, and can promote sustained, rapid and healthy economic development, improve statistical efficiency, reduce statistical costs, and use Data mining technology digs out value information from a large amount of data, which is conducive to the policy formulation of economic departments and the sound development of the national economy.
- (2) Talent structure, national and local policies, national politics, import and export foreign trade, financial market environment, regulatory system, currency, taxation, productivity, culture and other factors all affect financial development and economic fluctuation trends, and ultimately cause a negative impact on economic growth. Influence.
- (3) In response to the results of economic forecasts, the state should provide positive intervention, moderately increase the import of production factors, promote the "competitive effect" of products, optimize the national market structure, improve economic entities, focus on production and payment, and increase the introduction of technology and capital Products, increase export earnings, enhance factor liquidity, expand market scale, stimulate income and output, promote economic development and economic growth, establish a sound financial market environment, encourage financial innovation, build an effective financial monitoring system, and adjust the human resource industry In addition to the structure, banks should expand the scale of bank credit, increase the money supply, expand the absolute amount of capital market financing, moderate tax cuts to stimulate economic development, and promote financial development and economic growth on the basis of maintaining the stability of the economic system.

REFERENCES

- [1] Franz, W. Hysteresis in Economic Relationships: An Overview[J]. Empirical Economics, 1990: 109-125.
- [2] Backus,Davis K. ,Kehoe,Patrick J. and Kydland, Finn E. (1994). Dynamics of the trade balance and the terms of trade: J-curve, American Economic Review, vol. 84,pp. 84-103.
- [3] Baxter, Marianne,1995, "International Trade and Business Cycles" in Handbook of International Economics,ed. by Gene M. Grossman and Kenneth Rogoff (Amsterdam: Elsevier, North Holland)
- [4] Canova, Fabio and Harris Dellas,1993,"Trade Interdependence and the international Business Cycle,"Journal of International Economics, vol. 34,pp,23-47.
- [5] 5Claessens,StOn,Simeon Djankov and Larry Lang(1998),"East Asian Corporates: Growth, Financing and Risks over the Last Decade",Mimeo,World Bank.

- [6] Shaw, Edwards. Financial Deepening in Economic Development[M].New York: Oxford University Press,1973.(ECM)
- [7] Prasad, Eswar S. ,and Jeffery Gable,1998,“International Evidence on the Determinants of Trade Dynamics”, IMF Staff Paper,v01. 45,PP. 401-439.
- [8] Perroux F. Economic Space: Theory and Application[J]. Quarterly Journal of Economics,1950(64).
- [9] Muller K R,Mika S,Rtseh G. An Introduction to Kernel--Based Learning Algorithms[J]. IEEE Trans. On Neural Networks,2001,12(2).
- [10] P.Ping-Feng.System Reliability Forecasting by Support Vector Machines with Genetic Algorithms. Mathematical and Computer Modeling.2006,43:262-274.
- [11] Clarida,Richard,1 994,“Co-integration,Aggregate Consumption, and the Demand for Imports : A Structural Econometric Investigation”, American Economic Renew 84,PP. 298-308.
- [12] Aghion P and Bolton P. A Theory of Trickle-Down Growth and Development [J]. Review of Economic Studies,1997,64 (2) : 151-172.
- [13] Johansen,S. Likelihood Based Inference in Cointegrated Vector Autoregressive Models[M],Oxford University Press,1995.
- [14] Hans Jarle Kind, Endogenous Growth and Trade Liberalization Between Small and Large Countries,Review of International Economics,10(1). 151-165,2002.
- [15] Glick, Reuven,and Kenneth Rogoff,1995,“Global Versus Country—Specific Productivity Shocks and the Current Account,”Journal of Monetary Economics,v01. 35,pp. 159-92.
- [16] McKinnon,R. Money and Capital in Economic Development [M]. Brookings,1973.
- [17] O’Rourke, Kevin H. ,Tariffs and Growth in the late 1 90 Century, Economic Journal 110(2000): 456-83.
- [18] Peter Burridge and EJ. N. Sinclair,Relationships between economic growth,foreign direct investment and trade: evidence from China,Applied Economics,2002,34,1433-1440.
- [19] Alesina,A. and Perotti P. Income Distribution,Political Instability and Investment [J]. EER 1996,40 (6) : 1203-1229.
- [20] Aghion,Philippe,and Peter Howitt. Endogenous Growth Theory [M]. Cambridge,MA: MIT Press,1998.
- [21] Goldsmith,Raymond,W. Financial Structure and development[M]. New HaVen,CT: Yale U. Press,1969.
- [22] Schumpeter,Joseph A. The theory of economic development. Leipzig: Dunker&Humblot,1912.