

Empirical Analysis on High-tech Industry Export and Financial Structure in China

Zhen Zhang

School of finance, Nanjing audit university, Nanjing, Jiangsu 211815, China

ABSTRACT. *According to the theory of optimal financial structure, the industrial structure and its risk characteristics determine the financial structure. For the industries with lower risk, banks are more effective financing channels, while for High-tech industries with higher technology and market risk, financing through financial markets is more effective. In this paper, an empirical model of industrial structure and financial structure factors is established to make an empirical analysis of China's high-tech industry export and bank credit. It is found that China's high-tech industry export has not promoted the development of China's financial market, but strengthened the indirect financial structure mainly based on the banking system.*

KEYWORDS: *The theory of optimal financial structure ,High-tech Industry Export, Financial Structure*

1. Literature review

High-tech industry refers to the industrial cluster which produces high-tech products by using modern advanced technology. Compared with other industries, it has the characteristics with high investment in R&D and a large proportion of R&D personnel. Export of high-tech products is of great significance to optimize China's industrial structure, to enhance international market competitiveness and to maintain balance of payments.

Lin Yifu (2009) defined the financial structure as the proportion and relative composition of financial systems including the relative importance of banks and financial markets in the financial system. He believed that the composition and relationship of financial system arrangement should be determined by the endogenous industrial structure, technological structure and enterprise characteristics determined by the factor endowment of the economy. Financial arrangement is adapted to support the development of industries and enterprises with comparative advantages.

Gong Qiang (2014) established a theoretical model to study the feasibility of financing in banks and financial markets under different risk characteristics. It is found that banks are more effective financing channels for mature industries with lower risk. For technology frontier industries with higher technology and market risk, financing through financial markets is more effective. Good investment

environment is a necessary condition for the healthy operation of financial market.

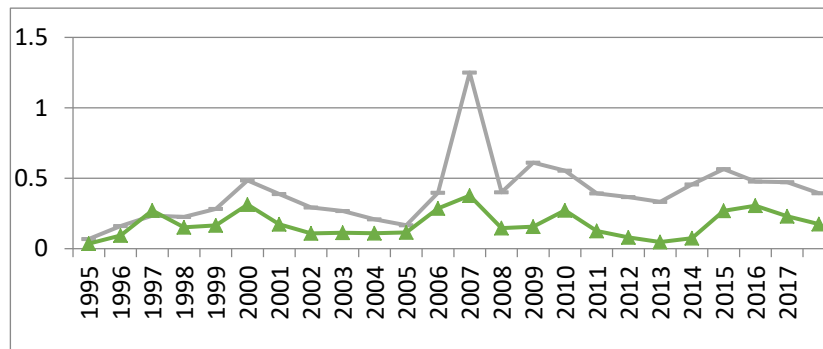
In this paper, based on the theory of optimal financial structure, an empirical model is established to conduct empirical research on China's high-tech industry export, financial market and bank credit, in order to verify the applicability of the theory of optimal financial structure in China.

2. Overview of China's Financial Structure and High-tech Industry Export

2.1 China's Financial Structure

In this paper, we use the ratio of the total market value of listed companies to the RMB credit balance of financial institutions to measure financial structure. The financial structure ratio increased from 0.07 in 1995 to 1.25 in 2007, and then fell back to 0.47 in 2017, with an average value of 0.39. From the perspective of financial flow, the amount of financial market financing increased from 15 billion yuan in 1995 to 166.14 billion yuan in 2017, namely, an increase of 110 times. The amount of domestic loans for fixed assets investment increased from 419.9 billion yuan in 1995 to 7243.5 billion yuan in 2017. The ratio of financial market financing to domestic loans for fixed assets investment was used to measure financial flow structure (Figure 1). The financial flow structure ratio increased from 0.04 in 1995 to 0.38 in 2007, and then fell back to 0.23 in 2017, with an average value of 0.17. From the above financial structure ratio analysis, it is revealed that China's financial structure of is still an indirect financial structure with banks as the main body, compared with the indirect financial structure, although the amount of financing, the number of listed companies and the absolute scale of the market value of Listed Companies in Chinese financial market have increased considerably. As far as financial markets are concerned, indirect finance plays a more important role in China.

Figure 1: China's Financial Structure from 1995 to 2017



(Note: green line refers to the ratio of financial market financing to domestic loans for fixed assets investment. Grey line refers to the ratio of the listed

companies' total market value to the RMB credit balance of financial institutions.)

2.2 China's High-tech Export

The technology level of industrial manufactured goods in China has been continuously improved. And the share of high-tech industry export has been continuously expanded. The export volume of high-tech industries has increased to 670.1 billion US dollars in 1995, nearly 65 times. The proportion of high-tech industry exports in total industrial manufactured goods exports has increased from 8% to 31%. Although the transformation and upgrading of China's industrial manufactured industry has been remarkable, the proportion of exports of non-high-tech products is still 70%. China's manufactured products are mainly labor-intensive and capital-intensive traditional industrial products.

3. Hypothetical Propositions

High-tech industries face high risk of technology R&D. At the same time, the high-tech industries develop new products to market by means of R&D activities. the high-tech industries face the market risk whether the newly developed products are accepted by the market and customers. For the high-tech industry with high technology and market risk, financial market is a more effective financing channel rather than banking system. According to the theory of optimal financial structure, in a good market investment environment, the development of high-tech industries will lead to the prosperity of financial markets. Therefore, the following hypothesis is put forward:

The rapid growth of China's high-tech industry exports endogenously promotes the development of China's financial market.

4. Empirical Analysis

4.1 Empirical Model and Agent Variables

Based on the optimal financial structure theory and previous empirical studies, and combined with the proposed hypothesis, the following empirical model is established to further estimate the parameters.

$$IS = \beta_0 + \beta_1 FS + \varepsilon \quad (1)$$

In the above model (1), FS represents financial factors as independent variables, IS refers to industry factors as dependent variables, β_0 as constant term, and ε as random interference factors term.

High-tech Industry Export (HTIE) is selected as the proxy variable of industry factor IS, Annual Fixed Asset Investment Bank Credit (FAIBC) and Annual Financial Market Financing(FMF)AS as the proxy variable of financial factor FS.

The annual data of high-tech industry export, fixed asset investment bank credit and financial market financing from 1995 to 2017 is from the “China Statistical Yearbook”. All the data is in the form of LN.

4.2 integration and Co-integration Analysis

By means of EVIEW6.0 software, with the data of HTIE, FAIBC and FMF, ADF method is used to test integration. The results are as follows.

Table1 Times New Roman

Variable	P Value	Result
HTIE	0.27	Unstable
Δ HTIE	0.01	Stable **
FAIBC	0.82	Unstable
Δ FAIBC	0.01	Stable **
FMF	0.23	Unstable
Δ FMF	0.03	Stable **

(Note: Δ denotes the first order difference; ** denotes the significance level of 5%.)

From Integration Test Result of the time series data, HTIE, FAIBC and FMF are not stable, but their first-order differences are stable at the level of 5%, which can be used for data co-integration analysis.

In order to examine the impact of banks and financial markets on the export of high-tech products, the data of HTIE, FABC, FAIBC and FMF will be analyzed to test Cointegration.

Firstly, by means of EVIEW6.0 software, Johansen method is adopted to test Cointegration of HTIE and FMS. The results are as follows.

Table2 Co-integration Test Result

	T Statistical Value	Critical Value(5% Level)	P Value
NONE	38.91	29.80	0.0034
At most 1	14.93	15.49	0.0606
At most 2	3.91	3.84	0.0479

From the above co-integration analysis of HTIE and FMS data, it will be obtained that the first-order difference does not pass the co-integration hypothesis test in the confidence interval of 5%, which shows that there is no long-term equilibrium relationship between the high-tech industry export and the financing of financial markets. It is revealed that the export of high-tech products in China does not drive the development of financial markets.

The same method is used to analyze the co-integration of HTIE and FAIBC. The results are as follows.

Table3 Co-integration Test Result

	T Statistical Value	Critical Value (5% Level)	P value
NONE	42.84	29.80	0.0009
At most 1	22.53	15.49	0.0037
At most 2	9.39	3.841	0.0022

At the confidence level of 5%, the data of HTIE and FAIBC pass the co-integration test. There may be a long-term equilibrium relationship between high-tech industry export and Fixed Asset Investment Bank Credit. Parameter of can be further estimated.

4.3 Parameter Estimation

There is a co-integration relationship between high-tech industry export and the fixed assets investment bank credit. These two sets of data can be used to estimate the parameters of the empirical econometric model (1). By means of EVIEW6.0 software, least square method is applied to estimate the parameters of the empirical model. The results of the model parameters are as follows.

$$IS = -7.24 + 1.48IF \quad (2)$$

$$t = (-7.87) \quad (15.86)$$

$$R\text{-squared} = 0.92 \quad \text{Durbin-Watson stat} = 0.28 \quad F \text{ statistic} = 251.39$$

Judging from the above parameter estimation results, the coefficient of constant term and IS is significant at 99% confidence level; the fitting coefficient of the model is 0.92, which indicates that the fitting degree of the model (2) is good. The model does not have autocorrelation problem, and the parameter of IF, namely β_1 is 1.48, which indicates that the high-tech industry export is positively correlated with the domestic bank credit of fixed assets investment.

4.4 Granger Causality Test

Concerning the positive correlation, the Granger causality analysis of high-tech industry exports and domestic loans for fixed assets investment is further carried out. The results are as follows.

Table 4 Granger Causality Test result

hypothesis	F statistic	P value.
HTPE is not FABC Granger Reason	5.76699	0.0130
FABC is not HTPE Granger Reason	1.01887	0.3833

Judging from above Granger reasons analysis, in the 95% confidence interval, the export of high-tech industry is the Granger cause of fixed assets domestic loans, which shows that the export of high-tech industry has led to the expansion of fixed assets investment domestic loans. It is shown that the high-tech industry export have strengthened the indirect financial structure of the banking system.

5. Conclusions

From the above empirical analysis of high-tech industry export and financial structure, it is revealed that China's high-tech industry export expansion has not led to the development of China's financial market, but strengthened the indirect financial structure of the banking system, which is inconsistent with the theory of optimal financial structure. For most of China's high-tech industries are in the mature stage concerning industrial life cycle, the R&D risks and market risks faced by china's high-tech industry are greatly reduced. So Banks are willing to finance low-risk industries, and the china's indirect financial structure has been enhanced.

Reference:

- [1]Gong Qiang(2014). "Industrial Structure, Risk Feature and Optimal Financial Structure", Economics research, No.4, pp. 4-16.
- [2]Lu Jing(2015). The Effect of Financial Innovation on the Export Sophistication of China's High-tech Industry, International Economics and trade Research, Vol.31 No.5,pp. 47-61.
- [3] Bao Qun(2010). Financial Development, Comparative Advantage and Hi-tech Export, Studies of International Finance, No.11, pp. 87-96.
- [4]Zhang Peng(2016). The effect of international intra-product specialization on technology progress in Chinese industry: An empirical study on panel on China's 27 industries, studies in science of science, Vol.34 No.9, pp. 1347-1359
- [5]Yifu Lin(2009),Toward A Theory of Optimal Financial Structure in Economic Development, Economics research, No.8, pp.4-17.