Research on internationalization and industrial growth: based on Zhejiang manufacturing industry of China

Yao Limin[1], Chen Chao[1] and Zhao Jianhua[2]

[1]Zhejiang University of Technology, Hangzhou 310023, China
[2]Department of Commerce of Zhejiang Province, Hangzhou 310006, China.

ABSTRACT

The trend of the integration of trade and investment makes many inconsistent conclusions of the research on the relationship between economic growth and single trade or foreign direct investment. The combinability of industry internationalization patterns, for import, export and FDI of inflow and outflow, as well as their dynamic evolution law determines the nonlinear characteristic of internationalization growth effect. By putting the four internationalization patterns into a uniform production function and using Zhejiang manufacturing industry data of the year from 2002 to 2008, this paper does an empirical research on the non-linear relationship between the growth of Zhejiang manufacturing industry and the three kinds of internationalization patterns, namely, import, FDI and export. It is indicated that there exists a U-shaped relationship between Zhejiang manufacturing industry growth and the dependence of import and FDI, while an inverted U-shaped relationship between Zhejiang manufacturing industry growth and export dependence. In the present Zhejiang manufacturing industry, export can promote the growth of most manufacturing industry. But import and FDI are not conducive to the growth. The future internationalization development should enhance export and FDI level to exceed its critical value. Besides, export of most industry need to prevent the excessive growth and overleap the critical value of growth promotion too early. It's concluded that now China government must adjust the policy of export, import and FDI and consider the differentiation between different industries.

Introduction

The research on internationalization was mainly propounded by Hymer of his monopoly advantage theory in 1960s. Then many scholars made research on internationalization from different perspectives and hypotheses and put forward their own interpretation, such as Vernon (1966), Buckley and Casson (1976), Kojima (1978), Dunning (1977, 1981), Wells (1983), Lall (1983), Cantwell and Tolentina (1990) and so on. To the late twenty eighties, with the coming of new growth theory represented by Romer (1986) and Lucas (1988), a number of scholars began to do empirical research on the effect of different internationalization patterns on a country's economic growth. (Note 1) Many related articles had come forward. As a result, these researches came to many productive and significant conclusions. However, most of the researches only emphasized on the effects of one or two patterns of import, export, FDI inflow and outflow on economic growth, without putting the four internationalization patterns into a uniform production function to study the relation with economic growth. It's inconsistent with the actual internationalization patterns and dynamic evolution law. The experience of internationalization development tells us that firstly establishment of new industry should rely on import to meet national needs. Secondly, a number of FDI and technical equipment will enter into after domestic market reaches a certain scale and recognized by domestic and foreign entrepreneurs. Then with the industry development forming export advantages, export plays more important in industrial growth. At last, with gradually declining of export advantage, FDI outflow (OFDI, foreign direct investment abroad) will appear. The general evolution and upgrade of industry international patterns are import→FDI inflow→export→FDI outflow. So no matter import, FDI inflow, export or ODI outflow, the influence of industry growth is related with its stage of development. In different stage, growth effects of different internationalization patterns have great difference. As a result, there must be a nonlinear relationship between these patterns and industrial growth. On the contrary, inappropriate internationalization policies will extend the evolution cycle, even distort evolution law and stunt the industry development and upgrade. Besides, as the diversity of different industries, the same internationalization pattern has a totally different effect of industry development. Therefore, this paper tries to put import, FDI, export and ODI into a uniform frame of theory, and empirical research the nonlinear effect at the industry level. On the one hand, we can consider the growth effect of different internationalization patterns from a new point and provide a new research view. On the other hand, based on internationalization development of Zhejiang manufacturing industry, the paper analyzes the growth effect of internationalization patterns, verifies the effect of internationalization policies and provides a new thought of international policy adjustment of how to "bring in and go out "better in Zhejiang manufacturing industry, to promote sustainable growth.

Tele:
E-mail addresses: ylm@zjut.edu.cn

The rest of this paper is presented as follows: section 2 is literature review. Section 3 is model specification and data explanation. Section 4 is regressive results and interpretation. The last is conclusion and policy suggestions.

Literature Review

On the issue of internationalization promoting economic growth, foreign scholars made a lot of theoretical and empirical research. But most of them studied the relations between respective one or two patterns (import, or FDI, or export, or ODI) and economic growth. Moreover, most of these researches hadn't considered the nonlinear effect of different internationalization patterns. So the results were quite inconsistent.

Foreign research on single internationalization growth effect

In the impact of import on economic growth, through the effect of input-output, Coe (1997) thought that importing new intermediate products can enhance the productivity of the importing country. Besides, international trade also strengthens mutual understanding between importing countries about Product design, production methods and market to increase national productivity. Using endogenous growth model of open economy, Lee (1995) emphasizes that when a country put imports of advanced technology into the domestic production, it will directly improve the efficiency of production, ultimately leading to economic growth. In the impact of FDI on economic growth, there are two distinct opinions. The first is promotion (De Gregorio, 1992; Borensztein et al, 1998). The other is non-significance (Easterly, 1993；Kawai, 1994）. In the impact of export on economic growth, empirical researches support the promotion of export (Dollar, 1992; Edwards, 1998). However, some researches find that export to economic growth is only a short-term phenomenon rather than a long-term trend (Dhawan and Biswal, 1999). In the impact of ODI on economic growth, the relevant literatures are few and most state the effect theoretically. Two different views are as follows: first, enterprises spontaneously choosing ODI may mobilize productive resources more efficiently and give full play to comparative superiority, so as to improve the overall welfare and economic strength (Markusen, 2002); second, it's believed that ODI may reduce the country's overall economic level. If the enterprises with high production efficiency invest in overseas, it may decrease average productivity of home-country enterprises (Helpman and so on, 2004).

Chinese research on single internationalization growth effect

Chinese scholars also make many researches on the relation between China's economic growth and internationalization. In the impact of import on economic growth, Li Bing (2008) does an empirical study on the relation between import of industrial and primary products with economic growth. It's indicated that industrial products have a long and steady effect for our country's economic growth while an inhibiting effect of primary products. Whereas Qiao Yu (1998) think that import don't have a significantly direct causal relation with total output. In the impact of FDI on economic growth, most scholars hold that foreign capital is in favor of China's economic growth (Shen Kunrong, 2001; Yao Shujie and so on, 2006). Some Scholar also believe that we should look on both sides of FDI according to the specific circumstances, considering different areas(Wei Houkai, 2002) and different characteristics of FDI (Guo Xibao, 2009). In the impact of export on economic growth, basically, it reached a same conclusion, namely, export is beneficial to the China's economic growth. (Liu Xuewu, 2000; Shen Kunrong,

2003) But also some scholars think the effect of export is not noticeable or only exits in a short term, not obvious in the long term (Shen Chengxiang, 1999; Zhao Ling, 2001). In the impact of ODI on economic growth, there are two conclusions. Through the analysis of Guangdong data from 1990 to 2005, Dong Quan (2008) concludes that ODI of Guangdong Province promotes to stimulate local per capita GDP. While by analyzing the effect of ODI to the economic from 1982 to 2000, Wei Qiaoqin (2003) discovers that the relation between China's economic growth and ODI is not obvious. From these literatures, the conclusions of internationalization's economic growth effects are inconsistent.

Research on nonlinear growth effect of internationalization patterns

There are only a few literatures that study the nonlinear relation between internationalization and economic growth. Michaely (1977) point out that there is a critical level for export to promote growth. At the two extremes of this level, the effect of one is distinct from the other. Only when these countries reach a minimum threshold level, export will influence economic growth. While Kohli and Singh (1989) find that the export of export-oriented countries has a U-shaped relation with economic growth rather than non-export-oriented countries. Yang Quanfa (1998) using the same way as Kohli, inspects the situation of China from 1985 to 1994, but get the opposite result, namely, there is no increasing (decreasing) effect of export for economic in districts with higher opening degree. However, a U-shaped effect exists in districts with lower opening degree. Basing on the panel data of 29 provinces (municipalities directly under the Central Government) from 1996 to 2005, Bao Qun (2008) explores the nonlinear relation between trade openness and economic growth and gets an inverted U-shaped effect between them. Guo Xibao (2009) holds that if number of FDI on economic growth is positive, it's needed for foreign technology to meet a certain critical value. Only higher than this critical value, the effect of FDI on economic growth is positive and vice versa. So these researches reveal that there is a nonlinear relation in the growth effect of internationalization patterns, namely, the promotion of internationalization on growth is relative with the stage of development.

Integration and comparison on growth effect of internationalization patterns

There are few literatures that comprehensively study the four internationalization patterns: import, FDI, export, ODI. Most literatures emphasize on the International technology spillover. For the first time, Potterie BP de la (2001) introduces the four patterns as spillover to econometric model, verifying the spillover effect of these patterns. Lee (2006) analyzes the technology spillovers through FDI, ODI, export of intermediate products and immaterial direct channel. Through the way of import and FDI, Keller (2007) estimates the technology spillovers on American manufacturing industry from 1987 to 1996. Chinese scholars, such as Wang Ying and Liu Sifeng (2008), Guo Qingbin and Fang Qiyun(2009) empirically analyze the effect of all the spillovers on China's total factor productivity.

Different from previous studies, by putting the four internationalization patterns into a uniform production function and using Zhejiang manufacturing industry data, this paper does a research on the non-linear effect of different internationalization patterns on Zhejiang manufacturing industry. Based on the theory of industry international cycle and

international experience of industry development, there is a alternating evolution law between import, FDI inflow, export and ODI outflow during the process of industrial development, which is correspond with the process that national manufacturing newcomer developing from scratch from disadvantaged to advantaged. So the initial formation of industry is always accompanied by the positive promotion of import and FDI policies.

When the industry development approaches a certain scale and level, industrial comparative advantage begin to take shape. Encouragement policy of export is favorable to enhance industrial advantage and international competitiveness. After export scale is expanded, it must suffer trade barriers from importing countries. At this time, competitive industry need ODI policies to support the industry transit to a higher level of internationalization, which can further expand and sustain growth. Meanwhile, the industry differences that exist in international development period of industries and the asynchrony in international evolution are relevant with its industrialization development and heterogeneity in different enterprises. However, the overall level of economic development is approximately the same as development of international manufacturing.

So by putting the four internationalization patterns into a uniform production function, this paper empirically estimates the nonlinear effect of different internationalization patterns on economic growth. It reveals the stage of internationalization industry in china districts and the specific function of internationalization patterns on growth, so as to adjust its international policies better.

Model Specification and Data Explanation
Model specification and variable selection

In order to study the effect of import, FDI, export and ODI on economic growth, data analysis will based on an aggregate production function framework. (Note 2) This function assumes that traditional elements such as labor and capital in non-classical production function, nontraditional elements as FDI and trade are included in the model to examine the effect on economic growth. Aggregate production function can be set as follows:

$$Y = F(K, L) = AK^{\alpha}L^{\beta} \qquad (1)$$

Y denotes output while A, K, L denote TFP, capital Stock, labor stock. Fosu (2006) and Omisakin (2009) believe that FDI and trade openness (TR) influence economic growth by altering the efficiency of various factors, namely, TFP (A). Besides, they assume A is the function of FDI, trade and other factors:

$$A = f(FDI, TR, C) \qquad (2)$$

Combined (1) and (2), we can get an aggregate production function about capital Stock (K), labor stock (L), FDI, trade interdependency (TR) and other factors (C):

$$Y = (C, K, L, FDI, TR) \qquad (3)$$

Following the idea of Fosu (2006) and Omisakin (2009), we can improve the model to fit the research of this article. If take trade as the composition of import *(im)* and export *(ex)*, then TR splits into *im* and *ex*. What's more, if inspecting FDI in a wider range, FDI also can be divided into foreign direct investment and Chinese overseas direct investment, namely, *fdi* and *ofdi*. According to the methods of Bao Qun (2003) and Xu Helian, assume there is an exponential form between variables and A. The equation (2) can be changed as follows:

$$A = f\left(im, ex, fdi, ofdi, c\right) = e^{\alpha_1 im + \alpha_2 ex + \alpha_3 fdi + \alpha_4 ofdi + c} \qquad (4)$$

Since ODI of industries in Zhejiang Province just start, the ODI data of industries can't be obtained, research of this paper is thoughtless of variable of *ofdi*. Besides, for the nonlinear effect of internationalization patterns, we add equation of the other three patterns. Through inserting (4) into (1) and deforming, we can get the econometrics model:

$$LnY_{it} = \eta_i + LnK_{it} + LnL_{it} + \beta_1 im_{it} + \beta_2 im_{it}^2 + \beta_3 ex_{it} + \beta_4 ex_{it}^2 + \beta_5 fdi_{it} + \beta_6 fdi_{it}^2 + \varepsilon_{it} \quad (5)$$

i stands for industry, t foe time, η_i for control variable and ε_{it} for random errors. Dependent variable LnY_{it} represents the total output in t period and expressed by industrial added value. Then it gets a natural logarithm to reflect the growth of industries' output. K_{it} stands for the capital input of i in t period, marked as capital stock. L_{it} expresses the labor input, as annual average number of employees. im_{it} stands for import dependency. It is denoted by the ratio of industry imports and total output in this paper. ex_{it} stands for export impendency. It is denoted by ratio of industry exports and total output in this paper. fdi_{it} shows the dependence of foreign capital. It's represented by the ratio of gross industrial output in foreign investment and Hong Kong, Macao-invested industrial enterprises and the total output in all industries.

Data sources and processing

Because of data limitations, this paper selects the data of industries of Zhejiang manufacturing from 2002 to 2008. The data of industrial added value, total industrial output value, average balance of net value of fixed assets, total industrial output in foreign-controlled businesses, index of producer price of industrial products and consumer price index are all from Zhejiang Statistical Yearbook from 2003 to 2009. The data of RMB exchange rate from 2002 to 2008 is from China Statistics Yearbook of 2009. From 2003, State Statistics Bureau has adopted the new industry classification standard. For the unity of the data, this paper rejects statistics after 2003 of handicrafts and other manufacturing, waste of resources and waste materials processing industry and statistics before 2003 of other manufacturing. Meanwhile, this paper combines food manufacturing with food processing industry as food processing and manufacturing industry. So the last sample includes 27 manufacturing industries.(note3)

In the data processing, using index of producer price of industrial products and taking the year of 2002 as base period, industrial added value and total industrial output value converts the previous price to a comparable price. Referring to the way of Zhang Haiyang (2005) and Xu Helian (2007), we select the average balance of net value of fixed assets to stand for capital stock, the year of 2002 as base period, deflating on the base of price index of fixed assets. Labor stock is represented by annual average number of employees. The data from 2002 to 2006 is from industrial statistics database of DRCnet (note4) while from 2007 to 2008 is from Chinese industrial enterprise database of EPS. The import and export data of each industry is from external trade database of DRCnet. For the industry classification in Zhejiang Statistical Yearbook is not consistent with Harmonized commodity description and coding system (HS), it's needed to conduct a unified classification of these two

standards. From the conclusion of Sheng Bin (2002), in accordance with HS, we categorize the imports and exports of 27 industries and get the number of the year from 2002 to 2008. Since the original data is represented by US dollar. Using the method of Li Xiaoping (2006), this paper convert the value of import and export into CNY value according to the exchange rate of CNY against the USD, then convert into constant prices of the year of 2002 by utilizing consumer price index.

Estimation Result and Interpretation

Basing on different constants, panel model is always divided into mixed OLS model, fixed effect model and random effect. So before regression, we utilize F test and Hausman test to decide whether we should adopt mixed OLS model, fixed effect model or random effect. Through the comparison of test results, model (1)-(4) are all adopt fixed effect model. Moreover, thinking over the panel model includes information of cross section data and time series data simultaneously, it's easy to cause heteroscedasticity and serial correlation problems. Therefore it's using the estimated generalized least square method to analyze and White robust standard to get the statistic t in estimate of coefficient. See table 1.

Estimation result of manufacturing industries

As far as the effect of Zhejiang manufacturing industry growth, result shows that capital stock K and labor stock L can promote the growth with the influence coefficient of 0.551 and 0.2305. During the period of 2002 to 2008, the capital stock and labor input increased by 1% each, respectively, will drive manufacturing growth of 0.551% and 0.2305% in Zhejiang manufacturing industries. Besides, the effect of capital is greater than labor input.

This paper mainly emphasizes on the effect of import, FDI and export. First for the linear effect of these three patterns, it's indicated that import and FDI have a significant negative influence on Zhejiang manufacturing growth. Averagely, when import dependence and FDI dependence increase 1 percentage, growth rate of manufacturing industry will decrease 0.0218% and 0.0592% respectively. When export dependence has a significant positive effect, namely, while export dependence increases 1 percentage, growth rate of manufacturing industry will increase 0.0093%. However, is there a nonlinear effect of import, foreign capital and export on economic growth? Through further study of model (1), it's found that there is a U-shaped relation between import dependence, FDI dependence and Zhejiang manufacturing growth. By calculation, the turning point of import is about =25.21% and =41.24% for FDI dependence. It means that for the import dependence of industries lower than 25.21%, further improvement of import dependence will decrease the growth of output. For the import dependence of industries higher than 25.21%, further improvement of import dependence will promote the growth of output. For the FDI dependence lower than 41.24% as well, further improvement of FDI dependence will decrease the growth of output, vice versa. Then for export dependence, it's showed that there is an inverted U-shaped relation between export dependence and Zhejiang manufacturing growth. Its turning point is about =50.09%. That is to say for the export dependence of industries lower than 50.09%, increasing trade dependence will enhance the growth of output while for the export dependence of industries higher than 50.09%, the growth of output will decrease.

In accordance with the actual conditions in 27 manufacturing industries in Zhejiang, despite there is a U-shaped relation between import dependence, FDI dependence and manufacturing growth, most industries are still in the left of the U-curve. Take 2008 for example, only the import dependence of Petroleum processing coking and nuclear fuel processing industry (31.77%), raw chemical materials and chemical industry (52.13%), the processing industry of non-ferrous metal smelting & calendaring (35.39%) and manufacturing industry of instruments and office machinery is higher than the critical value of U curve. While the FDI dependence of beverage industry (62.39%), furniture industry (43.25%), rubber industry (52.70%) and communications equipment, computers and other electronic equipment manufacturing industry (70.93%) is higher than the critical value. For most Zhejiang manufacturing industries, import dependence and FDI dependence are all lower than the critical value. Meanwhile it's founded that the export dependence of most industries is in the left of inverted U-curve. In 2008, industry of leather, furs, down and related products (58.47%), furniture industry (74.17%), industry of stationery and sporting goods (62.25%), metal industry (65.27%) and manufacturing industry of instruments and office machinery (52.21%) is higher than critical value of inverted U-curve. Therefore for most Zhejiang manufacturing industries, export dependence is positively correlated with the growth of manufacturing industry in the curve. That is to say the increase of export dependence can promote growth of manufacturing industry.

Estimation result according to factor intensity

For the different combination of internationalization patterns in different industries, we divide the 27 manufacturing industries into 3 factor-intensive industries: labor-intensive industries, capital-intensive industries and technology-intensive industries. (note 5) Besides we estimate the effect of import dependence, FDI dependence and export dependence of these three industries on the growth of manufacturing industries.

First, similar to the sample of manufacturing industry, the categorical estimation results show that increase in capital stock and labor stock are the important factors for growth. The effect of capital stock for the industry growth is greater than labor stock. Secondly, comparing the growth effect of different factors in industries, effect of different factor input is various despite estimated symbol of each variable is similar. The capital stock in capital-intensive industries (0.5757) in driving the industry growth is higher than the overall level (0.5501). But capital stock in labor -intensive industries (0.5282) and technology-intensive industries (0.5217) is lower than the overall level. At the same time, the labor input of technology-intensive industries (0.2785) and labor-intensive industries (0.2467) is higher than the overall level (0.2305). The pulling effect of capital-intensive sector (0.1880) is lower than the overall level.

We mainly focus on the relationship between import dependence, FDI dependence, export dependence and industry growth. Seeing from the model (2)-(4), the linear effect of three internationalization patterns on the growth of different factor-intensive industries is similar with the whole conclusion. In other words, improvement of import dependence and FDI dependence will decrease the growth rate of factor-intensive industries. Besides the effect of export dependence on technology-intensive industries is not significant. But it can promote the growth of labor-intensive industries and technology-intensive industries. Then seeing about the nonlinear effect of different factor-intensive industries, it's indicated that there is a U-type relation of import dependence on the growth of

these industries, with the critical value of labor-intensive industries (=21.83%), capital-intensive industries (=42.09%) and technology-intensive industries (=23.28%). In the data analysis of 2008, we discover that 12 labor-intensive industries haven't reached the threshold of import dependence on promoting industry growth. Five of six technology-intensive industries haven't reached the critical value. Capital-intensive industries perform better, in which four of eight reaching the critical value. Similarly, there is a U-type relation of dependence on foreign capital on the growth of factor-intensive industries, with the critical value of labor-intensive industries (=38.53%), capital-intensive industries (=42.09%) and technology-intensive industries (=40.77%). In the data analysis of 2008, we discover that eight of twelve labor-intensive industries haven't reached the critical value of dependence on foreign capital on promoting industry growth. Eight capital–intensive industries haven't reached the critical value while five of six technology-intensive industries haven't reached. Then for export dependence, there is a significant inverted U-type relation between export dependence of labor-intensive and capital–intensive industries. The nonlinear relation of technology-intensive industries on industry growth can't be found, with the critical value of labor-intensive industries (=46.85%), capital-intensive industries(=39.09%). By analyzing the data of 2008, in eight of twelve labor-intensive industries, export reliance is positively correlated with the growth. Five of eight capital–intensive industries is in the positive section in the curve. It's revealed that improvement of export dependence of most labor-intensive and capital–intensive industries can promote the growth of industry.

Conclusion and Policy Suggestions

By putting the four internationalization patterns into a uniform production function and using Zhejiang manufacturing industry data of the year from 2002 to 2008, this paper does an empirical research on the non-linear relationship between the growth of Zhejiang manufacturing industry and the three kinds of internationalization patterns, namely, import dependence, FDI dependence and export dependence. For the panel regression of whole industry, we find that there is a U-type relation between import dependence, FDI dependence on growth of Zhejiang manufacturing industry. The critical value is 25.21% and 41.24% respectively. However there is an inverted U-shaped relation between export dependence and growth of Zhejiang manufacturing industry, with the critical value of 50.09%. According to the regression of different factor intensity, it's founded that there is also an inverted U-type relationship between import dependence, FDI dependence and growth of their own industries, with the critical value of labor-intensive industries (21.83% and 38.53%), capital-intensive industries (28.14% and 42.09%) and technology-intensive industries (23.28% and 40.77%). Besides, there exists an inverted U-type relation between export dependence and the growth of labor–intensive and capital-intensive industries, with the critical value of 46.85% and 39.09%. There is no nonlinear relation between technology-intensive industries and the growth of industry.

Based on the above analysis, we obtain the following policy recommendations: (1) We should increase employment of FDI, expand the intensity scale, improve the quality of FDI and take advantage of the positive spillover effect of FDI and rapidly stride over the threshold of non-linear effect, promoting economic growth. Although there is a U-type relation between import dependence, FDI dependence and growth of Zhejiang manufacturing industry, the effect of the dependence for

industry growth is still in downward phase of U-curve no matter for the whole manufacturing industry or different factor-intensive industries. It still can't stride over the threshold of growth effect. One reason is that Zhejiang manufacturing industry, dominated by private enterprises need more foreign capital to mergence and development. The other is that in recent years, Zhejiang lays the international focus on the export rather than import. Take the year of 2008 for example, the proportion of total import is only 31.24%, much lower than Shanghai (48.88%) and Jiangsu (43.04%). As a result, the development of import and foreign capital in most Zhejiang manufacturing industries should stride over the threshold of nonlinear growth to promote industry development. (2) We should control the export growth properly, enhance the added value of export products and increase the proportion of export in capital-intensive and technology-intensive industries to achieve the transition from the "quantity" to "quality" of export. This paper finds that many industries are still in the positive section of inverted U curve. But if we emphasis on export constantly, it will play less and less role in economic growth with the further increase in the proportion of export. So it's needed to balance the proportion in export of factor-intensive industries. Besides it's also important to control export preference in labor-intensive industries and encourage export in capital-intensive and technology-intensive industries to play the role in growth promotion better. For the excessive export industries that already have stridden over the critical point, it's necessary to control the growth of export and explore international ways of outward FDI (ODI) actively. (3) We should attach great importance to the combination, dynamic and industry difference.

Research finds that at the present international stage of Zhejiang manufacturing industry, only export model is in the rising stage of inverted U-type curve in most industries. But import and foreign capital dependence can't enter the rising stage. Thus it can be seen that the internationalization policies in Zhejiang manufacturing industries should consider reasonable combination and collocation to enhance growth effect. Based on the limitation of scale development, we should improve quality in the export.

However it's proper to expand import and foreign capital scale to upgrade industry transformation. It's required to strive and to avoid the conflicts from growth effect of different internationalization patterns in internationalization development. For example, increase of import and foreign capital brings the extensive export growth, which prematurely force export entry into he downward phase of inverted U-curve and cause slow economic growth.

Reference

Bao Qun, Xu Helian and Lai Mingyong: Trade Openness and Economic Growth: Theory and Empirical Research on China, the world economy [J], 2003(2): 10-18(in Chinese)

Bao Qun: only a linear relation, the world economy [J], 2008（9）：3-18(in Chinese)

Feng Xiaohua, Zhang Yuying: The Welfare Effects of Exchange Rate Fluctuations---Basing on Empirical Research on Panel Data of Manufacturing Industry, Journal of International Trade[J], 2009（9）：107-116(in Chinese)

Guo Qingbin, Fang Qiyun: Spillover Effect of International Research and Development (R&D): Based on the Empirical Research from 1985-2005, Journal of International Trade[J], 2009（4）：87-92(in Chinese).

Helpman, E., Melitz M. J., and Yeaple, S. R., Export versus FDI with Heterogeneous Firms, American Economic Review, 2004, 94(1): 300-316

Keller, W., and Yeaple. S. R., Multinational Enterprises, International Trade, and Productivity Growth: Firm-Level Evidence from the United States. April 2007, Working paper.

Kohli, I. and Singh, N., Exports and Growth: Critical Minimum Effort and Diminishing Returns. Journal of Development Economics, 1989, 30: 391-400

Lee, G., The effectiveness of international knowledge spillover channels. European Economic Review, 2006, 50: 2075–2088

Li Xiaoping, Zhu Zhongdai: International Trade, R&D Spillover and Productivity Growth. Economic Research Journal[J], 2006（2）:31-43

Lichtenberg, F. R., and Potterie BP de la. International R&D spillovers: A comment. European Economic Review, 1998, 4: 1483-1491.

Omisakin, O., Adeniyi, O. and Omojolaibi, A., Foreign Direct Investment, Trade Openness and Growth in Nigeria. Journal of Economic Theory, 2009, 3(2):13-18

Potterie BP de la and Lichtenberg, F., Does Foreign Direct Investment Transfer for Technology across Board?. The Review of Economics and statistics, 2001, 83 (3): 490～497

Wang Ying, Liu Sifeng: Empirical Research on International Technology Spillover Channels, Journal of Quantitative & Technical Economics [J], 2008（4）:153-161(in Chinese)

Xu Helian, Wei Yingqi, Lai Mingyong, Wang Chengang: The Analysis of Effect on Backward Linkage of Foreign Direct Investment, Management World[J], 2007（4）:24-31(in Chinese).

Table 1 Estimation results of panel data

Explanatory variable	Model（1）Whole manufacturing industry	Model（2）Labor -intensive	Model（3）Capital -intensive	Model（4）Technology-intensive
c	0.2667*** (2.8629)	0.0050 (0.0150)	0.7859 (1.3331)	-0.0298 (-0.0574)
im	-0.0218*** (-6.6768)	-0.0135** (-2.1928)	-0.0305*** (-3.2442)	-0.0210*** (-5.8587)
im^2	0.0004*** (8.4395)	0.0003*** (2.8515)	0.0005*** (3.1142)	0.0005*** (5.4870)
fdi	-0.0592*** (-19.7675)	-0.0646*** (-8.0038)	-0.0542*** (-3.9620)	-0.0614** (-2.3576)
fdi^2	0.0007*** (19.3656)	0.0008*** (8.0794)	0.0006*** (4.1335)	0.0008** (2.0817)
ex	0.0093*** (3.7259)	0.0114*** (2.8634)	0.0152* (1.8501)	0.0032 (0.6973)
ex^2	-0.00009** (-2.4602)	-0.0001** (-2.0549)	-0.0002* (-1.9048)	0.000006 (-0.1296)
LnK	0.5501*** (19.0669)	0.5282*** (10.7997)	0.5757*** (5.7501)	0.5217*** (5.5305)
LnL	0.2305*** (14.4807)	0.2467*** (10.7652)	0.1880** (2.4783)	0.2785*** (6.2912)
Adj.R^2	0.9141	0.8920	0.8979	0.8681
F	48.1902***	28.9060***	23.4480***	14.1804***
Obs	189	91	56	42
F test	4.4187***	2.8904***	3.1506***	4.1303***
Hausman test	78.3243***	24.8483***	/	/
FE or RE	FE	FE	FE	FE

Notes: ***, **, * shows statistically significant at 1%, 5%和0%. The number in internal bracket is value t. To save space, the fixed effect of regression results is omitted. F test determines the estimation model to choose generalized least square method or fixed effect model. FE and RE indicate the adoption of fixed effect model and random effect, respectively. When the value of Hausman test is significant in the level of 10%, it should adopt fixed effect model (FE), otherwise random effect (RE). For the cross-section greater than the number of variables is the prerequisite of random effect, fixed effect model is adopted in capital-intensive and technology-intensive industries.