

нансовой и компьютерной грамотности, что позволит решать проблемы самореализации и обеспечения жизнедеятельности конкретного индивидуума. Работаящие в цифровой экономике должны уметь мыслить критически, обрабатывать большие объемы информации, быть гибкими и уметь решать проблемы цифрового мира, что трансформирует взаимоотношения обучаемого и преподавателя.

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## EXPORT, INNOVATION AND PRODUCTIVITY'S CHOICE

### I. Introduction

Most of the theories of industrial dynamics, such as Jovanovic (1982), Hopenhayn (1992), Melitz (2003), assume that firms are born with some kind of intrinsic productivity or efficiency, ie productivity. High productivity companies can survive and develop in the tide of market competition, low productivity companies cannot maintain business in the competition, out of the market. These models assume that the productivity distribution of the enterprise is exogenous, so the likelihood that the firm will survive depends on the lucky randomness. This assumption makes the impact of business decision-making on productivity is not important, cannot reasonably explain the factors that affect the productivity of the enterprise before the export.

However, a very important phenomenon in the real economy is that there is a clear correlation between enterprise productivity and its own export activities and innovative behavior. As a result of the high productivity characteristics of enterprises in advance to determine the choice of enterprises to enter the export market, commitment to open up the international export market, a variety of fixed costs, in the fierce competition in the international market to survive, the successful export. This shows that the previous decision-making behavior of enterprises to understand the effect of market selection is essential. But there is a lack of reasonable theory to explain why some companies began to have high productivity, and foreign exports to participate in the international market for enterprise productivity will have what feedback effect. This paper constructs the heterogeneity model framework of enterprise technology selection and export trade. It is found that enterprise innovation activities have a significant self — selection effect. Large — scale and higher — productivity enterprises are more willing to carry out innovation activities and technological upgrading. At the same time, from the perspective of the impact of export trade on enterprise innovation, with the development of trade liberalization, the expansion of enterprises is accompanied by the fact that export enterprises are more innovative and use new technologies, so export participation factors can improve the innovative tendencies, At the same time, export enterprises are generally more willing to innovate and adopt new technologies than non-export enterprises, and export and innovation activities can jointly improve enterprise productivity.

## II. Measurement Model Setting and Empirical Results

### (I) Variable Selection and Description

This paper analyzes the influencing factors of enterprise export and innovation joint decision, that is, studies the current enterprise productivity, export experience, innovation experience and other heterogeneity characteristics, for the impact of the future export of enterprises and innovative joint behavior choice, the specific setting of the measurement model is as follows.

$$\Pr(\text{choice}_{it} = 1 | \varphi_{it-1}, x_{it-1}) = \beta_0 + \beta_1 TFP_{it-1} + \beta_2 EX_{it-1} + \beta_3 Innov_{it-1} + \\ + \lambda' Z_{it-1} + \delta_r' ind_r + \gamma_k' \text{regin}_k + \theta_t' \text{year}_t + \mu_{it}.$$

In addition to the value of choice from small to large (from 1–4), respectively, on behalf of non-export / non-innovative enterprises, a single export enterprises, a single innovative enterprises and innovation and export enterprises four.

#### 1. Enterprise Export, Innovation choice Variable

Choice variables, on behalf of enterprises in accordance with the export, innovation activities, different types of participation, divided into four types of enterprises. According to the value of choice from small to large (from 1–4), respectively, on behalf of non-export / non-innovative enterprises, a single export enterprises, a single innovation and innovation and export enterprises four types.

#### 2. Total Factor Productivity TFP

In view of the fact that the total factor productivity of the OLS least squares method used in the traditional method has the problem of endogenous and sample selection errors, The OP method of Olley-Pakes (1996) can solve these two problems well. Therefore, the total factor productivity calculated by OP method is taken as the basic measure variable of TFP, and the numerical analysis of TFP is carried out.

#### 3. Export Variable EX

The selection of the export variable EX of the enterprise is analyzed by exporting the binary state variables. Define the binary discrete state variable EX of the enterprise's export participation, then EX = 1 for the enterprise export, otherwise 0.

#### 4. Innovation Variable innov

In general, the commonly used variables that measure R & D and innovation activities typically include variables in terms of innovation inputs and variable performance variables. In terms of innovation input variables, the main use of R & D investment expenditure to measure; and in the innovation output variables, the use of corporate R & D activities generated by the number of patents or new product output to measure. Because of the lack of enterprise patent data in the data samples of enterprise survey statistics, this paper mainly uses R & D expenditure and new product output variables as the proxy variables of input and output of enterprise innovation activities.

#### 5. Enterprise Scale

Enterprise size is an important feature of the enterprise, the empirical paper on the size of the enterprise is very large. Commonly used proxy variables, mainly sales income, the total number of employees, the total assets of enterprises, these three kinds of variables are different applications, but usually the most commonly used is the enterprise sales revenue variables. Therefore, this paper uses sales revenue as the main agent variable of enterprise scale, and also considers the possible existence of enterprise scale and R & D innovation factors have a nonlinear relationship, so the sales income of the second term analysis.

#### 6. Control Variables

(1) Industry variable ind, according to the statistical classification of the statistical bureau, according to 2-digit code to generate 30 manufacturing industry dummy variables.

(2) Regional variable regin, according to China's provinces, municipalities and autonomous regions of the administrative region code, generate 31 regional dummy variables.

(3) Year variable year, in order to control the impact of different years of macroeconomic impact, such as the appreciation of the RMB exchange rate, economic fluctuations, policy changes, generate three year dummy variables.

(4) Ownership variable owner, taking into account the different types of ownership of enterprises on the enterprise productivity, business innovation and other business decisions have an important impact, especially the state-owned enterprises, foreign-owned enterprises of the type of ownership. So the type of ownership of the enterprise to control, according to the ownership type code, produce owner dummy variable. The variables are from 1 to 6, respectively, representing the state-owned enterprises, collective enterprises, private enterprises, Hong Kong, Macao and Taiwan investment enterprises and foreign-invested enterprises and other types of enterprises.

## (II) Measurement Results

Multinomial Logit measurement results of export, innovation decisions

| Dependent variable choice <sub>it</sub><br>(Use choice = 1 as the reference type) | (1) Single exit<br>Choice = 2 | (2) Single innovation<br>Choice = 3 | (3) Export and innovate<br>Choice = 4 |
|---|-------------------------------|-------------------------------------|---------------------------------------|
| TFP <sub>it-1</sub>   | -0.058*<br>(0.0267)           | 0.537***<br>(0.0212)                | 0.644***<br>(0.0279)                  |
| EX <sub>it-1</sub>  | 4.604***<br>(0.0146)          | -0.564***<br>(0.0258)               | 4.110***<br>(0.0217)                  |
| innov <sub>it-1</sub>   | -0.648***<br>(0.0227)         | 3.151***<br>(0.0140)                | 2.638***<br>(0.0212)                  |
| State — owned enterprises   | -0.461***<br>(0.0609)         | 0.140***<br>(0.0348)                | 0.361***<br>(0.0512)                  |
| Collective enterprises  | -0.258***<br>(0.0432)         | -0.583***<br>(0.0378)               | -0.636***<br>(0.0563)                 |
| Private enterprise  | 0.0252<br>(0.0193)            | -0.301***<br>(0.0155)               | -0.380***<br>(0.0226)                 |
| Hong Kong, Macao and Taiwan enterprises   | 1.141***<br>(0.0246)          | -0.121***<br>(0.0291)               | 0.499***<br>(0.0308)                  |
| Foreign companies   | 1.316***<br>(0.0244)          | -0.014<br>(0.0274)                  | 0.802***<br>(0.0292)                  |
| Industry fixed effect   | Yes                           | Yes                                 | Yes                                   |
| Regional fixed effect   | Yes                           | Yes                                 | Yes                                   |
| Year fixed effect   | Yes                           | Yes                                 | Yes                                   |
| Observed values   | 433229                        |                                     |                                       |
| Pseudo R <sup>2</sup>   | 0.4997                        |                                     |                                       |
| Logarithmic likelihood  | -227739.41                    |                                     |                                       |

Note: \* and \*\* and \*\*\*, respectively, that the coefficient at 5 %, 1 % and 0.1 % level significantly.

From the model estimation results, we obtained the following findings:

1. TFP coefficient is negative and significant compared to non-export and non-innovative enterprises, indicating that export participation does not reflect the advantage of productivity selection, but shows the productivity paradox, which may reflect the important reality that China's enterprises are heavily involved in export processing trade. Enterprises often do not need high productivity to participate in processing trade to realize export, which may not reflect the difference of corporate ownership; the EX coefficient is positive, indicating that the export experience has a significant effect on the export decision; the innovation coefficient is negative, indicating that the innovation experience has a negative effect on the single export decision, the export enterprise is in the low-end production chain of the value chain; different types of enterprises of different types of export tendencies are different, state-owned

and collective enterprises do not tend to a single export, foreign companies significantly inclined to export.

2. The TFP coefficient is positive and reflects the high productivity characteristics of the innovation activity participant in the single innovation enterprise. The EX coefficient is negative, indicating that the export participation does not promote the enterprise's innovation participation; innovation experience on the implementation of innovative activities, has a significant role in promoting; state-owned enterprises tend to higher innovation, private enterprises tend to lower innovation.

3. The TFP coefficient is the highest coefficient, which reflects the highest productivity characteristics of the enterprises participating in export and innovation activities at the same time, and conforms to the theoretical prediction of the heterogeneity model. EX coefficient is positive, indicating that export experience has a catalytic role; innovative experience on the implementation of innovative activities, but also has a significant role in promoting; state-owned enterprises and foreign-funded enterprises, while engaging in these two activities tend to be higher.

### **III. Conclusion and Further Study of the Direction**

This paper describes the problem of productivity selection in the decision-making process of heterogeneous enterprises entering the export market and technology upgrading. Based on the microscopic data of Chinese manufacturing enterprises from 2005 to 2007, this paper validates the conclusion of theoretical model. The results show that the total factor productivity of enterprises is very important in the role of enterprises in export and innovation decision making. The innovation activities of enterprises are reflected in the self-selection effect of productivity.

From the explanatory power of the measurement model, the overall low, indicating that the performance of China's manufacturing enterprise productivity analysis is still inadequate, but also need to continue to further study the other factors and mechanisms of action. In fact, this paper because the data sample time is too short, there is no strict distinction between continuous export enterprises and new export enterprises, and failed to introduce trade liberalization of the proxy variable, cannot fully identify the export market with the expansion of the scale of exports, innovation and joint decision-making and complementary relations. Therefore, the study of this paper is still only a further in-depth exploration of the starting point.

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## **АНАЛИТИКА РЫНКА ТРУДА В УСЛОВИЯХ ЦИФРОВИЗАЦИИ ЭКОНОМИКИ**

Информация играет центральную роль в регулировании рынка труда в условиях цифровизации, согласовании спроса на труд и его предложении, снижении информационной асимметрии. При анализе рынка труда в качестве эмпирической базы используются статистические и частично административные данные, что не является достаточным для понимания современных тенденций на нем и принятия решений. Для эффективного регулирования рынка труда в этих условиях нужно принятие решений на основе анализа данных в реальном режиме времени, возможность предвосхитить появление новых профессий или тенденций. Такие знания становятся необходимыми для участников рынка труда и органов государственного управления, создавая возможность понимать динамику рынка труда и предвосхищать его тенденции. Но множество источников информации дают вариативность в представлении рынка труда.