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The impact of import trade on the high-quality development of China's economy—Analysis based on innovation perspective

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Abstract: *The article uses panel data from a total of 31 provinces in mainland China from 2008 to 2018, and uses the intermediary effect method to test the impact of import trade on high-quality innovation, empirically examines the impact of import trade on innovation, and then finds that imports How does trade affect high-quality development. The study found that the protection of intellectual property rights in import trade has an indirect impact on high-quality development. Based on this, change the purpose of importing high-tech products and strengthen our company's ability to learn and imitate. In terms of imports, we should further increase the tax difference between high-tech products and low-tech content products to encourage enterprise innovation; use the intellectual property protection system to improve Some companies that infringe upon others' enterprises will impose penalties to protect the economic benefits of small, medium and micro enterprises using innovation; we urge banks and other financial institutions to inject funds into small, medium and innovative enterprises; we need to implement fiscal reductions and exemptions across the country to solve the financing difficulties of small, medium and micro enterprises, etc. Problem: Formulate a protective tax system that adapts to national conditions and promote the further development of innovative enterprises.*

Keywords: *Import trade; high-quality development; technological innovation; intermediary effect*

1. Introduction

Since China's reform and opening up in 1978 and its accession to the World Trade Organization in 2001, China's economy has been growing at a double-digit rate in the past few decades. At that time, the troika driving China's rapid economic development was It is exports, investment, and consumption. Among them, exports are the "bull nose" that drives economic growth. Another way of understanding is that the growth and development of exports drives consumption and investment. The miracle of China's economic growth in the past few decades can be attributed to export-oriented. After China joined the World Trade Organization, China has actually become a "processing factory" for developed countries such as the United States in the world. We can understand this development status from these two aspects. The first aspect is that China wants to join the world economic and trade environment dominated by Western developed countries such as the United States. Due to the early stage of China's economic development, its technological level is comparable to that of developed countries. There is a big gap. According to the theory of comparative advantage, China can only participate in the international trade environment by relying on its own cheap labor. Although this type of participation can accelerate China's integration into the general environment, it also brings about unbalanced and insufficient development. Coordination and unsustainability issues. The second aspect is that China's integration into global trade is mainly affected by the low level of China's economic development. In the international market, China can only rely on the large demand from developed countries such as Europe and the United States to drive economic growth. Excessive dependence on foreign trade is not conducive to China's long-term economic growth.

The above model, which mainly relies on exports to drive economic development, has become increasingly unfavorable to China's development after the 2008 international financial crisis. In addition, the Sino-US trade friction that began in 2017 has pushed the development of this model into Bottom of the valley. In recent years, under the background of the prevalence of global unilateralism and trade protectionism, China's original high-speed export growth model has faced problems such as low quality and efficiency. At the same time, it has also faced many uncertainties due to the deterioration of the world trade situation. Economic development brings a lot of instability. At the same

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time, in the past decades of economic growth, the price of labor in China has become no longer cheap, China's natural resources have gradually been depleted, and China's environment has become more and more deteriorating to waste resources and the environment. Economic growth at the expense of destruction has hindered China's further development.

In response to this series of problems, at the 19th National Congress of the Communist Party of China in 2017, the concept of high-quality development was first put forward, which also shows that the Chinese economy should shift from a stage of rapid growth to a stage of high-quality development. The report of the 19th National Congress of the Communist Party of China also clearly pointed out that China should establish and improve the economic system of green and low-carbon circular development, which pointed out the direction for high-quality development in the new era. At the same time, this is also an extremely important topic of the times.

Through the above description, this article will study the indicators of high-quality development, the relationship between imports and high-quality development, and how imports affect high-quality development.

2. Literature review

Domestic and foreign studies on the impact of import trade on my country's technological innovation capabilities. First, Coe and Helpman (1995) established a CH trade spillover model, and then found from an empirical point of view that both domestic and foreign R&D can improve the importing country's capacity. Total factor productivity, which is what we call TFP, this discovery confirms that imported technology spillovers have become an important source of technological innovation and development in a country. At the same time, Lichtenberg and Pottelsberghe (2018) created the LP model by improving the CH model of the former. They also concluded that import trade will have technology spillover effects on importing countries. The empirical studies of Wang, Olarreage (2002) and Blyde (2004) also found that import trade in international trade also improves the technological innovation capabilities of importing countries. In recent years, the impact of import trade on my country's technological innovation has also attracted the attention of domestic scholars. Fang Xihua (2004) used my country's foreign trade data from 1978 to 2000 to conduct an empirical study and concluded that importing countries continue to expand scientific research expenditures and scientific and technological innovation expenditures through import trade, and through this approach, the scientific and technological innovation capabilities of importing countries continue to improve. The empirical research of Zhao Wei, Wang Quanli (2006) and Zhang Quanhong (2008) also found that import trade has a significant technology spillover effect on China.

Import trade also has regional differences in technological innovation. For example, Mao Qilin (2010) used my country's inter-provincial panel data from 1998 to 2007 and adopted dynamic panel generalized moment estimation measurement methods to empirically study the influence of import trade on China's technological innovation. Impact. The results of empirical research found that the impact of import trade on China's technological innovation has regional differences, which can be further understood as a phenomenon that the degree of impact is diminishing from the eastern region to the western region.

At the same time, some domestic and foreign scholars classify imported goods and study their effects on the technological innovation of import-competing enterprises. For example, Chu Mingqin and Ding Ping (2013) divided imported goods into intermediate goods, capital goods, and consumer goods, and tested the R&D spillover effects of China's imports of intermediate goods and capital goods from G7, Singapore and South Africa. The results of the empirical test found The spillover of foreign R&D gained from imported intermediate products has a significant role in promoting domestic scientific and technological progress. Xing Xiaobing, Xu Jiexiang, and Wang Yang (2018) found through analysis using mathematical economic models that importing low-tech products may promote technological innovation in importing countries through competitive effects. At the same time, they used 48 countries' transnational panel data from 2004 to 2014. The empirical analysis found that the import of high-tech products has a significant negative impact on the technological innovation of importing countries, while the import of low-tech products has a significant positive impact on technological innovation.

Some scholars also believe that the innovative effect of import trade on an enterprise mainly depends on the level of productivity of the enterprise. Li Ping and Shi Yaru (2020) used relevant data such as China's industrial warehouse and Haiku from 2000 to 2013, and constructed import value

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substitution variables at the product level and industry level. System analysis. It is found that the impact of imports on enterprise innovation depends on the productivity level of the enterprise. The higher the productivity of the enterprise, the more obvious the promotion effect of imports on innovation, and this promotion effect only appears in enterprises with higher productivity levels.

In summary, domestic and foreign economists hold positive opinions on the promotion of importing country's technological innovation level by import trade, but most of the domestic and foreign literatures analyze the role of import trade on the promotion of enterprise innovation ability from the enterprise level. Only a handful of documents are analyzed from the regional level. This article selects 31 provinces in mainland China as representatives to study the improvement of my country's technological innovation capabilities by import trade and further examine the role of import trade.

3. Empirical research framework and index measurement

3.1 Selection of indicators

3.1.1 Selection of explained variables

To measure the high-quality development level of a region, this article uses Wang Huiyan's (2019) research to use scientific and technological innovation capabilities as its indicator. Since the number of patents of an enterprise represents the innovation capability of an enterprise, the number of patents in a region also represents the innovation capability of its region. Among them, patents are generally divided into three types: invention patents, use model patents, and design patents. The gold content and technological content of the three patents are also different. Among them, invention patents have the most technological content; the second is utility model patents, which have less technological content; and the last is Appearance design patent, less technology content. Patent applications are generally divided into two stages, from application to acceptance, and then from acceptance to authorization. This article adopts the number of invention patent applications and authorizations of each province each year. This is because the authorization of invention patents can better represent the level of technological innovation in a region. The area of a province is large or small, and its resident population is also small. If the number of patents in a province is used to determine the level of innovation capability, it is obviously contrary to reality. Comparing the total number of patents with its permanent population, the number of patents per capita obtained can better reflect the size of the province's scientific and technological innovation capabilities.

3.1.2 Selection of explanatory variables

Since we are studying the impact of import trade on high-quality development, and we take technological innovation as an indicator of high-quality development, the core explanatory variable should be the import amount of each province in year i. Because the import amount is too large, we are It takes the logarithm for processing.

3.1.3 Selection of control variables

There are many factors that affect the innovation capability of a region. Add the influencing factors to the control variables to make it a set of factors. This set includes international direct investment (FDI), the average provincial unit's GDP (per capita GDP)), the number of science and technology research and development personnel of listed companies, the science and technology research and development expenditures and fixed capital of listed companies, and the stock of deposits in financial institutions. Among these variables, we use the actual use of foreign direct investment per capita in a province to measure the factor of foreign direct investment (FDI); we use the natural comparison between the province’s total production value in a year and the province’s total resident population ratio. To measure the per capita GDP per capita (GDP per capita); we use the full-time equivalent of scientific and technological R&D personnel in listed companies in each province to measure RDP; we use the scientific research funding of listed companies in each province to be The ratio of the province’s gross national product to measure research and development expenditure (RDE); we use the ratio of the province’s total fixed capital formation to the province’s GDP to measure fixed capital (FC); we use the balance of foreign currency deposits in financial institutions The logarithm of is used to measure the deposit balance (De) of financial institutions.

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3.2 Measurement model setting

This article builds a benchmark model to test the impact of import trade on innovation:

$$\mathrm{Inn\_ap_{it}} = \mathrm{A_1} + \mathrm{B_1 LNimp_{it}} + \mathrm{C_1 control_{it}} + \mathrm{D_i} + \varepsilon_{it} \quad (1)$$

$$\mathrm{Inn\_am_{it}} = \mathrm{A_2} + \mathrm{B_2 LNimp_{it}} + \mathrm{C_2 control_{it}} + \mathrm{D_i} + \varepsilon_{it} \quad (2)$$

In the above formula, i and t represent province and year respectively. Is the number of patent applications per capita in the province i in the t year; is the number of patent grants per capita in the province i in the t year. Impit is the amount imported by the province i in year t. A, B, and C are the parameters to be estimated, which are fixed effects and random error terms.

This article uses Wen Zhonglin's method of analyzing the intermediary effect perfected in 2014. The model is as follows.

$$\mathrm{Inn\__{it}} = \mathrm{A_1} + \mathrm{B_1 LNimp_{it}} + \mathrm{C_1 control_{it}} + \mathrm{D_i} + \varepsilon_{it} \quad (3)$$

$$M_{it} = A_2 + B_2 LNimp_{it} + \mathrm{C_2 control_{it}} + \mathrm{D_i} + \varepsilon_{it} \quad (4)$$

$$\mathrm{Inn\__{it}} = \mathrm{A_3} + \mathrm{B_3 LNimp_{it}} + \theta_1 \mathrm{M_{it}} + \mathrm{C_3 control_{it}} + \mathrm{D_i} + \varepsilon_{it} \quad (5)$$

In the above formula, M is an intermediate variable, and we use the intellectual property protection index to measure this variable. Formulas (3), (4), (5), when B1, B2, B3 and B2* are the same sign as B1, then there is a partial mediation effect; when B1, B2, B3 and are both significant, B2* When the sign is different from B1, it is a masking effect; when B3 is not significant and all explanatory variables and mediating variables are significant, then it is a complete mediating effect.

3.3 Data source

This article mainly uses the panel data of 31 mainland provinces in China from 2008 to 2018. The data mainly comes from the People's Bank of China, China Marketization Index, China Statistical Yearbook and China Science and Technology Statistical Yearbook, using interpolation to deal with missing data. The figure below shows the descriptive statistics of the main variables.

Table 1 Descriptive statistics

variable	Observed value	average value	Standard deviation	Minimum	Max
Inn_ap	310	0.001711	0.002534	0.000055	0.015513
Inn_am	310	0.000932	0.001422	0.000033	0.009071
LNimp	310	14.28035	1.793372	7.672479	17.82218
FDI	310	0.017712	0.028054	7.25e-06	0.205809
GDP per capita	310	45741.11	25035.4	9855	140211.2
RDP	310	0.001613	0.001804	7.28e-06	0.008208
RDE	310	94.36387	53.89392	2.535193	218.6415
FC	310	0.6040679	0.19112	0.26923	1.4928
De	310	10.00775	1.019422	6.72022	12.17837

4. Benchmark estimation results and analysis

4.1 Benchmark regression

This article pays more attention to the impact of import trade on the high-quality development of various provinces. As mentioned above, scientific and technological innovation is used as an indicator of high-quality development. Now we perform regression analysis on the above models (1) and (2). Model (1) is the benchmark regression of import trade volume to per capita patent applications, and model (2) is the benchmark for import trade volume to per capita patent authorization. return. At the same time, the above two models passed the Hausman test, and the results strongly reject the null hypothesis, so we use the fixed-effects model. The regression analysis is shown in the following table.

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Table 2 Import trade volume and technological innovation capacity: fixed effects model

variable	Inn_apModel(1)	Inn_amModel(2)
LNimp	-0.00038***	-0.00017**
	(-2.80)	(-2.23)
FDI	0.01010	0.00677
	(0.75)	(0.76)
GDP per capita	1.09e-07***	6.24e-08***
	(4.13)	(3.59)
RDP	0.28997	0.08865
	(1.11)	(0.642)
RDE	-9.71e-06*	-5.49e-06**
	(-1.75)	(-2.08)
FC	-0.0009**	-0.00050*
	(-2.24)	(-1.96)
DE	-0.0011**	-0.0007**
	(-2.59)	(-2.51)
Constant term	0.01434***	0.00802***
	(3.09)	(2.76)
Observations	310	310
R^2	0.7684	0.7151

Note: *, **, *** are significant at the 10%, 5%, and 1% significance level respectively, the same below

We can see from the above table that contrary to the expected research results, the import trade and the number of invention patent applications per capita are significantly negatively correlated with the number of invention patent authorizations per capita. Our country's trade structure is responsible for this phenomenon. main problem. Liu Zhidong's research in 2019 found that the level of technological innovation in the U.S. core manufacturing industry has been improved to a certain extent due to the export of China's domestic manufacturing products. From this research result, we can conclude that China's manufacturing industry The export of products will have a considerable impact on low-end industries in developed countries such as the United States, but has little impact on high-tech industries. At this stage, the high value-added output and imports of our country's export commodities account for a relatively large proportion. Because of the reduction of the cost and return profit cycle and the need for listed companies to prepare large-scale reports, companies are unwilling to pay too much. R&D expenditure to improve its own technology, this problem makes China's R&D investment in any industry too small. The backwardness of technology in high value-added industries will keep China's economy under control of other countries. For example, the Sino-US trade friction in 2017 and China's backwardness in high-tech industries have made China a passive position in this friction. China imposes a ban on sales of products with high content, and has long used the "negative list" to suppress China's national enterprises, especially some high-tech enterprises, such as ZTE and Huawei.

Foreign direct investment (FDI) does not have a significant impact on innovation. The reason may be that at the beginning of our country's reform and opening up, foreign businessmen made large-scale international direct investment in China's Pearl River Delta and Yangtze River Delta, which not only brought a lot of Fiscal and financial funds also brought some advanced technologies to promote China's development. These conditions promoted the improvement of China's high-quality innovation level at that time. With the outbreak of the financial crisis in 2008 and Western developed countries led by the United States, they were afraid of China's economy. The rise of foreign companies began to restrict the import of advanced technology into our country, which made foreign direct investment in recent years to import management experience and capital mainly, and the core technology has always been mastered by the foreign parent company.

The impact of RDP on innovation is not significant. The reason may be that we have selected data from the past ten years, but according to relevant data, researchers have only begun to invest in large-scale research and development in recent years. Obtaining results may take a certain period of time, so R&D personnel do not play a lot of role in innovation.

Research and development expenditures (RDE) are negatively correlated in models (1) and (2) in Table 2. The reason may be that companies spend a lot of money to purchase and invest in fixed assets such as real estate, and in relatively short research The large amount of capital investment during the period did not actually work. Due to financing difficulties and their own operations, small, medium and micro enterprises do not have a large amount of funds to maintain huge investment in research and

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development; large listed companies pay more attention to short-term profits instead of long-term economic benefits in order to keep their stock prices rising in the short term , Which makes these companies need to reduce short-term research and development expenditures to make the financial statements beautiful.

Fixed capital (FC) is negatively correlated with innovation. There may be two reasons for this. The first point is that in the past 10 years, Chinese society has been at a key node in the transformation of economic development. Various industries have begun to transform due to the financial crisis in 2008, and the old and new industries have continued to evolve. Appearing in industries with low added value and low technology content, industry transformation takes a certain amount of time, and new investment in fixed capital in the technology industry requires a certain amount of time to perform its due function. The second point is that there is a part of innovation output that is not caused by fixed capital investment.

Financial institution deposits (DE) are also negatively correlated with innovation. There is a common phenomenon, such as large state-owned enterprises with low production efficiency and low innovation level. Due to their large size, they produce more products. , Even if the added value of the product is low, it can still obtain greater benefits; but those small, medium and micro enterprises with high technology content are relatively small and small in size. If they are not guaranteed by high-credit enterprises, this type of It is extremely difficult for companies to obtain financing loans. The greater the deposits of Zhongrong institutions are only the result of large-scale companies accumulating small profits, because they will not invest large amounts of profits in technological research and development.

4.2 Endogenous test

In the benchmark regression, some variables related to import trade and affecting high-quality innovation may be omitted. This is mainly because high-quality innovation ability will be affected by the previous period of high-quality innovation, so this paper constructs the lag of high-quality innovation in the model to re-regress, and forms a dynamic panel model, which uses a lag period to test.

Table 3 Endogenous test

variable	Inn_apModel(1)	Inn_amModel(2)
Inn_ap^	0.41024*** (3.50)	
Inn_am^		0.5605*** (24.78)
LNimp	-0.00024** (-2.08)	-0.0001*** (-6.08)
FDI	-0.0139*** (-17.21)	-0.0018** (-2.55)
GDP per capita	6.01e-08*** (5.49)	3.14e-08*** (13.54)
RDP	0.2047* (1.66)	-0.0133 (-0.59)
RDE	3.06e-06 (1.05)	-2.5e-07 (-0.23)
FC	-0.0001 (-0.59)	-0.0001 (-1.00)
DE	-0.0006*** (-2.81)	-0.0004*** (-6.24)
Observations	279	279

Note: The symbol in the quotation mark of "^" is the value of the above variable lagging one period

The results show that the one-period lagging coefficients of the number of invention patent applications per capita and the number of invention patent authorizations per capita both show a significant positive correlation. However, import trade is still significantly negatively correlated with the number of patent applications per capita and the number of patent authorizations per capita. Other controls The results of the variables are also similar to the results of the fixed effects model. In

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summary, the empirical results of the previous articles are considered stable and reliable.

4.3 Intermediary effect test

Tables 4 and 5 are the test results of the intermediary effect of import trade on per capita invention patent applications and authorizations, which are used to illustrate that intellectual property protection has the function of intermediary variables.

Table 4 Mediation effect test A

variable	MModel(4)
import	-2.473** (-2.60)
FDI	40.586 (1.08)
GDP per capita	-0.00016 (-1.25)
RDP	795.57 (0.69)
RDE	0.04163 (1.95)
FC	-3.589* (-1.75)
DE	5.885** (2.30)
Constant term	-12.742 (-0.64)
Observations	310

Table 5 Mediation effect test B

variable	Inn_apModel(5)	Inn_amModel(5)
M	0.00002** (2.58)	0.00001** (2.44)
import	-0.0003** (-2.49)	-0.0001** (-2.08)
FDI	0.0084 (0.51)	0.00706 (0.73)
GDP per capita	1.10e-05** (2.12)	5.29e-04* (1.71)
RDP	0.3030 (0.70)	0.1395 (0.48)
RDE	-8.05e-04 (-1.39)	-1.78e-04 (-0.59)
FC	-0.0009* (-1.91)	-0.0005* (-1.82)
DE	-0.0012 (-1.57)	-0.0006 (-1.30)
Constant term	0.0146* (1.85)	0.0065 (1.47)
Observations	310	310
R^2	0.7183	0.6632

From the above table, the product of the import coefficient of the Inn_ap model in Table 5 and the M coefficient of the Inn_ap model in Table 5 is negative, and the import coefficient of the M model in Table 4 is also negative. According to the above expression, it can be concluded that this is Part of the mediation effect, according to calculations, the ratio of this mediation effect to the total effect is 0.455. The product of the import coefficient of the Inn_am model in Table 5 and the M coefficient of the Inn_am model in Table 5 is a negative value, and the import coefficient of the M model in Table 4 is

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also a negative value. According to the above description, this is a partial mediation effect. The ratio of the mediating effect to the total effect is 0.145.

The above description illustrates the mediating effect of intellectual property protection in the impact of imports on innovation. The coefficient of intellectual property protection is significantly positive. This result shows that the number of patent applications per capita and the number of patent grants per capita can be increased. It mainly promotes innovation through two aspects: on the one hand, intellectual property protection increases the cost of imitation, thereby forcing economic entities to proceed. Innovation; on the other hand, the protection of intellectual property rights increases the economic benefits brought about by innovation, thereby promoting innovation by economic entities.

5. Conclusions and suggestions

This article uses panel data from a total of 31 provinces in Mainland China from 2008 to 2018, and uses the intermediary effect method to test the impact of import trade on high-quality innovation, thereby deriving the impact of imports on high-quality development. The research found that: First, import trade is negatively related to the number of per capita invention patent applications and per capita number of invention patent authorizations; second, intellectual property protection is an intermediary that imports have an effect on per capita invention patent applications and authorizations.

First, in view of the negative correlation between import trade and per capita invention patent applications and authorizations, China has imported some low-tech products in recent years, because the United States and other developed countries have blocked China’s technology, which has led to high imports. Quality products become extremely difficult. In this matter, China should make extensive diplomatic relations with neighboring countries, increase policy constructions such as the “Belt and Road”, exclude the intervention of countries such as the United States, and import high-tech products from countries along the “Belt and Road” through continuous learning. Create, make import trade more favorable to China's development.

Second, in view of the fact that foreign investment is not significant for China’s innovative and high-quality development, our country should propose some policies for the introduction of foreign-funded foreign enterprises. In terms of geographic location conditions, more use of policy attraction and geographic location is used to increase the technology introduction rate of foreign investment.

Third, regarding the fact that the investment of scientific and technological researchers is not significant to the development of innovation, as mentioned above, due to the time lag, the investment of scientific and technological personnel cannot fully play its role in a period of time. Therefore, China should continue to expand the innovation of scientific and technological innovation personnel. Investment to allow more young people with ideas and capabilities to join the field, which also coincides with the third connotation of high-quality development. The quality of human resources. It only takes time to settle, and the positive impact of human capital will be More significant.

Fourth, in view of the negative correlation between R&D funding and innovation investment, the Chinese government should ensure that the allocation of R&D funding is implemented, and the phenomenon of misuse of R&D funding for real estate opening and stock repurchase should be strictly investigated. Large-scale listed companies must increase their social responsibilities and set their sights on the long-term future.

Fifth, in view of the negative correlation between fixed capital and innovation, the Chinese government should stabilize housing prices. In the past ten years, housing prices in China have skyrocketed by 10 times, even as high as 20 times in some cities. The profit invested in the real estate industry, the benefits obtained are far greater than the benefits invested in innovative industries.

Sixth, in view of the negative correlation between deposits in financial institutions and innovation, state-owned enterprises should lead by example and invest more profit capital where it can generate the greatest value. The Chinese government should pay attention to the financing of small and micro enterprises and reduce the pressure on small and medium enterprises.

Seventh, the state should increase the protection of intellectual property rights, conduct thorough management of existing technological innovations, closely safeguard the powers of foreign companies that are caused by foreign technologies, and adopt the best practices for theft of innovations and patent theft. Strict measures are prohibited.

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