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THE IMPACT OF ARTIFICIAL INTELLIGENCE TECHNOLOGY ON INTERNATIONAL TRADE

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Abstract:

This paper studies the complex impact mechanism of AI (artificial intelligence) technology on international trade. This provides an answer to how different countries use AI technology to increase their own international trade volume. This article is based on an analysis of cross-sectional data for 139 countries in 2021. This paper uses the Ordinary Least Square (OLS) method to perform a analysis on the cross-sectional data. This paper finds that the membership of World Trade Organization (WTO) has obvious significance for a country to use AI technology to promote exports. In countries with a high Government AI Readiness Index, AI technology has a significant role in promoting the growth of international trade. However, there is a significant negative correlation between the number of patent applications for AI-related technologies and imports and exports across countries. Besides, the number of patent applications for AI-related technologies has a direct heterogeneous impact on the imports of countries with different income groups. AI technology is an emerging technology. To study the impact of this technology on international trade, multiple factors of AI technology must be considered at the same time. For countries that are not members of the WTO, joining the WTO can make better use of AI technology to promote the development of their international trade. Between the complex relationship between the number of patent applications for different AI-related technologies and international trade, countries with different income groups should develop AI technologies that are beneficial to their own international trade.

Keywords:

Technological Change; AI Technology; International Trade; Government AI Readiness Index; AI-Related Technologies

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Introduction

International trade starts around 3000 BC. At that time, civilizations in places such as ancient Egypt, Mesopotamia, ancient India, and China began to trade with neighboring countries. With the development of transportation and communication technology, trade activities gradually expanded to more distant areas. From the end of the 18th century to the beginning of the 19th century, the steam engine invented by Scottish engineer James Watt promoted the process of industrialization and changed the mode of international division of labor. Industrial countries such as Britain became the center of the world's manufacturing industry at that time. Meanwhile, the steam engine also promoted the traditional way of trade and transportation. The appearance of the steamship greatly expanded the range of goods transported, laying the foundation for the rise of global trade. British textiles and mechanical equipment could be quickly transported to Europe, Asia and America by steamship, which promoted the spread of industrialization and the expansion of trade. The steam engine promoted Britain's industrialization, and industrialization promoted Britain's international trade (Eric Hobsbawm, 1968). Through colonial expansion, Britain established a huge empire, using the colonies as its own market and source of raw materials, and at the same time sold its own manufacturing products to all parts of the world through trade networks, thus achieving a huge trade surplus (Niall Ferguson, 2003).

At the end of the 19th century, the invention of the internal combustion engine further promoted the development of transportation methods. The transportation of goods around the world is more convenient and faster. Then, in 1891, the American General Company produced electric motors. The application of electric motors in the production process greatly improves the production efficiency. The production cost of the product is thus reduced and the variety of goods is more abundant. The use of electricity not only helps the production of goods, but also promotes cooperation and trade on a global scale through telegraph communication and telephone. Merchants can use this to communicate and communicate more easily to facilitate transactions. During the same period, basic sciences such as physics and chemistry developed rapidly, which provided a theoretical basis for the research and development of new technologies.

In the middle of the 20th century, with the further development of science and technology, the international industrial division of labor was further formed. Different countries participate in different stages of production according to their own comparative advantages. The use of computers in the production process makes the improvement of production methods and the improvement of production efficiency. The use of the Internet allows international trade and production to take place on a global scale. If we say that the first industrial revolution created Britain's dominance in international trade. The second industrial revolution brought many industrial countries into international trade, giving birth to globalization. Then the third industrial revolution will make the division of labor among countries in the world clearer. That is to say, the degree of industrialization in developed countries has declined, and they have turned to develop service industries and knowledge industries with higher added value. Developing countries participate in global production and supply chain networks and begin to undertake most of the production links.

At the beginning of the 21st century, with the development of information technology, artificial intelligence, Internet of Things, big data and other technologies, many enterprises began to

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explore new models combining traditional trade with emerging technologies (Zhao & Zhou, 2021). In 2011, the German industry first proposed the concept of the fourth industrial revolution at the Hannover Messe. With the popularity of e-commerce, it has become an increasingly important form of trade. Through the use of information technology, enterprises can establish a more rapid and close connection with the global market. Automate, visualize and optimize logistics processes through IoT technology. This helps improve transaction efficiency and accuracy, and reduces logistics costs and transit times. The Internet of Things can enable enterprises to better control every link of the supply chain, realize real-time monitoring, forecast demand and adjust production, improve production efficiency and accuracy, and reduce inventory costs and waste. Through big data technology, enterprises can reduce the intermediate links of transactions, so that the efficiency and speed of transactions can be improved.

As one of the representative technologies of the fourth industrial revolution, artificial intelligence technology was first proposed by scholars John McCarthy at the Dartmouth Conference in 1956. Over the ensuing decades, AI technology continued to evolve and grow. In 2010, with the substantial increase in computer computing power, artificial intelligence technology began to be widely used in various fields. The following year, Watson, an artificial intelligence developed by IBM, defeated the two winners of the Jeopardy! game show. In the same year, the "Siri" voice assistant developed by Apple made its debut on the iPhone 4S, which marked the beginning of artificial intelligence to enter daily life. Today, artificial intelligence technology plays a very important role in the process of globalization. International trade is one of the core drivers of globalization. The application of artificial intelligence technology in international trade not only improves production efficiency and reduces costs, but also enterprises can use artificial intelligence technology to reduce logistics costs and improve supply chain management to improve the operational efficiency of enterprises. But not all the changes brought about by artificial intelligence technology to international trade are beneficial. The widespread use of AI technology in international trade has also raised concerns for many. Jobs with low wages, single job content, and mechanical repetitive operations are most likely to be replaced by automation. Countries that lack AI-related technologies and resources will lose competitiveness in international trade, causing their economies to fall further behind.

International trade is an important engine of global economic development, and the wide application of artificial intelligence technology will further change the pattern and mode of international trade. Studying the impact mechanism of artificial intelligence on international trade can not only help policy makers and entrepreneurs formulate corresponding policies and countermeasures. It can also promote transnational cooperation, strengthen global trade governance and accelerate the process of globalization. However, most of the current research methods on the impact of artificial intelligence technology on international trade remain at the level of theoretical research. There are few empirical articles on the impact of artificial intelligence technology on international trade. On the one hand, it is because it is difficult to choose variables to measure artificial intelligence technology. On the other hand, the impact of artificial intelligence technology on international trade is a long-term trend, and structural changes brought about by technological progress require articles with a longer time span. This paper selects the number of AI-related patent applications commonly used by previous scholars as the core variable. At the same time, this paper selected the Government AI Readiness Index

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as another core variable to explore the impact of AI technology on international trade. An empirical analysis is conducted based on cross-sectional data from 139 countries in 2021. The results show that the countries with high Government AI Readiness Index have higher international trade volume. In the regression of WTO member countries as samples, the influence of the two core variables on the dependent variable international trade is more significant than that of non-WTO member countries. In addition, the number of applications for AI-related technologies has a heterogeneous impact on the international trade of countries with different income groups.

Literature Review

Theoretical Background

AI technology is an emerging technology that has had an impact on traditional international trade theories. In the theory of absolute advantage proposed by Adam Smith (1776), it was mentioned that a country should focus on producing the goods in which it has an absolute advantage. Obtain services and goods from other countries through trade. However, the emergence of AI technology has promoted product innovation and diversification, thereby breaking the assumption of a single commodity in the theory of absolute advantage. It enables different countries to have competitive advantages in more fields. Besides, in the absolute advantage theory, countries rely on their own resources and cost advantages to conduct trade in international trade competition, but the emergence of AI technology makes technological innovation an important factor for countries in international trade competition. Most importantly, AI technology enables countries to cooperate more closely in international trade, and at the same time accelerates the trend of resource integration through close cooperation. This breaks the assumption of relative independence among countries in the theory of absolute advantage.

David Ricardo (1817) developed the theory of comparative advantage in the 19th century. Different from the theory of absolute advantage, the theory of relative advantage holds that even if a country has an absolute disadvantage in all products, the country can still participate in trade and bring profits by producing products with relatively small disadvantages. The emergence of AI technology has changed the pattern of competition in international trade, which may make certain countries' industries with comparative advantages lose their advantages. Industries related to AI technology may replace some traditional industries and become new comparative advantage industries. For example, the application of AI technology in automation and intelligence will make some low-skilled labor-intensive industries disappear. The application of AI technology in data processing and analysis may make repetitive and standardized industries such as accounting and legal consulting lose their advantages. AI technology improves the efficiency and safety of transportation. Thus, the traditional mode of transportation is replaced and so on. Besides, AI technology has also catalyzed some emerging industries, such as digital trade and service outsourcing. Through AI technology, digital products and services can conduct cross-border transactions more efficiently, thus changing the traditional trade model.

Eli Heckscher and Bertil Ohlin (1920) proposed the resource endowment theory. The resource endowment theory believes that there are differences in the relative abundance of production factors in different countries, and this difference leads to the emergence of international trade.

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Factors of production mainly refer to labor force and capital. The emergence of new technologies such as AI technology has become a new component of production factors. Countries with large technical talent and R&D capabilities have a comparative advantage in high-tech industries. This high demand for talent intensifies competition among countries. Through the data processing capabilities and forecasting capabilities brought by AI technology, countries with comparative advantages in AI technology will be more competitive in the international trade market. Of course, AI technology not only intensifies the competition between countries, but also makes the cooperation between countries closer. However, this close cooperative relationship will make some countries that do not have advantages participate in international trade less and less. Besides, the application of AI technology will also lead to the adjustment of trade barriers. AI technology makes cross-border data flow more important. Some countries may adopt restrictions on data flow and enforce local data storage requirements to protect their own data security. This management and control of data has become a new model of trade barriers. The powerful ability of AI technology to process data can not only help enterprises locate target user groups more accurately. Improper use will result in data leakage, resulting in the risk of personal privacy disclosure and financial loss. Therefore, many countries require foreign companies to store data locally. This prevents some foreign companies that are unwilling to store data locally from entering the local market.

With the changes in the world division of labor, the form of international trade division of labor has also undergone tremendous changes. A group of economists represented by Paul Krugman (1980) proposed a new trade theory. New trade theory focuses on differences among firms and the impact of competition on international trade. As the scale of multinational enterprises expands, in order to pursue lower production costs and higher product quality, the production of a commodity may be completed in different countries. Economies of scale arise from this. AI technology can help multinational companies better plan production and resource allocation. At the same time, the application of AI technology in automated production has made some countries lose their advantage in labor costs in the world division of labor and thus unable to participate in international trade. Moreover, AI technology has also had an impact on product differentiation. Enterprises can use AI technology to accurately locate target customers to produce products that are more attractive to consumers, thereby enhancing the company's competitive advantage in the international market, and ultimately achieving an increase in exports. AI technology can also facilitate trade by facilitating communication. For example, through technologies such as natural language processing and image recognition, artificial intelligence can help eliminate language barriers and cultural differences.

As mentioned in the theoretical background introduction above, AI technology has had positive and negative impacts on international trade in different ways. The biggest impact of AI technology on international trade is undoubtedly its impact on the production process of goods. In the production process, AI technology can take a variety of operations to replace manual operations. At the same time, it can also realize employee management, product tracking and production monitoring services (Gelan & Assefa, 2022). AI technology has further promoted the development of automated production. It replaces a lot of basic manual work in the production process. There are now many fully automated factories around the world. Such as Tesla Gigafactory, Foxconn factory and Flex factory and so on. The disappearance of jobs has caused many academics to worry about the unemployment rate (Xiao & Boschma, 2022). AI disrupts the labor market, reducing employment over time (Cruz et al., 2021). However, some

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scholars believe that AI technology can also create new job demands. As productivity increases, less labor is required to produce the same output. Besides, due to the reduction in production costs brought about by the increase in productivity, the output has increased. More output creates more jobs (Bação et al., 2022). But this growing demand for high-skilled occupations is difficult to meet because in many countries their education systems cannot produce enough talents (Muhammad et al., 2023). Based on differences in development levels and technological capabilities among countries, the unemployment rate in developing and underdeveloped countries will be more severe (Zhou, 2015). The application of AI technology has also had an impact on the psychological state of workers. In a world where aging is on the rise, AI technologies could increase the insecurity of older workers. They are less accepting of new technologies than young people. This affects the employability of older adults (Alcover et al., 2021). However, some studies have pointed out that the application of AI technology can reduce the psychological depression score of manufacturing workers by 1.643 points, which shows that AI can promote the mental health of workers (Kapoor & Ghosal, 2022).

AI-driven systems have great potential to remove international geographic barriers and influence global trade (Garg et al., 2022). In recent years, through the development of Internet technology, e-commerce has played an increasingly important role in international trade. E-commerce has significantly improved the efficiency of trade and made e-commerce more intelligent (Li et al., 2021). At the same time, the fact that e-commerce does not have to be limited by transaction location and time attracts a lot of customers and increases trade (Hidayati et al., 2019). The application of artificial intelligence in e-commerce further enhances the customer experience. For example, artificial intelligence can analyze customer preferences and preferences to help customers find their favorite products more easily (Pillarisetty & Mishra, 2022; Jangra, 2022). The intelligent after-sales service driven by artificial intelligence technology can quickly respond to customer inquiries and complaints to improve the customer's shopping experience. (Jangra & Jangra, 2022). Meanwhile, AI enables e-commerce businesses to optimize their inventory management by predicting demand and ensuring the right products are available at the right time. This reduces costs and improves the turnover of goods (Johare et al., 2022). However, AI comparison is a technology based on learning human habits to make human-like responses, which is not yet mature. Artificial intelligence also needs more training and learning to eliminate the problems of prejudice and discrimination that may exist due to human diversity and cultural diversity (Shimo, 2020).

AI technology can not only affect international trade from the production and sales links of commodities. It can also have an impact on international trade from the following aspects. Enterprises can optimize their investment portfolios through AI technology (Dmello et al., 2022). At the same time, AI technology can help companies better understand market orientation (Brännback et al., 2007). Using AI technology to analyze data from e-commerce platforms and social media can also help companies expand their business and so on (Xiao et al., 2022). AI technology advances financial innovation. AI technology simplifies the cross-border payment process and makes trade easier (Huang & Wang, 2019). With the help of AI technology, investors can optimize their investment models to achieve more efficient and high-return investment behavior for overseas industries (Huang2023).

The combined application of AI technology and 5G technology can combat financial crimes and money laundering (Chitimira & Ncube, 2021). But AI technology may help criminals to

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commit crimes, etc. (Mison et al., 2022). AI technology can not only affect trade, but also become a commodity to promote cooperation between countries. But there is evidence that AI technologies pose existential risks for less-skilled countries (Ciuriak et al., 2020). In addition, because of the gap in the ability of countries to develop and use AI technology. Therefore, some countries may face a competitive disadvantage in international trade (Goldfarb & Trefler, 2018). AI technology involves a large amount of intellectual property rights. From the perspective of intellectual property protection, some countries will increase market access to AI technology. This has led to trade barriers in international trade and inhibited the development of international trade (e.g., Gurkaynak, 2017; Wang & Hu, 2020; Jiang & Hu, 2019).

In general, the impact of AI technology on international trade is mainly in two aspects. On the one hand, it is a positive aspect, AI technology has become a factor of production. It can not only conduct trade itself, but also increase trade by reducing production costs by improving production efficiency. At the same time, the application of AI technology in international trade links makes trade easier. The application of AI technology in the e-commerce platform can enhance the customer's shopping experience and thus promote the generation of transactions. Multinational companies can also use AI technology's ability to process data to better manage production processes and make more informed decisions. On the other hand, AI technology has also had a negative impact on international trade. Although AI technology has become a tradable commodity. However, because of the technical barriers generated by AI technology, it is difficult for some countries to keep up with the pace of technological progress. Thus, losing competitiveness in the international market. The application of AI technology in the production process has impacted low-tech labor-intensive industries. The international labor market has thus been affected. The requirements of AI technology for data circulation have raised global concerns about data privacy leaks and financial risks. Such concerns may increase market access in certain countries and affect global capital flows.

To sum up, this paper fills the literature gap from the following aspects. First of all, the previous literature lacks empirical analysis. This paper analyzes the impact of AI technology on international trade through empirical analysis. The positive analysis method can reflect the reality more accurately through the study of actual data. In addition, the research results of empirical analysis should be more objective. Secondly, this paper selects two kinds of data to try to analyze the complex impact of AI technology on international trade. One type of data is the Government AI Readiness Index. Use this index to determine the impact of different countries' different capabilities in applying AI technology on international trade. Another type of data is the application status of AI-related patents in various countries. This data can also reflect the different capabilities of various countries in the application of AI technology, and can also reflect the impact of technological differences on international trade.

Methodology

Model

The data used in this article is the cross-sectional data of 139 countries in the world in 2021. Data comes from the World Bank, World Trade Organization, International Monetary Fund (IMF), World Intellectual Property Organization (WIPO) and Oxford Insights Research Group. Through the collation of previous literature, it is found that previous scholars often use the

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number of AI-related patent applications in various countries to measure the substitution variables of these countries' AI capabilities. However, this approach is often questioned by other scholars. Because before the impact of AI technology on an economic factor has clear literature support and data support, it is impossible to determine whether different aspects of AI-related technologies have the same impact on this economic factor. The regression results of this paper also confirm that different AI technology-related patent applications have different impacts on international trade. Therefore, this paper chooses the Government AI Readiness Index as an alternative indicator of the AI level of various countries. Through nine input indicators, the index provides an overall estimate of each country's national government's readiness to implement AI in public service delivery. This evaluation method can more comprehensively evaluate a country's ability to apply AI technology. However, in 2020, the indicator changed how the index was calculated. Therefore, it is extremely difficult to use this indicator to establish a panel database to build a multiple regression model. Because the original data and calculation method of this indicator are not public, the data before 2020 cannot be treated equivalently with the data after 2020. In addition, because the data of each control variable in each country in 2022 is incomplete, this paper also discards the data for 2022. For the above reasons, this paper chooses to use the cross-sectional data in 2021 to complete the empirical research of this paper. The method used in this paper is the Ordinary Least Square (OLS) method and the software used is STATA version 17.

The basic regression model is as follows,

$$Y_i = \alpha + \beta_1 ait_i + \beta_2 pt_i + \beta_3 deficit_i + \beta_4 gdp_i + \beta_5 landarea_i + \beta_6 pop_i + \varepsilon_i \quad (1)$$

Where α is intercept, ε is the residual item and i is country.
Where, i = 1, 2, 3, ..., n, Y_i is the dependent variable. α is intercept. $X_{1,2\cdots k}$ is independent variable. ε is the residual, i is country. The dependent variables and independent variables are explained in Table 1 and 2.

TABLE 1. Dependent Variable

Variable	Explanation	Data source
$lnimp_i$	The logarithm of imports in country i	IMF
$lnemp_i$	The logarithm of exports in country i. (USD)	IMF
$lntrade_i$	The logarithm of total import and export volume in country i. (USD)	IMF

TABLE 2. Independent Variables

	Independent variable	Explanation	Data sources
The Government AI readiness index	ait_i	Overall score in country i.	Oxford Insight
	ai_{2i}	Score of the Technology Sector Pillar in country i.	Oxford Insight
	ai_{3i}	Score of the Data and Infrastructure	Oxford Insight

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		Pillar	
The number of AI-related patent applications	pt_i	The number of patent applications about AI in country i.	WIPO
	p_{1i}	The number of patent applications about Electrical machinery, apparatus, energy in country i.	WIPO
	p_{2i}	The number of patent applications about Audio-visual technology in country i.	WIPO
	p_{3i}	The number of patent applications about Telecommunications in country i.	WIPO
	p_{4i}	The number of patent applications about Digital communication in country i.	WIPO
	p_{5i}	The number of patent applications about Basic communication processes in country i.	WIPO
	p_{6i}	The number of patent applications about Computer technology in country i.	WIPO
	p_{7i}	The number of patent applications about IT methods for management in country i.	WIPO
	p_{8i}	The number of patent applications about Semiconductors in country i.	WIPO
Fiscal deficit-to-GDP ratio	$deficit_i$	The fiscal deficit ratio in country i. (%)	IMF
Gross domestic	gdp_i	The GDP in country i. (Million dollars)	IMF
National territorial area	$Landarea_i$	The land area	World Bank

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Population	Pop_i	he population in country i. (Millions)	World Bank
WTO member or not	wto_i	Virtual variable, whether country i is a WTO member	WTO
WTO member state	$income_i$	Virtual variable, which income group country i belongs to. (high income 1, middle and high income 2, middle and low income 3, low income 4)	IMF

Results And Discussion

TABLE 3. Descriptive Statistics

Variable	Obs	Mean	Std.dev.	Min	Max
lnimp	139	24.2110	1.9119	20.2832	28.8552
lnexp	139	24.0676	2.1242	18.6977	28.8990
lntrade	139	24.8570	1.9855	20.5015	29.5249
ait	139	48.4580	16.5781	20.7300	88.1600
pt	139	3586.1870	22348.6000	0.0000	220383.0000
deficit	139	0.0434	0.0352	-0.0936	0.1413
gdp	139	662.7864	2554.4710	1.4570	23315.0700
landarea	139	866860.4000	2130612.000	300.0000	16400000.0000
pop	139	52.8547	173.2037	0.0980	1412.6000

TABLE 4. Regression With Imports And Exports As Dependent Variables

lnimp	Coefficient	Std.err.		lnexp	Coefficient	Std.err.
ait	0.08392800 ***	0.00599220		ait	0.09524870 ***	0.00667490
pt	-0.00001800 **	0.00000912		pt	-0.00001710 *	0.00001020
deficit	-1.43609600	2.66464000		deficit	-4.01976600	2.96821900
gdp	0.00013860	0.00008490		gdp	0.00010420	0.00009460
landarea	0.00000007	0.00000005		landarea	0.00000009	0.00000006
pop	0.00274270 ***	0.00069400		pop	0.00283910 ***	0.00077310

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cons	19.97705000 ***	0.33062120		cons	19.38722000 ***	0.36828850	
Number of obs	139	R-squared	0.7102	Number of obs	139	R-squared	0.7087
F	53.91	Root MSE	1.0524	F	53.52	Root MSE	1.1723

p<0.01***, p<0.05**, p<0.1*

Table 3 reported the descriptive statistics for all variables involved in this study. Results of Regression 1 and Regression 2 reported in Table 4 are regressions with import and export data as dependent variables respectively. The coefficients of the variable ait in regression 1 and regression 2 are both significant at 99% confidence intervals. Similarly, the coefficients for the variable pt are significant at the 95% confidence interval and significant at the 90% confidence interval in regression 1 and regression 2, respectively. The coefficients of the variables ait and pt have the same sign in regression 1 and 2 and both are significant, which proves that AI technology has no heterogeneous effect on import and export. Therefore, this paper will use the data of total import and export as explanatory variables to complete subsequent regression analysis. Exports can bring foreign exchange earnings to a country, so countries with high exports usually have lower fiscal deficits than countries with low exports (Uğur, 2021). In countries with large land areas, these countries are rich in resources. Meanwhile, these countries have more ports. As a result, these countries can export more resources (Huo, 2014).

TABLE 5. Regression Results With Trade As Dependent Variable

	Coefficient	Std.err.	P>|t|
ait	0.08814910***	0.00617530	0.000
pt	-0.00001760*	0.00000940	0.063
deficit	-2.84976300	2.74606400	0.301
gdp	0.00012520	0.00008750	0.155
landarea	0.00000008	0.00000005	0.144
pop	0.00277430***	0.00071520	0.000
_cons	20.47449000**	0.34072410	0.000
Number of obs	139	R-squared	0.7146
F	55.09	Root MSE	1.0845

p<0.01***, p<0.05**, p<0.1*

Table 5 shows that the significance and sign of the core variables ait and pt did not change. This proves that the regression results are more reliable. The coefficient for the variable ait is significant at the 99% confidence interval. This shows that in countries with high Government AI Readiness Index, the total import and export volume of these countries is relatively high. The variable pt has a coefficient is significant at the 90% confidence interval. This data shows that in countries with a high number of AI-related patent applications, these countries have a lower total import and export value. The opposite signs of the coefficients of the variable ait and the variable pt reflect the complex effect of AI technology on international trade. Countries with high Government AI Readiness Index have higher international trade volume. However, in countries with a high number of AI-related patent applications, the value of international

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trade in these countries is low. The 139 samples in the model include 11 countries that are not members of WTO. Next, in order to explore whether the WTO member states have an impact on the model, conducts the following regression.

TABLE 6. Regression Verification Of The Influence Of WTO Membership Status On Model Regression Results

Regression 6				Regression 7			
lntrade	Coefficient	Std.err.	P>|t|	lntrade	Coefficient	Std.err.	P>|t|
ait	0.08769740***	0.00631950	0.000	ait	0.08420750	0.06588400	0.270
pt	-0.00001730*	0.00000937	0.068	pt	0.01131720	0.02825100	0.709
deficit	-3.03487700	2.88668100	0.295	deficit	-1.49992300	12.5272200	0.910
gdp	0.00012770	0.00008750	0.147	gdp	0.01063500	0.00725770	0.217
landarea	0.00000008	0.00000005	0.162	landarea	-0.00000034	0.00000067	0.642
pop	0.00271710***	0.00071350	0.000	pop	0.00740340	0.01979570	0.727
cons	20.49760000***	0.35921300	0.000	cons	0.08420750	0.06588400	0.270
Number of obs	128	R-squared	0.7256	Number of obs	11	R-squared	0.7721
F	53.32	Root MSE	1.08	F	2.26	Root MSE	1.1866

p<0.01***, p<0.05**, p<0.1*

Regression 6 in Table 6 is the regression result when the sample only includes WTO members. Regression 7 is the regression result when the sample does not include WTO member states. Neither the coefficients for the variable ait nor pt are significant in regression 7, but they are consistently significant and unchanged in sign in regression 6. It shows that the significant impact of variable ait and variable pt on variable lntrade is only significant when the sample only includes WTO member states. For countries that are not WTO members, the effect of using AI technology has no significant impact. In order to further explore the impact of AI on trade, t

his paper will replace the variable ait with its constituent variables ait1, ait2 and ait3. Similarly, the variable pt will be replaced by its constituent variables p1, p2,...p8. Depending on the different income group country belongs to, this may also have an impact on the regression results. Therefore, in the follow-up regression, countries will be divided to 4 different samples (high-income group, middle-high-income group, middle-low-income group and low-income group) according to the income groups they belong to. Then do regression again. It is worth noting that, because of the multicollinearity of samples from countries with low-income groups, the regression results of this sample were not analyzed.

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TABLE 7a. The Regression Of The Component Variables Of Each Core Variable In Samples Of Different Income Groups

Regression 8				Regression 9			
lntrade	Coefficient	Std.err.	P>|t|	lntrade	Coefficient	Std.err.	P>|t|
ai1	0.01269890	0.00979590	0.197	ai1	0.02479730*	0.01424940	0.092
ai2	0.05488060***	0.01866460	0.004	ai2	0.08445910***	0.02530500	0.002
ai3	0.01690070	0.01224040	0.170	ai3	0.00477400	0.03934060	0.904
p1	-0.00001940	0.00043470	0.964	p1	-0.00053230	0.00058630	0.371
p2	-0.00034490	0.00236330	0.884	p2	-0.00128200	0.00213510	0.553
p3	0.00050140	0.00356160	0.888	p3	-0.00698440	0.00416310	0.104
p4	-0.00003670	0.00070250	0.958	p4	0.00099020	0.00081660	0.235
p5	-0.01232240*	0.00603980	0.043	p5	0.01457430	0.01001830	0.156
p6	0.00026770	0.00068190	0.695	p6	-0.00143590	0.00098270	0.154
p7	-0.00314860	0.00413870	0.448	p7	0.00552430	0.00416450	0.195
p8	0.00227070	0.00235480	0.337	p8	0.00189850	0.00231680	0.419
deficit	-4.65838800*	2.75101200	0.093	deficit	-3.76513600	4.51403400	0.411
gdp	0.00112150***	0.00034720	0.002	gdp	-0.00071000	0.00101660	0.490
landarea	0.00000006	0.00000007	0.430	landarea	-0.00000005	0.00000012	0.683
pop	0.00084500	0.00104530	0.420	pop	0.08096550***	0.02846200	0.008
_cons	21.06680000***	0.39367680	0.000	_cons	19.46050000***	2.24403000	0.000
Number of obs	139	R-squared	0.7546	Number of obs	46	R-squared	0.8420
F	25.22	Root MSE	1.0418	F	10.66	Root MSE	0.82071

The regression 8 is performed after substituting the variables ait and pt with their constituent variables. In regression 8, the signs of the coefficients of the constituent variables ait1, ait2 and ait3 of the variable ait are all positive. Same sign as the coefficient of the variable ait in regression 6. This means that the variables ait1, ait2 and ait3 have no heterogeneous effect on the variable lntrade. However, the sign of the coefficients of variables p3, p6 and p8 in the constituent variables p1, p2, ..., p8 of the variable pt is positive, which is opposite to the sign of the coefficient of the variable pt in regression 6. This proves that the variables p1, p2, ..., p8 have heterogeneous effects on the variable lntrade. It is worth noting that the sign of the coefficient of the variable deficit becomes significant in regression 8 compared to the sign of the coefficient in regression 6.This means that the relationship between the government's fiscal deficit rate and the total amount of imports and exports is significantly negatively correlated. In order to further analyze the impact of the variable ait's components (ai1, ai2 and ai3) and the variable pt's components (p1, p2, ..., p8) in different charging groups. Regression 9, regression 10 and regression 11 are obtained by regression according to the different income groups of the sample countries.

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The coefficients of variable ai1 and variable ai2 in regression 9 are significant in the 90% confidence interval and significant in the 99% confidence interval, respectively. This means that in countries belonging to the high-income group with high variable ai1 and variable ai2, the import and export trade volume of these countries is high. For other high-income countries, if they want to have a higher import and export volume compared with other high-income countries,it will be an effective way to do work that can improve the variable ai1 and variable ai2. Although variable ai1, variable ai2 and variable ai3 are not significant in regression 10 and regression 11, the coefficients of variable ai1, variable ai2 and variable ai3 are significant in the confidence interval above 80% in regression 8. This means that no matter which country they are, as long as they can achieve a relatively high score in the Government AI Readiness Index through certain work, their import and export volume can always increase.

TABLE 7b. The Regression Of The Component Variables Of Each Core Variable In Samples Of Different Income Groups

Regression 10				Regression 11			
lntrade	Coefficient	Std.err.	P>|t|	lntrade	Coefficient	Std.err.	P>|t|
ai_1	0.00586430	0.01632980	0.723	ai_1	0.03618190	0.02510720	0.163
ai_2	-0.00660670	0.03290090	0.843	ai_2	-0.00779740	0.05419770	0.887
ai_3	0.01172570	0.03208780	0.718	ai_3	0.03172020	0.02872820	0.281
p_1	-0.09227270***	0.02483580	0.001	p_1	0.24495960	0.23792850	0.314
p_2	0.57002070***	0.18257950	0.005	p_2	-0.19328670	0.65023040	0.769
p_3	-0.27480100	0.16780060	0.116	p_3	-0.13416030	0.20233040	0.514
p_4	-0.18049880*	0.08703970	0.051	p_4	-0.63100950	1.06591100	0.560
p_5	0.33863620	0.28885340	0.254	p_5	-0.50763410	0.75508370	0.508
p_6	-0.04448560	0.03023600	0.156	p_6	0.35626620	0.64786350	0.588
p_7	-0.05234980	0.10004720	0.606	p_7	-0.33397440	0.53656320	0.540
p_8	0.65266460***	0.14908870	0.000	p_8	0.10088400	0.14353740	0.489
deficit	-8.81914200	3.92612800	0.036	deficit	-2.13040800	5.63521200	0.709
gdp	-0.00060040	0.00260500	0.820	gdp	-0.00177230	0.00258430	0.500
landarea	0.00000025	0.00000045	0.581	landarea	0.00000046	0.00000033	0.174
pop	0.03373360	0.02288640	0.155	pop	0.01317650	0.00756630	0.095
_cons	23.15237000***	1.68769900	0.000	_cons	20.86244000***	1.29429700	0.000
Number of obs	37	R-squared	0.8961	Number of obs	39	R-squared	0.7868
F	12.07	Root MSE	0.75014	F	5.66	Root MSE	0.88513

p<0.01***, p<0.05**, p<0.1*

The variable p_2 has a coefficient in regression 10 is significant at the 99% confidence interval. This means that in high-middle income countries, the technology represented by variable p_2 has a significant role in promoting import and export volume. The coefficients of variable p_5 is only significant in regression 9 with a p-value of 0.156. This shows that the technology represented by variable p_5 plays a greater role in promoting the import and export of high-income countriesthan other income group countries. The coefficients of variable in regression 10 is significant in the 99% confidence interval. This shows that for high-middle income

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countries, the technology represented by variable p_8 has a more significant role in promoting imports and exports than countries with other income groups. For these countries, if it is possible to increase investment in the technology represented by variable p_8, significant import and export improvements can be achieved.

Conclusions

This paper presents an empirical analysis of cross-sectional data for 139 countries in 2021. The regression results show that the two core variables have a significant impact on the samples of WTO member states. But in the sample of non-WTO member countries, the two core variables have no significant impact on the total import and export. This proves that for non-WTO countries, the role of AI technology in increasing their imports and exports is not obvious. Government AI Readiness Index have significant positive impact on imports and exports. Further subdividing and analyzing the impact of the three components of the Government AI Readiness Index on countries with different income groups, this paper finds that among high-income countries, countries with high scores on the Government Pillar and the Technology Sector Pillar have positive impact on import and export volumes. The highly significant positive correlation between the Government AI Readiness Index and imports and exports indicates that countries should find out the aspects that need to be further improved based on the calculation rules of the Government AI Readiness Index and the country's scores in the three sub-indices. For each country, the relationship between the number of patents on semiconductor technology and imports and exports is positive. This relationship is particularly pronounced in upper-middle income countries. Therefore, increasing investment in research and development of semiconductor technology is an effective way to increase imports and exports. For lower middle- income countries, electrical machinery, instruments, energy technology and computer technology have a certain degree of positive impact on the import and export of these countries. Similarly, the positive relationship between digital communication technology and IT methods for management technology and import and export in the sample of high-income countries also shows that these two technologies have a certain degree of positive impact on the import and export of high-income countries. In view of the obvious effect of Audio-visual technology on the increase of imports and exports with middle and high-income countries, these countries should further increase their investment in Audio-visual technology.

Basic communication processes technology has a positive relationship with imports and exports in the samples of high-income countries and upper middle-income countries. This relationship is particularly pronounced in the sample of upper middle-income countries. Therefore, it is very important to increase the investment in Basic communication processes technology to improve the import and export of middle and high-income countries. Telecommunications technology is negatively related to imports and exports in each income group sample. This may be because the increase in the number of patents for Telecommunications technology has led to more technical barriers and patent protection. This may limit the competitiveness and technological innovation of other enterprises and thus have a negative impact on imports and exports. The following recommendations are made for future research on the impact of AI technologies on international trade. The selection of variables for AI technology should not be limited to one. Different variables have different impacts on imports and exports. When considering the impact of AI technology on imports and exports, it is necessary to consider as many different aspects of AI technology as possible.

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Reference

Alcover, C., Guglielmi, D., Depolo, M., & Mazzetti, G. (2021). "Aging-and-Tech Job Vulnerability": A proposed framework on the dual impact of aging and AI, robotics, and automation among older workers. Organizational Psychology Review, 11, 175 - 201.

Bação, P., Gaudêncio Lopes, V., & Simões, M.C. (2022). AI, Demand and the Impact of Productivity-enhancing Technology on Jobs: Evidence from Portugal. Eastern European Economics, 61, 353 - 377.

Bonsay, J. O., Cruz, A. P., Firozi, H. C., & Camaro, P. J. C. (2021). Artificial intelligence and labor productivity paradox: the economic impact of AI in China, India, Japan, and Singapore. Journal of Economics, Finance and Accounting Studies, 3(2), 120-139.

Brännback, M.E., Carsrud, A.L., & Renko, M. (2007). EXPLORING THE BORN GLOBAL CONCEPT IN THE BIOTECHNOLOGY CONTEXT. Journal of Enterprising Culture, 15, 79-100.

Chitimira, H., & Ncube, P. (2021). The Regulation and Use of Artificial Intelligence and 5G Technology to Combat Cybercrime and Financial Crime in South African Banks. Regulation of Financial Institutions eJournal.

Chien-Feng Huang (Professor) (2022), "High-frequency trading through artificial intelligence for financial innovation", Open Access Government January 2023, pp.280-281. Available at https://www.openaccessgovernment.org/article/high-frequency-trading-artificial-intelligence-financial-innovation/1 49943/.(Accessed: 08 Jul 2023)

Ciuriak, D., Ptashkina, M., & Rodionova, V. (2022). THE TECHNOLOGY NEXUS OF AI. International Negotiation and Political Narratives: A Comparative Study, 119.

Dmello, A., Jadhav, A., Kale, J., & Deshpande, A. (2022, January). Evaluating MPT and CAPM to Optimise Investment Portfolio of BSE Securities. In 2022 International Conference for Advancement in Technology (ICONAT) (pp. 1-5). IEEE.

Ferguson, N. (2012). Empire: How Britain made the modern world. Penguin UK. Hobsbawm, E. J. (1999). Industry and Empire: from 1750 to the Present Day. The new press.

Garg, S., Mahajan, N., & Ghosh, J. (2022). Artificial Intelligence as an emerging technology in Global Trade: the challenges and Possibilities. In Handbook of Research on Innovative Management Using AI in Industry 5.0 (pp. 98-117). IGI Global.

Gelan, T. M., & Assefa, B. G. (2022). AI Adoption in Ethiopian Manufacturing: Prospects and Barriers (No. 8803). EasyChair.

Goldfarb, A., & Trefler, D. (2018). AI and international trade (No. w24254). National Bureau of Economic Research.

Gurkaynak, G., Yılmaz, I., Doygun, T., & İnce, E. (2017). Questions of intellectual property in the artificial intelligence realm. The Robotics Law Journal, 3(2), 9-11.

Hidayati, R., Permatasari, R.K., & Fairy, A.N. (2019). Factors Affecting E-Commerce Adoption and Their Impact on SMEs' Performance: A Case Study of Jabodetabek Region. Proceedings of the International Conference on Trade 2019 (ICOT 2019).

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 19 (March 2024) PP. 153-170
DOI 10.35631/AIJBES.619012
Huang, C., & Wang, X. (2019, July). Financial innovation based on artificial intelligence technologies. In Proceedings of the 2019 International Conference on Artificial Intelligence and Computer Science (pp. 750-754).

Jangra, G., & Jangra, M. (2022). Role of Artificial Intelligence in Online Shopping and its Impact on Consumer purchasing behaviour and Decision. 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA), 1-7.

Jangra, G., & Jangra, M. (2022). Role of Artificial Intelligence in Online Shopping and its Impact on Consumer purchasing behaviour and Decision. 2022 Second International Conference on Computer Science, Engineering and Applications (ICCSEA), 1-7.

Jiang, T., & Hu, S. (2019, September). Intellectual property protection for AI-related inventions in japan. In 2019 International Conference on Virtual Reality and Intelligent Systems (ICVRIS) (pp. 286-289). IEEE.

Kapoor, R., & Ghosal, I. (2022). Will Artificial Intelligence Compliment or Supplement Human Workforce in Organizations? A Shift to a Collaborative Human–Machine Environment. International Journal on Recent Trends in Business and Tourism (IJRTBT), 6(4), 19-28.

Li, L., Wang, Y., & Zhang, Y. (2021). Analysis on the Application of Artificial Intelligence in Cross-Border E-commerce. Proceedings of the 6th Annual International Conference on Social Science and Contemporary Humanity Development (SSCHD 2020).

Lv, H. (2021, January). Research on University Education Innovation in the Big Data Era. In 2021 the 3rd International Conference on Big Data Engineering and Technology (BDET) (pp. 54-57).

Mison, A., Davies, G., & Eden, P. (2022). New Wave Cyber Attacks. International Conference on Cyber Warfare and Security.

Muhammad, A., Umar, U. A., & Adam, F. L. (2023). The impact of Artificial Intelligence and Machine learning on workforce skills and economic mobility in developing countries: A case study of Ghana and Nigeria. Journal of Technology Innovations and Energy, 2(1), 55-61.

Pillarisetty, R., & Mishra, P. (2022). A Review of AI (Artificial Intelligence) Tools and Customer Experience in Online Fashion Retail. Int. J. E Bus. Res., 18, 1-12.

Johare, Kirankumar & Wagh, Vasant & Shaligram, Arvind. (2022). Scope and Impact of Internet of Things (IoT) and Artificial Intelligence (AI) in the Global Construction Industry. International Journal of Innovative Research in Engineering & Multidisciplinary Physical Sciences. 10. 10.37082/IJIRMPS.2022.v10i04.012.

Shimo, S. (2020). Risks of Bias in AI-Based Emotional Analysis Technology from Diversity Perspectives. 2020 IEEE International Symposium on Technology and Society (ISTAS), 66-68.

Wang, L., & Hu, S. (2020, January). Patent Protection for Artificial Intelligence in Europe. In 2020 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS) (pp. 591-594). IEEE.

Xiao, J., & Boschma, R. (2022). The emergence of artificial intelligence in European regions: the role of a local ICT base. The Annals of Regional Science, 1-27.

Xiao, L., Cheng, X., & Mou, J. (2022). Understanding global e-commerce development during the COVID-19 pandemic: Technology-Organization-Environment perspective. Journal of Global Information Technology Management, 25, 1 - 6.

Advanced International Journal of Business, Entrepreneurship and SME's
AIJBES
EISSN: 2682-8545
Volume 6 Issue 19 (March 2024) PP. 153-170
DOI 10.35631/AIJBES.619012
Zhao, J., & Zhou, Q. (2021). Special issue on 2020 international conference on machine learning and big data analytics for IoT security and privacy (SPIoT-2020). Neural Computing and Applications, 33, 3869-3870.

Zhou, H. (2015). Unemployment and Economic Integration for Developing Countries. Frontiers of Economics in China, 10, 664-690.