**Optimization of the business environment, reverse outsourcing and high-quality introduction of foreign investment in China**

**Summary** Innovation outsourcing is a strategic behavior of multinational companies to cope with changes in the external environment. Based on the large sample micro data of the Chinese market, this paper explores the impact mechanism of changes in China's business environment on international innovation outsourcing. The results show that the optimization of the business environment of the destination not only leads to the increase of mature technology outsourcing services of multinational corporations, but also prompts multinational companies to expand the investment in sunken technology services, and this conclusion is still valid after the endogenous treatment and robustness test. From the perspective of influencing mechanism, the optimization of the business environment of the destination of contracting, on the one hand, promotes a structured contracting market and significantly intensifies the degree of market competition, which in turn leads to the expansion of the supply of innovative technology services by quality-competitive multinational companies and the increase of the supply of mature technical services by cost-competitive multinational companies; on the other hand, it can significantly reduce the transaction cost of outsourcing, and promote both the supply and demand sides of outsourcing to increase the types of transactions of outsourcing services and expand the technical demand for outsourcing services. The stronger the innovation demand of the contracting destination, the greater the positive effect of the optimization of its business institutional environment on the investment of the two types of innovation outsourcing services, and can significantly reduce the R&D cost burden of multinational companies. Based on the analysis of the impact of changes in China's market business system environment on the surge of international innovation outsourcing, this paper not only makes up for the understanding of the latest practice of innovation outsourcing in developing countries, but also provides a theoretical basis and policy enlightenment for China to deepen the business ecology of the outsourcing market in the new era, effectively respond to the changes in the external harsh environment, and continue to attract high-quality foreign investment such as R&D.

**Key words** : business institutional environment, multinational corporations, reverse outsourcing, ambidextrous technology

**I. Introduction**

In traditional international economic activities, outsourcing is classified as a special type of transactional activity between licensing and foreign direct investment. Its particularity lies in the fact that outsourcing not only has the characteristics of a market contract transaction, but also involves the flow of project knowledge and information between micro-organizations, resulting in the configuration characteristics of organizational boundaries (Chen, 2005). Since the end of the 80s of the 20th century, due to the rapid development of globalization, the outsourcing activities of enterprises have expanded from production outsourcing to R&D (innovation) outsourcing, and [[1]](#endnote-1)its activity mechanism and development trend have been paid more and more attention (JB Quinn, 2000). These shifts highlight the deepening of service outsourcing activities and the complexity of the value of technology. The continuous expansion and deepening of service outsourcing has greatly improved the production efficiency of relevant departments, and has gradually become an important force in contemporary economic development and promoting the reform of production methods (Xu Yi and Zhang Erzhen, 2008).

From the perspective of development history, innovation outsourcing can be roughly divided into three basic types: information technology outsourcing (ITO), business process outsourcing (BPO) and knowledge processing outsourcing (KPO), of [[2]](#endnote-2)which ITO occupies two-thirds of the share, and the latter two are developing rapidly. With its cheap labor and large potential consumer base, India occupies the position of the global "IT outsourcing hub", at one point owning 85% of the global offshoring market at the beginning of the 21st century (Chanda, et, al, 2006).[[3]](#endnote-3) Relying on the vast domestic market and abundant labor force, China's outsourcing services have also developed rapidly after joining the WTO, and ushered in a "golden decade"[[4]](#endnote-4) of innovative outsourcing from 2006 to 2016From 2010 to 2018, the proportion of China's international service outsourcing business in the global service outsourcing market increased from 17% to 31.7%, maintaining its position as the second largest global service outsourcing country for nine consecutive years, and continuing to maintain a high growth trend. Since 2016, the Ministry of Commerce of the People's Republic of China has officially issued the "Guiding Catalogue of Key Development Areas of the Service Outsourcing Industry", which is revised every two years, marking that China, as an emerging and important global innovative outsourcing service market, has ushered in institutionalized open innovation. Since the beginning of the 21st century, another trend in China's innovative outsourcing has been the rise of outsourcing activities: Chinese enterprises not only carry out "reverse outsourcing" offshore, [[5]](#endnote-5)but also give full play to the potential of the domestic market for outsourcing, and continue to attract many multinational companies to enter the Chinese market to carry out contracting, so as to be onshore based on the Chinese context"Reverse outsourcing" activities have flourished over the past decade or so[[6]](#endnote-6).

The emergence of onshore "reverse outsourcing" activities in Chinese mainland provides a subject of great academic research value, not only because of the role of multinational companies as undertakers in host country innovation outsourcing activities, so as to facilitate our better perspective on the "black box" mechanism of technology diffusion of multinational companies in contract trading activities. More importantly, the onshore trading scenario is more uncertain for multinational companies entering China, especially when it comes to R&D contract transactions, which puts forward higher requirements for the host country's business environment. Therefore, the focus of this paper is to sort out the influencing factors of the surge of multinational corporations (2001-2011) in China's innovation outsourcing market after China's accession to the WTO, and analyze the mechanism behind it. Considering that China's economy has entered a downward zone since 2011, especially since 2016, the impact of major events such as the Sino-US trade war and the new crown epidemic has been superimposed, and cross-border investment has been overshadowed by "de-globalization", and there are different debates at home and abroad about the reasons for the withdrawal of foreign capital from China. It is of great significance to summarize China's practical experience in successfully introducing high-end capital such as international R&D in a timely manner to correctly understand and guide China to continue to introduce high-quality foreign investment, and to break the barriers to cross-border investment in China by the United States and other Western countries using practices such as "nearshoring/friendly outsourcing".

The theoretical and practical value of this study lies in the fact that, at the theoretical level, different from the traditional theory, the research on outsourcing activities focuses more on distinguishing between intra-firm and arm's-lengthThis paper further explores the following new questions: What is the impact of the host country's business environment on the technology diffusion of multinational corporations when they adopt different contracting modes for purely distance subcontracting activities? This innovative design not only promotes our understanding of the process mechanism of how the host country's institutional environment acts on the innovation behavior of multinational companies, but also places technology diffusion in the context of international outsourcing, enriching the understanding of more path mechanisms of international technology diffusion.

Practical significance: The research data selected in this paper are the micro contract data of multinational companies in innovation outsourcing in China. On the one hand, the previous literature has often focused on production outsourcing activities, and few innovative outsourcing analyses have also focused on the perspective of developed countries. As the largest developing country, China has more and more say in the world economy and trade, and the analysis of the Chinese phenomenon can help us better understand the role of developing countries in global innovation outsourcing activities. The analysis of the phenomenon of "reverse outsourcing" in the Chinese market will help us to think about why the technological capabilities of Chinese enterprises have been able to change by leaps and bounds after joining the WTO from another perspective, and can also effectively counter the false claims of "technology plagiarism" in foreign countries that Chinese enterprises exist. The research data in this paper covers the decade from 2001 to 2011, which is precisely the decade when China opened its doors and accelerated its march to the world stage, and it was also a prosperous period when multinational companies went to the Chinese market to carry out the allocation of global value chains. The empirical results of this paper can not only help China summarize the path and experience of rapid globalization in the past, but also provide reference for other developing countries and emerging economies to open their doors to participate in outsourcing activities, which has strong practical significance.

The structure of the remaining parts of this paper is as follows: the second part reviews the content of the literature and puts forward the hypotheses based on this, the third part is the research design, sets up the empirical model of this paper, and describes the core variables and control variables, the fourth part is the empirical analysis, including the benchmark regression of the model, the discussion of endogeneity and selection bias, the robustness analysis and the heterogeneity analysis of the results, and the fifth part summarizes and summarizes the conclusions of the paper.

**2. Literature review and research hypothesis**

**1. Combing of relevant literature**

**(1) Technology diffusion and outsourcing of multinational corporations**

Foreign Direct Investment (FDI)Foreign Direct Investment, referred to as FDI) is of great significance to the technological progress and industrial structure optimization of enterprises in the host country (Li Daokui et al.,2006；[Atalay](https://sc.panda321.com/citations?user=zbM4cD8AAAAJ&hl=zh-CN&oi=sra) et al.,2014; Caselli et al.,2020）。 Generally speaking,The role of FDI in promoting the technological progress of domestic enterprises in the host country can be attributed to technology spillover) and technology transfer (technology transfer) two pathways, collectively known as the technological diffusion effect of FDI (technology distribution(JIANG Xiaojuan,2002ZHANG Haiyang,2005; Li ping2006; Jiang Dianchun et al.,2008;LI Mei et al.,2012）。 In the process of technology diffusion, there are also great differences in technology flow and incentives between different transaction entities and different countries and regions (Lapan et al.,1973; Findlay,1978; R Jensen et al.,1987）。 In the parent-subsidiary system of multinational corporations, there are not only positive incentives for technology spillover (frequent expatriate executives), but also in line with the trend of globalization, the original one-way technology transfer between parents and subsidiaries has also developed into two-way technology transfer, and the reverse technology transfer and feedback from overseas subsidiaries are receiving more and more attention from parent companies (Cui et al., 2020). However, in the external system of multinational corporations, especially in the markets of developing countries, multinational corporations generally adopt the new FDI method or joint ventures and mergers and acquisitions, although the latter method is difficult to avoid a certain degree of technology spillover, but under the strict technical and organizational control of multinational corporations, developing country enterprises participating in cooperation essentially only get part of their module technology spillover at most (Zheng Feihu et al.,2016）。

The above-mentioned characteristics of technology diffusion by multinational corporations make it difficult for developing countries to directly achieve the goal of rapid development by introducing FDI (limited by technology spillover) or participating in technology transfer (limited by the external environment such as intellectual property protection of the host country). Fortunately, the rise of outsourcing strategies of multinational corporations in the late eighties of the twentieth century provided another opportunity for parallel development. When it comes to technology development and product manufacturing activities across different national borders, multinational corporations often use OEM contracts after weighing the size of production and transaction costs (Cyhn, 2000).[[7]](#endnote-7) This kind of production outsourcing not only gives TNCs access to local production technology (Chen, 2005), but also has a significant impact on the productivity (Ito et al. 2011) and innovation capacity of the countries concerned (Keller, 2004; Xu et al., 2008). Specifically, the positive effect of outsourcing on productivity is obvious, which can promote the upgrading of the industrial structure of both the host country and the contracting country, among which the outsourcing of offshore productive services has the most significant promotion effect on the contracting country (Li Huijuan et al., 2018; Grossman et al.,2008）。 However, the impact of outsourcing on innovation ability has been found that although outsourcing activities are conducive to increasing R&D investment, thereby improving innovation output (Chen et al., 2015;Wang et al., 2015), offshoring will still lead to lower R&D investment in countries with large market size (Marjit et al., 2010; Becker et al., 2013), and reverse outsourcing has the most obvious effect on improving the innovation capacity of developing countries (Zhang et al., 2013).

Since the beginning of the 21st century, with the rise of open innovation theory and the vigorous development of innovation outsourcing (Chesbrough, 2006), the technology diffusion of multinational corporations has become complexHowever, as MNCs gradually upgrade the content of their outsourcing business links (from ITO to BPO to KPO), the materialized business knowledge and endogenous technology of TNCs are also constantly spilling over and transferring to the contracting enterprises in developing countries, thus bringing about the internal outward (Thoms, 2004). ）。 Obviously, the increasing complexity of technology in innovative outsourcing activities requires more frequent interaction and communication between the employer and the contractor, and thus the reticence of knowledge/technology is also increasing. In addition, the rise of reverse innovation outsourcing activities has increased the demand for complex business knowledge from developing country firms, which also reflects the urgent need for technology spillover and transfer of firms in developed countries, so innovation outsourcing has attracted more and more scholars' attention (Hsuan et al., 2011; Banerjee et al.,2019）。

**and (2) characteristics of "reverse outsourcing" activities**

The rise of innovation outsourcing activities has made the transaction objects and the nature of transaction activities from production outsourcing to service outsourcing more complex and diversified, which will also lead to the consideration of transaction cost savings (Coase, 1937). Based on the transaction cost theory (Geyskens et al., 2006), it can be found that the risk profile of multinationals is different under different outsourcing models. For example, from the outsourcing phenomenon in Europe and the United States to the outsourcing phenomenon in China, we have observed that the specific investment in outsourcing transactions is increasing, and the uncertainty and risks faced by multinational companies are also increasing. This is due to the fact that, as described in the traditional European and American outsourcing phenomenon, multinational corporations in developed countries only outsource simple labor-intensive business links to enterprises in developing countries in order to take advantage of the latter's various cheap skills and resource subsidies, while the offshore "reverse outsourcing" described in the Indian phenomenon is more likely to be contracted by Indian enterprises in the backyard of developed countries to seek technical help from multinational corporations as much as possible (Zheng Feihu et al., 2016). In both cases, although the risks of TNCs are increasing, especially in the case of India, there will be competition between subcontracted TNCs, but after all, the local implementation of TNCs is moderately uncertain. However, in the onshore "reverse outsourcing" activities corresponding to the phenomenon of contracting in China, the strategic uncertainty faced by multinational companies is greatest due to the need for multinational companies to go deep into the Chinese market to seek outsourcing business, such as the existence of a different cultural environment between China and its host country, unfamiliarity with counterparties, and the presence of many domestic and foreign competitors.

In the innovation outsourcing market, when multinational companies come to the Chinese market to participate in the contracting, due to the greatest uncertainty they face, there will be the following game between the two parties in the transaction activities: on the one hand, for the domestic contractor, it is not only necessary to rely on a certain amount of internal /The external institutional environment and market information to understand the real level of the undertaker, and in the process of project implementation, it is also necessary to motivate the undertaker to better carry out technical services through certain institutional measures. On the other hand, for the undertaker, if the employer cannot tell the employer its own level of ability and effort with true information transmission, it will cause both parties to spend unnecessary time and energy entangled in low-level negotiation and communication. In addition, if an inappropriate match occurs, it will eventually affect the brand image of the recipient. Therefore, from the beginning of the contracting activity to the end of the transaction, whether the two parties to the transaction can quickly identify, communicate and match with the help of a reasonable business system environment is a thorny problem and task that needs to be solved urgently behind the phenomenon of innovative outsourcing in China.

**and (3) the impact of the business institutional environment on "reverse outsourcing" activities**

The business environment is the ecological environment for economic development, and a good business environment has certain positive significance for enterprises to carry out independent innovation (Xia Houxue et al., 2019), alleviate market uncertainty (Yu et al., 2019) and financing constraints (Zhou Zejiang et al., 2020), and introduce foreign investment and go global (Liu Jun et al., 2020;

In the innovation outsourcing market, due to the unpredictability of service quality, the transaction cost of innovation outsourcing is mainly reflected in the risk of service quality, including the ability of the service contractor, the quality of human capital, the timeliness of transactions, and the protection of intellectual property rights and trade secrets within the enterprise (Long Guoqiang, 2009). It can be seen that the risk of this service activity not only comes from the management[[8]](#endnote-8) of the contractor itself and the quality of human resources, but also closely related to the environment in which the contractor is located, such as the market environment that respects the contract and the protection of intellectual property rights.

When risks from firms and markets hinder the smooth flow of trading activities, the government, as the provider of the institutional environment for doing business, should [[9]](#endnote-9)play an active role (Lin Yifu, 2014), especially in ensuring the hardware and software infrastructure to facilitate the execution of trading activities (intellectual property protection, favorable financial and tax system arrangements, policy incentives, etc.). In addition, micro-level project funding and incentive arrangements will also help reduce the additional burden on the pioneers and encourage more frontier technology exploration. When the above-mentioned institutional arrangements at the macro and micro levels are effective, the parties to the transaction will also increase the frequency of transactions with each other due to the reduction of uncertainty, which promotes information communication and understanding, and helps to further consolidate the business trust relationship between the two parties. It can be seen that the optimization of the business institutional environment can greatly reduce the transaction cost of the innovation outsourcing market and better promote the development of "reverse outsourcing" activities by eliminating many risks to service quality [[10]](#endnote-10)On the basis of the above reasoning, this paper constructs an internal logical chain of "optimization of business system, change of transaction cost, selection of contracting mode/technology diffusion" of high-quality foreign investment, which is not only used to explain the complexity and uncertainty of MNCs' outsourcing services (different business system environmental factors correspond to different risks of outsourcing service quality), but also serves as the main guiding framework for the empirical research in this paper.

**2. Research hypothesis**

**(1) Tax system arrangement and contracting mode**

In innovative outsourcing activities, if the contractor wants to obtain higher profits, it becomes very important for the contractor to provide the employer with high and reliable project service quality.

From the perspective of the contract, the asset specificity of the contract is an important basis for measuring the quality level of the undertaker. Dedicated assets are assets that can only be used for the development of a specific project and cannot be used for other projects after the study is completed (Williamson, 1975). As a project quality signal, high specificity investment not only represents the technical level and differentiation ability of the undertaker, but also the more difficult it is for the customer to switch to the undertaker and the greater the dependence on the technical contract with strong specialized assets (Zheng Feihu et al., 2017). ）。 According to our data analysis, multinational companies entering the Chinese market often carry out the following two different types of contract undertaking activities with their counterparties: one is a technical service contract, which refers to a contract concluded by the undertaking party to solve a specific technical problem for a customer with technical knowledge, and the subject matter of such contract transactions is mainly low-cost mature technology. Generally speaking, multinational companies are more likely to engage in such trading activities when serving domestic domestic enterprises or institutions (hereinafter referred to as "cost-competitive outsourcing"). ）。 The other type is technology development contracts, which refer to the contracts concluded between the parties on the research and development of new technologies, new products, new processes or new materials and their systems, including entrusted development contracts and cooperative development contracts, the object of which is the technological achievements that do not yet exist to be developed. Compared with technical service contracts, technology development contracts require the undertaker to invest more specialized technologies to achieve differentiation, and the subject matter is mostly sunken technology, and many foreign-funded enterprises in China and multinational companies carry out such contract transactions more frequently (hereinafter referred to as "quality competitive outsourcing").[[11]](#endnote-11)。 Since 1999, in order to encourage more multinational companies to deploy their high-end R&D projects locally, the Beijing Municipal Government has adopted a large-scale business tax reduction and exemption policy based on the amount of project transactions, so as to provide certain support for the R&D costs of multinational companies. Accordingly, we put forward the following assumptions based on the tax system arrangement for asset-specific investment incentives:

**Hypothesis 1a: The more asset-specific the technology development contract signed by the two parties to the transaction, the greater the tax incentives for the multinational company, and the more willing the multinational company is to carry out quality-competitive outsourcing.**

**(2) Commercial credit arrangement and contracting model**

In innovative outsourcing activities, the diversification of demand and technology matching will increase the asymmetry of transaction information, which will correspondingly increase the difficulty of contracting behavior. Even the direct application of mature technology will be repeated due to the needs of the employer's unit and the characteristics of different industries, and these repetitions and uncertainties are usually reflected in the fluctuation of the contract price, so the determination of different payment methods of the contract becomes very crucial. There are two types of contract pricing, fixed-price contracts and floating-price contracts (Kim et al., 2015). The main difference between the two is the different definition of risk – the main risk bearer for fixed-price contracts is the undertaker, while for variable contracts, the employer is the employer. From the actual analysis, in the context of high information asymmetry in innovation outsourcing, when the undertaker provides corresponding technical services based on the project needs of the employer, its behavior mode tends to be more self-interested, so in the context of controllable costs, the undertaker is more likely to transfer the contract risk to the employer through the contract payment method in order to maximize its own benefits, that is, to adopt variable payment.

Accordingly, we make the following assumptions based on the risk profile suggested by the contractual payment method in the commercial credit arrangement:

**Hypothesis 1b: The more the contractual payment method tends to be variable, the smaller the cost burden of the MNE, and the more willing the MNE is to engage in cost-competitive outsourcing**

**(3) Market system arrangement and contracting mode**

In innovative outsourcing transactions, the contractor's implementation of contracting services is actually a disguised "export" of technical services, because the ultimate ownership of the project belongs to the employer. From the perspective of actual transactions, the "export" of technical services carried out by the undertaking party includes two situations: one is to contract the application results or technical solutions provided by the multinational company based on its own mature technology, and the multinational company may use this technology to serve other peer enterprises, so this kind of technology does not have good exclusivity, and it is difficult to form the core competitive advantage of the contracting enterprise. On the other hand, the subject matter of the transaction is based on the achievements of new technologies, which can be applied to the international competition of the contracting enterprise, and has a certain threshold to ensure the expected income of the contracting enterprise. On the basis of the supply of ambidextrous technology (Zheng et al., 2018), whether the employer can realize the above wish depends not only on the micro-transaction motivation of the technology diffusion of the contractor, but also on the external macro level of intellectual property protection, that is, it reflects the quality level of the market system of the host country's intellectual property protection (in particular, the degree of protection for technological exclusivity is more conducive to the diffusion of new technologies by the multinational corporation).

Accordingly, we put forward the following assumptions based on the market institutional arrangements revealed by the protection of technological exclusivity:

**Hypothesis 2: The higher the exclusivity of the subject technology of the contract and the more adequate intellectual property protection for innovation, the more willing multinational companies are to carry out quality-competitive outsourcing**

**(4) Organizational system arrangement and contracting mode**

-- **Arrangement of property rights structure**

In innovation outsourcing transactions, when TNCs come to the host country's market, they tend to exercise prudential control due to their unfamiliarity with the environment (Hymer, 1976). ), that is, to firmly hold its own assets through equity control. Reflected in the organizational form, that is, the multinational company adopts the wholly-owned mode to enter, at this time, the company faces a relatively small risk of technology spillover, and at the same time, it is convenient for the parent company to transfer core knowledge resources to it, which is suitable for internal transactions or quality competitive outsourcing transactions. In contrast, although the joint venture establishment of R&D institutions can save the management costs of multinational corporations, the control of multinational corporations over the R&D institutions is relatively weakened, and it is prone to technology spillover, which is not suitable for the internal transfer of core resources of multinational corporations.

Accordingly, we put forward the following assumptions based on the characteristics of the property rights structure reflected in the different equity arrangements:

**Hypothesis 3a: The more relaxed the host country's market access regime and the greater the proportion of WFOEs, the more willing MNCs are to undertake quality-competitive outsourcing**

-- **Organizational trust relationship**

For multinational corporations, there are not only many fixed transaction costs, but also many variable costs in the host country market. Therefore, when multinational companies undertake different business transactions, they will consider their organizational investment, especially the investment of special assets, which is often difficult to divert for other purposes, which invisibly increases the sunk cost of multinational companies. If the business partners contracted by TNCs in the host country are more frequent with them, the more information flows between the two sides through the transaction, and the TNCs can make relatively stable and continuous investment. Not only do the parties reduce information asymmetry in the process, but also avoid additional transaction costs due to frequent transactions (e.g., the problem of lock-in, Williamson, 1985). Moreover, in many transaction activities, with the increase of cooperation experience between the two parties, a relationship of mutual trust has been established, and the undertaker can continue to provide technology development for the employer, so the transaction target of the two parties tends to sink the technology. If the number of transactions between the parties to the same contract is very small, or only one cooperation, the subject matter of such contracts is usually mature technology, and multinational companies will not make special investment in it, which is more common in cost-competitive outsourcing activities.

Based on this, we propose the following assumptions based on the organizational trust relationship reflected by different transaction frequencies:

**Hypothesis 3b: The more frequent the transactions and the higher the trust relationship between the two parties, the more willing the MNC is to engage in quality-competitive outsourcing**.

Based on the above theoretical deductions and research assumptions, based on the correspondence between the business institutional environment and the service quality risk, we construct a benchmark analysis framework for the outsourcing model/technology diffusion of multinational corporations in "reverse outsourcing" activities around the changes in transaction costs[[12]](#footnote-1).

Trading frequency 3b

Asset specificity 1a

(Business Institutional Environment Vs Service Quality Risk).

**Tax system arrangement**: 1a: quality level of contracting (*asset specificity*);

**Commercial Credit Arrangements**: 1b: Project Uncertainty (*Contractual Payment Terms*).

Outsourcing model selection

(Cost Competitive vs. Quality Competitive.)

**Market Institutional Arrangements**: 2: Level of Intellectual Property Protection (Protection of *Technological Exclusivity*).

**Organizational institutional arrangements**: 3a: property rights structure effect (equity arrangement*) and* 3b: organizational trust relationship (transaction frequency*).*

Transaction Cost Theory (3D).

Uncertainty 1b/2

Diffusion of contracting technology

(Proven technology Vs sinking technology).

(Impact of the Institutional Environment of Doing Business)

(Change in transaction costs)

Technology diffusion

Duality – Outsourcing model

vs Technology Diffusion

Fig. 1 The impact of the business institutional environment on outsourcing patterns: a framework for technology diffusion analysis under changing transaction costs

# 3. Research design

This section gives the basic settings of the model and explains the meaning of the relevant variables.

Based on the real situation of multinational corporations in China to carry out contracting, this paper expands the contract trading behavior into the trinity logic of "business system optimization-transaction cost change-transaction mode selection", and based on the "project-organization-organization-to-project" Environment" is analyzed from the perspective of macro and micro interactions. The above-mentioned framework can not only cope with the complexity and uncertainty of innovative outsourcing transactions, but also facilitate multinational companies to promote outsourcing transactions from the perspective of transactions with the different incentives of the business institutional environment, so as to facilitate the efficient identification, communication and matching of both parties to the transaction, so as to ensure the smooth progress of outsourcing activities.

**(1) Model setting**

According to the above-mentioned analytical framework and research hypothesis of the business institutional environment, the Probit model is adopted, and the estimated model is as follows

thereinto

where is the cumulative distribution function of the standard normal distribution, and is the density function of the standard normal distribution. It is a dummy variable for innovation outsourcing, an asset-specific variable to measure the utility of tax system arrangement, a contract payment method to measure the uncertainty risk reflected in the commercial credit arrangement, a domestic patent, a technical secret, a measure of the characteristics of the property rights structure, and a time of establishment of the company when participating in outsourcing activities, and the rest is a control variable, a fixed effect of time (accurate to the year), and an error term. The sample is the microdata at the contract level.

**(2) Variable selection**

**1. Explanatory variables: dummy variables (outsourcing model/diffusion of different technologies).**

In the distance subcontracting activity, according to the different matching of the two parties to the transaction (whether the employer is a domestic enterprise or a foreign-funded enterprise in China), this paper summarizes two different innovative outsourcing models: cost-competitive outsourcing and quality-competitive outsourcing, which correspond to the low-cost strategy and differentiation strategy of multinational companies, respectively[[13]](#endnote-12). Correspondingly, we define the dependent variable as a binary dummy variable (foreign-to-local-outsourcing). When 1 is taken, the corresponding transaction is "cost competitive outsourcing", the employer is a domestic enterprise or institution, and the contractor is a multinational R&D institution. When 0 is taken, the corresponding transaction is "quality competitive outsourcing", the employer is a foreign-funded enterprise in China, and the undertaker is a multinational R&D institution.

**2. Core explanatory variables: different dimensions of the environmental impact of the business system**

Under the guidance of the above theory, we identify three dimensions of business institutional environmental variables as a series of independent variables:

(1) Two variables representing the tax system/commercial credit arrangement. In this database, since the purpose of the tax system arrangement is to encourage the settlement of higher-value R&D projects, we use the asset specificity variable of the receiver to characterize the incentive direction of the system. In this article, we distinguish between technology outsourcing contracts and technology development contracts and technology service/consulting contracts. Since the subject matter of technology development contracts is mostly sunken technology, while the subject matter of technical service/consulting contracts is mainly mature technology, the asset specificity of technology development contracts is stronger and the project quality is higher[[14]](#endnote-13). Here, we use dummy variables to express the degree of asset specificity of the contract (Michael et al., 2011), where the value of the contract is 1 for the technology development contract, and 0 for otherwise. The second is to use the payment method () of the contract to characterize the transaction risk sharing, i.e., the degree of uncertainty represented by the commercial credit arrangement, and the variable is 1 for "installment payment or commission payment", that is, for variable price contracts, and 0 for "one-time payment", that is, for fixed-price contracts. In this study, the undertaker has more incentive and ability to adopt variable price contracts.

and (2) variables that represent the institutional arrangements of the market. In this paper, two binary dummy variables, whether there are domestic patents () and technical secrets (), are used to measure the level of technical exclusivity of the contract, and then reflect the degree of intellectual property protection in the host country. The perfect market institutional arrangement indicates that the host country has a complete intellectual property protection system, so the host multinational company can apply for and obtain more comprehensive intellectual property protection support. In innovation outsourcing activities, important forms of intellectual property protection such as technical secrets and computer software are of great significance to the multinational company of the undertaking party (patent and know-how protection is essentially to give the creator a monopoly for a certain period of time), so we introduce Chinese domestic patents and technical secrets, when the subject matter of the contract has a domestic patent, the value is 1, otherwise the value is 0, and when the subject matter of the contract is a technical secret, the value is 01, and vice versa is 0. Compared with the subject matter that does not involve intellectual property rights, the contract with the subject matter of domestic patents or technical secrets represents a higher level of technological exclusivity and also reflects a stricter level of intellectual property protection.

(3) Two variables representing organizational institutional arrangements. The first is the characteristics of the property rights structure (i.e., whether the multinational corporation of the undertaking party is a wholly foreign-owned enterprise or a foreign-funded joint venture). Obviously, for the multinational company that undertakes the wholly-owned enterprise, the sole proprietorship can carry out strict technical control based on complete ownership to prevent technology leakage. However, host countries often require joint ventures with TNCs in order for domestic firms to gain better access to technology spillovers. In this sense, outsourcing transactions between the undertaking party of a multinational corporation existing in the joint venture model and domestic enterprises and institutions may be more conducive to technology spillover. In this paper, a dummy variable is introduced, in which the value is 1 when the undertaking party is a wholly foreign-owned enterprise, and the value is 0 when the foreign-owned joint venture is a foreign-owned enterprise. The second is the organizational trust relationship represented by transaction frequency (). From the perspective of organizational behavior, if there are frequent transactions between the multinational company and the employer, then with the deepening of mutual understanding, the two parties do not have to worry about the problem of lock-in, so that the multinational company can continue to invest in special assets to serve the employer based on the continuity of the task, which in turn leads to the contract between the two parties to be more biased towards technology development and carry out more sunken technology transactions. For one-off transactions, the multinational company that undertakes the transaction may be more inclined to conduct business based on existing mature technology. We use the number of transactions between the parties during the sample period (2001-2011) to represent the frequency of transactions between the two parties (), which is a measure of the level of trust between the parties.

**3. Control variables**

(1) R&D capabilities of multinational corporations. As an important variable to reveal the service capability of the undertaker, the dedicated investment is closely related to the R&D level of the undertaker (). In innovation outsourcing transactions, if the host multinational company is mainly engaged in cost-competitive outsourcing activities, such activities usually do not involve too many specialized knowledge resources, so the multinational company does not need strong R&D capabilities in the research and development of new technologies. However, for quality-competitive outsourcing activities, in order to complete the transformation of new technologies, multinational companies need to have higher R&D capabilities, so it is common practice in the reference literature to add the R&D capabilities of enterprises to the control variable (Grimpe et al., 2010). In this regard, we can distinguish by looking at the proportion of the contract value of the project undertaken by the undertaker, and the variable represents the proportion of all contracts with a transaction value of more than RMB 10 million from 2001 to 2011. According to the "2012 Beijing Technology Market Statistical Annual Report" released by BTMO, the amount of a single technology transaction contract is generally distributed between 100,000 and 1 million, accounting for about 50% of the total number of contracts, and the huge contract of more than 10 million yuan accounts for only about 3.5% of the total contract, but accounts for 77.5% of the contract amount. In other words, the higher the proportion of large projects in the contract, the stronger the ability of the multinational company to develop new technologies.

(2) Time fixation effect. This article uses mixed cross-sectional data, which needs to take into account the impact of different years. With the increase of market internationalization, the improvement of the intellectual property protection system and the enhancement of enterprises' awareness of intellectual property rights, the external environment for multinational companies to carry out two different types of innovation outsourcing transactions is constantly changing, so it is necessary to consider the impact of the time fixation effect (). Table 1 shows the meaning of each variable, descriptive statistics, and a comparison of the characteristics of cost-competitive outsourcing and quality-competitive outsourcing.

# 4. Empirical analysis

In this section, we conduct an empirical analysis of the data based on the model setting, explore the driving forces that affect the diffusion of the two types of outsourcing models and technologies, analyze the endogeneity of the model (including the two perspectives of sample selection bias and reverse causation), and then discuss the robustness.

1. **Descriptive statistics**

The data used in this article is based on the transaction information of R&D contracts of multinational companies registered with the Beijing Technology Market Management Office (BTMO) from 2001 to 2011. The database records the detailed information of the innovative outsourcing contracts of multinational companies in Beijing, including the transaction contract range, payment method, frequency of the two parties to the transaction, and the nature of ownership of the two parties. This article identifies whether a transaction is "reverse outsourcing". Specifically, if the undertaking party of the transaction is not a multinational company in China, and the employer is not a foreign-funded enterprise or a domestic-funded enterprise or institution in China[[15]](#endnote-14), the sample will be deleted, and the remaining sample will be 2,070 (i.e., this article is discussing purely distance subcontracting activities). In the whole sample, there were 1,843 cost-competitive outsourcing contracts, accounting for more than 70%.

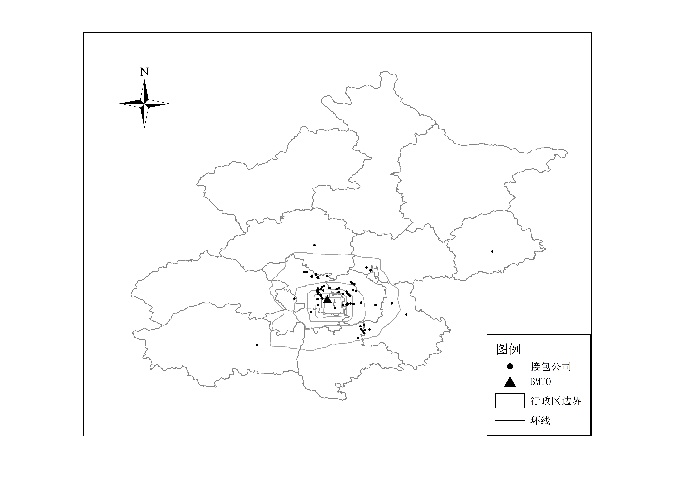
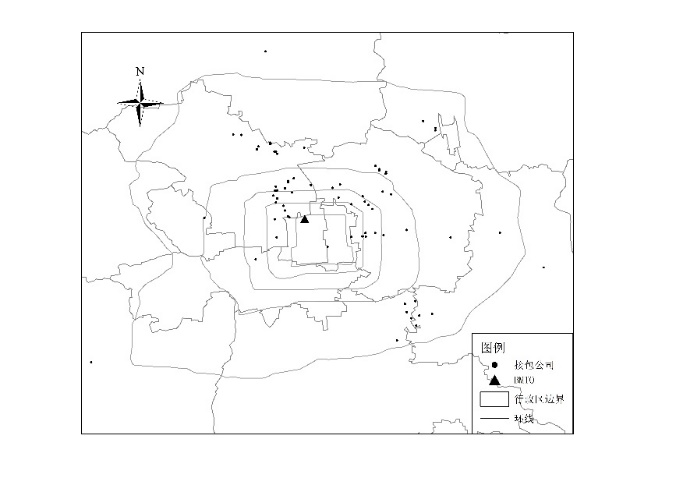


Figure 2 Location distribution of contracting companies

Note: 1) The data comes from BMTO and Baidu Maps and has been sorted out by the author;2) The darker the color, the more the number of packages.

Table 1 shows the characteristics of cost-competitive outsourcing transactions and quality-competitive outsourcing transactions. As can be seen from Table 1, compared with quality-competitive outsourcing transactions, the proportion of technology development contracts in the total number of contracts in cost-competitive outsourcing transactions is slightly lower, only 42.105%, which means that more specialized assets are invested in quality-competitive outsourcing transactions, and the quality level of the undertaker is higher. The proportion of the payment method of the cost-competitive outsourcing contract is 81.226%, which is nearly twice that of the quality-competitive outsourcing, indicating that the payment of the contract through the variable price is more conducive to the contractor to carry out the contracted service of its established technical level. From the perspective of the characteristics and organizational characteristics of the transaction target, the cooperation target of quality competitive outsourcing has more applications for intellectual property protection and contains technical secrets in China, and the transaction exclusivity is stronger, with the proportion of domestic intellectual property rights applied for by the target being close to 52%, and the proportion of technical secrets containing technical secrets is 28.070%, which is much higher than the technical exclusivity of the cost competitive outsourcing target. At the same time, from the perspective of property rights structure, 37% of the undertakers of quality competitive outsourcing are wholly foreign-owned enterprises, and only 8% of cost competitive outsourcing are foreign-funded joint ventures. In terms of transaction frequency, the average number of transactions between the two parties in cost-competitive outsourcing transactions is slightly smaller than that of quality-competitive outsourcing. The above comparison of characteristics is consistent with the theoretical hypothesis of this paper, which indirectly proves the validity of the theoretical hypothesis.

Based on the growth trend of the total number of technology outsourcing contracts (the proportion of cost-competitive outsourcing has been steadily increasing since 2006 and has little fluctuation), this paper studies the overall situation from 2001 to 2011 and uses the model to test the short-term model situation from 2006 to 2011 in the benchmark regression.

table 1 Descriptive statistics of the variables and comparison of the characteristics of the two types of outsourcing

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable type | The name of the variable | Variable definitions | References | mean | minimum | maximum | Cost competitive outsourcing | quality competition outsourcing". |
| Dependent variable: Outsourcing model | *FTLO* | Cost-competitive outsourcing = 1, quality competitive outsourcing = 0 | Zheng Feihu et al. (2016, 2017) | 0.890  (0.313) | 0 | 1 | / | / |
| Independent variable 1a: Tax regime | Asset Specificity (*SERVCON*). | The different contract types (technology development contracts/technical services/consulting contracts) indicate the size of the asset's specificity. Technology development contract = 1, technical service/consulting contract = 0 | Michael et al. (2011), Zheng et al. (2016, 2017) | 0.455  (0.498) | 0 | 1 | 42.105% | 45.958% |
| Independent variable 1b: Business credit | Transaction uncertainty (*paystyle*). | Fixed/variable price payment. Installment or commission payment = 1, lump sum payment = 0 | Gopal etc.,(2003) | 0.777  (0.416) | 0 | 1 | 81.226% | 49.123% |
| Independent variable 2: Market regime | Technical exclusivity (*localIP*). | The subject has a domestic patent localIP=1, and does not have a patent =0. | Cohen(2010) | 0.351  (0.477) | 0 | 1 | 33.044% | 51.754% |
| Independent variable 2: Market regime | Knowhow | The existence of technical secret knowhow=1, the absence of technical secret knowhow=0. |  | 0.118  (0.323) | 0 | 1 | 9.821% | 28.070% |
| Independent variable 3a: Organizational structure | Form of organization (*foreignonly*). | Multinational enterprises are sole proprietorships = 1 and joint ventures = 0. | Beamish et al.(1987) | 0.113  (0.316) | 0 | 1 | 8.085% | 36.842% |
| Independent variable 3b: Trust relationship | Transaction frequency (*amount*). | The number of repeated transactions between the parties to the same contract during the sample period | Williamson(1975, 1985) | 4.476  (6.694) | 1 | 49 | 4.356 | 5.531 |
| Control variables | R&D capability (*prebig*). | The proportion of contracts with a transaction amount greater than RMB 10 million | Grimpe et al. (2010) | 0.007  (0.088) | 0 | 1 | 0.597% | 2.193% |
| Control variables | Time trend (*year*). | The time for reporting contract transactions shall prevail | / | 2008.106  (2.410) | 2001 | 2011 | 2008.241 | 2007.009 |

Note: Standard deviations are in parentheses in the mean column.

1. **Baseline regression**

The explanatory variable in this paper is a binary choice variable, so the Probit model is selected to estimate Eq. (1), and the results are shown in Table 2. The results show that the estimation coefficient of asset specificity is significantly positive at the level of 1%, and from the perspective of asset specificity, projects that invest a large number of specialized assets generally belong to technology development contracts, so the higher the probability of multinational companies implementing sunk technology transfer through quality-competitive outsourcing under the incentive of the tax system, which verifies the validity of hypothesis 1a in this paper, and this result is also similar to that of Glauco et al. (2010). The marginal effect of the asset specificity variable, which represents the technical level of the undertaker, is 0.062, indicating that every standard deviation increase in the asset specificity of the undertaker will increase the likelihood of the transaction being in line with quality competitive outsourcing by 3.088% (0.062\*0.498). ）。 The payment method of the contract is significantly negative, which means that in terms of uncertainty, the more the contract payment method tends to be variable payment, the greater the probability that multinational companies will implement mature technology transfer through cost-competitive outsourcing, which verifies the validity of hypothesis 1b in this paper. The estimation coefficients of the dummy variables of domestic patents and technical secrets are all negative and significant at the 1% level, indicating that the higher the technical exclusivity of the subject matter of the contract, the greater the probability that the transaction will meet the quality competitive outsourcing level, which verifies the validity of hypothesis 2 in this paper. The estimated coefficient for the characteristic variable of the trading organization is -0.815 and is significant at the 1% level. Since the R&D capabilities of wholly-owned R&D institutions are stronger and more suitable for internal transactions or quality-competitive outsourcing, the more likely the multinational company is to implement quality-competitive outsourcing if the undertaker is a wholly foreign-owned enterprise, which verifies the validity of hypothesis 3a in this paper. Therefore, from the perspective of transaction frequency, the more the number of cooperation between the two parties, the greater the trust between the two parties, and the greater the probability of multinational companies implementing technology transfer through quality-competitive outsourcing, which verifies the validity of hypothesis 3b in this paper. For the R&D capability of control variables, the R&D capacity required by the undertaker of cost-competitive outsourcing projects is smaller than that of quality-competitive outsourcing projects, so the stronger the R&D capability of the undertaker, the greater the probability that multinational companies will pass quality-competitive outsourcing. The above empirical results are consistent with the assumptions of this paper. The empirical results of this paper are also basically consistent with the conclusions of related studies, which shows the credibility of the results (Aubert et al.). ,2004; Alaghehband et al.,2011; Moretto,2012; Zhang et al., 2013).

In the context of this study, cost-competitive outsourcing has the greatest uncertainty, and the proportion of multinational companies choosing to participate is also the highest. As the saying goes, "existence is reasonable", what is revealed behind this anomaly is that this outsourcing model can still achieve a win-win situation for the multinational company and the Chinese enterprises and institutions of the contractor. For Chinese enterprises, as China changes from the contractor of international labor-intensive outsourcing activities to the contractor of innovative outsourcing activities, this change of identity is conducive to the improvement of Chinese enterprises' voice and credibility in the international market, and for the undertaker, it brings the dual technology to the huge Chinese market, and the transaction with domestic enterprises helps multinational companies to share R&D costs and obtain more profits. In particular, these internationally renowned contracting enterprises can combine China's low-cost resources and manpower advantages with their own contracting capabilities, and help Chinese enterprises quickly embed themselves into the global service outsourcing production network.

Although the cost-competitive outsourcing model is more common for domestic enterprises, the results of benchmark regression show that the stronger the asset specificity, the more fixed the contract payment method, the higher the technical exclusivity of the subject matter, the stronger the control over the property rights structure of the undertaker, and the more frequent the transactions between the two parties during the sample period, the smaller the probability that the multinational company will implement technology diffusion through cost-competitive outsourcing. In order to get the answer, we refer to the method of Shao Min et al. (2019) and make the following simulation based on the Probit model estimation results: between 2001 and 2011, transaction A is a technology development contract, and the value is 1Assuming that there is no difference between other influencing factors when examining the impact of asset specificity input on the probability of cost-competitive outsourcing (all take the median value), the actual impact of asset-specific input on the possibility of adopting a cost-competitive outsourcing model is:

In equation (3), the probability that the transaction is cost-competitive outsourcing is dedicated, and other factors that affect the occurrence of cost-competitive outsourcing are all taken as median values, which is a cumulative distribution function of the standard normal distribution. The result of Eq. (3) means that for an outsourcing transaction of a multinational corporation with the same median value of the contract payment method, the technical exclusivity of the subject matter of the contract, the property structure and the frequency of transactions, if the transaction is derived from technical services/If a consulting contract is converted into a technology development contract, the probability that the transaction will be cost-competitive outsourcing will decrease by 0.0278, or in other words, the probability of cost-competitive outsourcing will be reduced by 5.11% (0.0278/0.5438).

Combined with the data in Table 1 and using the same simulation method, the actual impact of the contract payment method, whether the subject matter of the contract has a domestic patent, whether the subject matter contains technical secrets, the property rights structure of the undertaker and the difference in transaction frequency (the above differences are the maximum and minimum values of variables) on the probability of cost competitive outsourcing are 12.56%, -14.66% and -19.01%, respectively、-15.37%、-23.20%。

The simulation results of the above variables, while not a measure of the actual impact, represent the maximum value of the impact and are comparable to each other. Through comparison, it can be found that from the perspective of the change of transaction costs due to the environmental impact of the business system, the transaction frequency reflecting the trust relationship of the organization has the greatest impact on the technology diffusion of cost-competitive outsourcing, followed by whether the subject matter of the technical exclusivity protection reflecting the market system arrangement contains technical secrets, and the smallest is the asset exclusivity investment reflecting the tax system arrangement, with an impact of only 5.11%. The above results have important analytical value for the transaction strategy of technology diffusion implemented by multinational companies through cost-competitive outsourcing (i.e., the positive promotion effect on localization in the host country).

Table 2 Baseline regression

|  |  |  |
| --- | --- | --- |
| *FTLO* | 2001-2011  (1) | Marginal effects  (2) |
| *servcon* | -0.354\*\*\* | -0.0476\*\*\* |
|  | (0.107) | (0.0145) |
| *paystyle* | 0.763\*\*\* | 0.102\*\*\* |
|  | (0.0982) | (0.0122) |
| *knowhow* | -1.200\*\*\* | -0.161\*\*\* |
|  | (0.179) | (0.0228) |
| *localIP* | -0.888\*\*\* | -0.119\*\*\* |
|  | (0.136) | (0.0175) |
| *foreignonly* | -1.000\*\*\* | -0.134\*\*\* |
|  | (0.117) | (0.0152) |
| *amount* | -0.0236\*\*\* | -0.00317\*\*\* |
|  | (0.00517) | (0.000657) |
| *prebig* | -1.038\*\* | -0.139\*\* |
|  | (0.469) | (0.0629) |
| *age* | -0.0163 | -0.00219 |
|  | (0.0140) | (0.00188) |
| Constant terms | 2.165\*\*\* | 0.889\*\*\* |
|  | (0.230) | (0.00587) |
| Time fixation effect | Yes | Yes |
| Observations | 2,070 | 2,070 |

Note: 1) Regression was performed using the Probit model, and the coefficients reported in column (2) were the marginal effects of column (1).

2) Robustness standard errors in parentheses: \*, \*\*, and 1% indicate significant levels of 10%, 5%, and 1%, respectively.

**3. Selectivity bias**

In the sample of empirical analysis in this paper, 89% of the sample is cost-competitive outsourcing, and "quality-competitive outsourcing" is "quality-competitive outsourcing". It accounts for 11% of the sample population, which is a serious imbalance. If the randomness of the sampling can be ensured, the proportionality problem will not affect the consistency and validity of the measurement results. In the sample of this paper, although the Beijing Municipal Office of Technology and Marketing grants tax deductions to the transactions that are declared, since the declaration is not mandatory for all transactions, there will inevitably be transactions that have already been carried out that are not declared, and such transactions are not observed in the sample of this paper. Therefore, this paper needs to verify whether the sampling of cost-competitive outsourcing and quality-competitive outsourcing is random in both observed and unobserved samples, and if not, it will lead to the problem of selectivity bias of the samples, which in turn will lead to bias in the measurement results.

To test this problem, the Heckman two-stage estimation method is used.

In the first stage, Probit selects the model, which is structured as follows:

After the estimation is completed, the predicted value of the dependent variable is obtained, and the inverse Mills ratio () corresponding to each sample is calculated, which intervenes in the second phase of the model as a new explanatory variable.

In the second stage, according to the selective sample, equation (5) is estimated, and the estimated coefficient after processing is obtained:

The estimation methods in this section refer to the treatment methods of selectivity bias by scholars at home and abroad, and most scholars believe that Heckman's two-stage estimation can effectively solve the problem of selectivity bias in samples. The specific results of Heckman's two-stage estimate are shown in Table 3.

Table 3 Heckman two-stage estimation – selectivity bias

|  |  |
| --- | --- |
|  | *FTLO* |
|  | 0.00448  (0.0176) |

Table 3 only shows the coefficient and significance level of the inverse Mills ratio, which is mainly because the inverse Mills ratio coefficient is not significant, indicating that there is no selectivity bias in the sample in this paper. In addition, the Heckman estimation method based on maximum likelihood estimation is also used, and the chi-square statistic of the LR test is 0.06 (p-value is 0.801), which is not significant, and the test results cannot reject the null hypothesis. Therefore, it can be concluded that there is no selectivity bias in the sample of this paper.

**4. Endogeneity discussion**

**(1) Heckman two-stage estimates**

On the basis of verifying that there is no selectivity bias in the sample in this paper, the core explanatory variable contract type may be endogenous due to the existence of reverse causality. Based on the mechanism of reverse causality, this paper argues that after solving the endogeneity, the inverse causality of other variables basically does not exist. Therefore, in order to solve this problem, unlike the previous part, the Heckman two-stage estimation model proposed by Branow in 1981 is selected here.

In the first stage, the Probit model is used to estimate *the simplified formula of servcon,* that is, all exogenous variables are used to represent this endogenous variable. The model is as follows:

After the estimation is completed, an estimate of this endogenous variable is obtained, and the inverse Mills ratio is calculated for each sample, which is added as a new explanatory variable to the two-stage equation obtained in the first part:

Model 2 uses the Heckman two-stage estimation model to solve endogeneity, and the specific results are shown in Table 4.

Table 4 Heckman two-stage estimation - endogeneity analysis

|  |  |  |  |
| --- | --- | --- | --- |
| *FTLO* | Heckman two-stage estimates | | |
| *servcon* | -0.354\*\*\* | *amount* | -0.0236\*\*\* |
|  | (0.118) |  | (0.00732) |
| *paystyle* | 0.763\*\*\* | *prebig* | -1.038\*\*\* |
|  | (0.100) |  | (0.351) |
| *knowhow* | -1.200\*\*\* | *age* | -0.0163 |
|  | (0.186) |  | (0.0164) |
| *localIP* | -0.888\*\*\* |  | 0.323\*\*\* |
|  | (0.146) |  | (0.0812) |
| *foreignonly* | -1.000\*\*\* | Constant terms | 7.425\*\*\* |
|  | (0.122) |  | (0.298) |
| Time fixation effect | Yes | Observations | 2070 |

Note: 1) The robustness standard error in parentheses, \*, \*\*, and \*\* indicate significant levels at 10%, 5%, and 1%, respectively.

The regression results show that the inverse Mills ratio in model 2 is significant at the significance level of 1%, and it is considered correct to consider "endogeneity" in the design of this paper. There is no change in the direction of the influence of all variables on the dependent variable, which is consistent with the hypothesis of the study. Therefore, the conclusions of this paper are robust and the hypotheses are valid.

**(2) Instrumental variable regression**

The instrumental variable method is a common method to solve the endogeneity problem, this paper collects the latitude and longitude coordinates of the multinational company of the contractor, and calculates the distance from the Beijing Technology Market Management Office (BTMO), and uses the calculated distance variable () as the instrumental variable of the endogenous variable for regression estimation, and the estimation results are as shown in the following table. Column (1) is the result without the addition of the control variable, and column (2) is the result after the addition of the control variable.

|  |  |  |
| --- | --- | --- |
| *FTLO* | Instrumental variable regression | |
|  | (1) | (2) |
|  | -1.923\*\*\* | -1.929\*\*\* |
|  | (0.0981) | (0.103) |
| *paystyle* | 0.120 | 0.171\* |
|  | (0.0906) | (0.0928) |
| *knowhow* | -0.734\*\*\* | -0.741\*\*\* |
|  | (0.146) | (0.158) |
| *localIP* | -1.127\*\*\* | -1.151\*\*\* |
|  | (0.0899) | (0.105) |
| *foreignonly* | -0.834\*\*\* | -0.870\*\*\* |
|  | (0.103) | (0.105) |
| *amount* | -0.0317\*\*\* | -0.0319\*\*\* |
|  | (0.00524) | (0.00545) |
| *prebig* |  | -0.589\* |
|  |  | (0.318) |
| *age* |  | -0.00817 |
|  |  | (0.0120) |
| Constant terms | 2.524\*\*\* | 2.613\*\*\* |
|  | (0.166) | (0.185) |
| Time fixation effect | Yes | Yes |
| Observations | 2070 | 2,070 |

Table 5 Instrumental variable regression results

Note: 1) The robustness standard error in parentheses, \*, \*\*, and \*\* indicate significant levels at 10%, 5%, and 1%, respectively.

After using instrumental variables to solve the endogeneity problem, the direction of the regression coefficients obtained is consistent with the benchmark regression results (see Table 2 for details), and the conclusions obtained are also consistent with the previous paper, indicating the reliability of the regression results in the previous paper.

**5. Robustness test**

**(1) Discussion of model setting**

In this paper, the Logit model is used instead of the Probit model to test the model setting problem, and the estimation results are shown in column (1) of Table 6. The results show that the significance and direction of the estimation coefficients of the explanatory variables do not change. Therefore, the estimates in this paper are robust, and the core conclusions do not change with the different model settings.

**(2) Replace explanatory variable asset specificity**

The contract amount can also be used as an alternative measure to characterize the asset specificity of tax system incentives, and the two are closely related (Artz et al.). Anderson et al., 2000), the robustness test in this paper replaces the contract type with the contract amount, and the variable measures the linearized value of the contract's technical transaction value, which reflects the amount of specialized assets required for contract development. We believe that projects that invest a large number of specialized assets generally have a large transaction amount, and the larger the contract transaction amount, the stronger the specificity of the asset (this kind of technical input assets cannot be diverted to other uses, which is equivalent to sunk costs, Michael et al., 2011). ), the smaller the probability that the transaction belongs to cost-competitive outsourcing (it can be seen from the data in this paper that the transaction amount corresponding to cost-competitive outsourcing contracts is lower than that of quality-competitive outsourcing contracts), that is, there is a significant negative correlation with the transaction. In addition, we believe that there is no reverse causal relationship for the variables here. The reason is that due to information asymmetry and the complexity of IT industry technology, the employer may not be aware of the intrinsic characteristics of the technology required for its own project when awarding the contract(e.g., the technical maturity of the project and the detailed step-by-step architecture adopted, etc.). The detailed status of the project technology can only be known to the undertaker, and the undertaker will not fully inform the employer of the degree of technical difficulty required in order to obtain a more generous contract amount. Similarly, for the employer, it only cares about whether the contractor can complete the required technical solution of the project within the specified time and acceptable amount, and generally does not spend too much money to search for the technical features contained in the contract.

The regression results in column (2) of Table 6 show that in terms of asset specificity, projects that invest a large number of specialized assets generally have a larger transaction amount (), so the probability that the transaction is cost-competitive outsourcing is smaller. The other variables in this paper are statistically significant at the significance level of 1%, and the signs are consistent with the assumptions proposed in this paper, which once again proves that the improvement of the asset specificity of the contract reduces the probability of cost-competitive outsourcing, and the conclusion of this paper will not change due to the different measurement methods of the explanatory variables.

**(3) Short-term model 2006-2011**

Taking 2006 as the boundary, two models are designed in this paper: the long-term model (model 1) studies the overall situation from 2001 to 2011, which is the model used in the benchmark regression in this paper. The short-term model (Model 2) studies the period from 2006 to 2011 and explores the significance of the model assumptions after the change in sample structure, and the regression results are shown in column (3) of Table 6. It can be seen that the size of the estimated coefficients of each variable in column (3) is basically slightly higher than that in column (1) of Table 2, and the significance remains unchanged, which verifies that the theoretical hypothesis of this paper is also valid for the short-term model, and the conclusion is robust.

Table 6 Robustness analysis

|  |  |  |  |
| --- | --- | --- | --- |
| *FTLO* | Logit model  (1) | Substitute variables  (2) | Short-term model: 2006-2011  (3) |
| *servcon* | -0.753\*\*\* |  | -0.481\*\*\* |
|  | (0.214) |  | (0.129) |
| *lnmoney* |  | -0.0753\*\*\* |  |
|  |  | (0.0216) |  |
| *paystyle* | 1.516\*\*\* | 0.736\*\*\* | 0.770\*\*\* |
|  | (0.185) | (0.0955) | (0.121) |
| *knowhow* | -2.314\*\*\* | -1.206\*\*\* | -1.241\*\*\* |
|  | (0.338) | (0.185) | (0.234) |
| *localIP* | -1.833\*\*\* | -0.667\*\*\* | -0.894\*\*\* |
|  | (0.275) | (0.123) | (0.157) |
| *foreignonly* | -1.860\*\*\* | -1.093\*\*\* | -1.422\*\*\* |
|  | (0.225) | (0.124) | (0.151) |
| *amount* | -0.0484\*\*\* | 0.00250 | -0.0245\*\*\* |
|  | (0.00973) | (0.00783) | (0.00570) |
| *prebig* | -2.045\*\* | -1.085\*\* | -1.411\*\*\* |
|  | (1.013) | (0.482) | (0.519) |
| *age* | -0.0361 | -0.00719 | -0.0189 |
|  | (0.0282) | (0.0139) | (0.0172) |
| Constant terms | 4.105\*\*\* | 2.360\*\*\* | 1.241\*\*\* |
|  | (0.436) | (0.237) | (0.184) |
| Observations | 2,070 | 2,070 | 1,778 |

Note: Robustness standard errors are in parentheses; \*, \*\*, and indicate significant at the significance levels of 10%, 5%, and 1%, respectively.

**6. Heterogeneity analysis**

Considering that most of the contracts in this study are information technology outsourcing (ITO), we divide the contracts into three types of heterogeneous analysis: basic technical services, system application services, and system operation services (Long Guoqiang, 2009).）。

**(1) Undertaker**

Firstly, the heterogeneity analysis is carried out from the perspective of the contractor, and the contractor enterprises are divided into Sino-foreign joint ventures, The results of heterogeneity analysis between foreign-funded enterprises and other companies are shown in Table 7 below, and it can be seen that when Sino-foreign joint ventures or foreign-funded enterprises act as contractors, these impact results are basically consistent with the overall and are very significant, while when other enterprises act as contractors, these results are no longer significant.

Table 7 Heterogeneity analysis - the recipient

|  |  |  |  |
| --- | --- | --- | --- |
| *FTLO* | Sino-foreign joint ventures | Foreign-funded enterprises | other |
|  | (1) | (2) | (3) |
| *servcon1* | -1.283\*\* | -0.916\* | -0.107 |
|  | (0.539) | (0.554) | (0.253) |
| *paystyle1* | 0.917\*\* | 1.198\*\*\* | -0.138 |
|  | (0.436) | (0.347) | (0.177) |
| *knowhow* | -2.043\*\*\* | -0.322 | -0.610 |
|  | (0.406) | (0.663) | (0.378) |
| *localIP* | -0.940\*\*\* | -1.362\*\*\* | -0.844\*\*\* |
|  | (0.287) | (0.494) | (0.314) |
| *foreignonly* | -1.793\*\*\* | -2.067\*\*\* | -0.370 |
|  | (0.350) | (0.584) | (0.607) |
| *amount* | 0.0203 | -0.160\*\*\* | -0.0567\*\*\* |
|  | (0.0192) | (0.0413) | (0.0197) |
| *prebig* | -1.782\*\*\* | -1.869\*\*\* | -0.916\* |
|  | (0.550) | (0.508) | (0.554) |
| *age* | -0.0180 | -0.162 | -0.0316 |
|  | (0.0243) | (0.113) | (0.0436) |
| Constant terms | 2.074\*\*\* | 4.431\*\*\* | 2.938\*\*\* |
|  | (0.457) | (1.183) | (0.607) |
| Time fixation effect | Yes | Yes | Yes |
| Observations | 1,212 | 229 | 576 |

Note: Robustness standard errors are in parentheses; \*, \*\*, and indicate significant at the significance levels of 10%, 5%, and 1%, respectively.

**(2) Contract type**

From the perspective of contracts, the heterogeneity analysis is carried out, and firstly, contracts are divided into basic technical services, system application services, system operation services, and others. Basic technical services mainly refer to the introduction and maintenance of information technology equipment, the management of communication networks, the construction and operation of data centers, etc., the system application services refer to the services of software development, testing, integration, implementation, etc., and the system operation services refer to the services of daily maintenance, management, and upgrading of IT systems and networks. The three services have different emphases and require different technical specificities. The heterogeneity analysis is carried out from the perspective of contract type, and the results are shown in the following table.

Table 8 Heterogeneity analysis - contract types

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *FTLO* | Basic technical services | System Application Services | System operation services | other |
|  | (1) | (2) | (3) | (4) |
| servcon1 | 0.349 | -1.057\*\*\* | -1.349\*\*\* | -0.438 |
|  | (0.357) | (0.351) | (0.353) | (0.314) |
| paystyle1 | 0.929\*\*\* | 0.229 | 0.267 | 0.412 |
|  | (0.233) | (0.218) | (0.268) | (0.255) |
| knowhow | -1.046\*\* | -1.579\*\*\* | -1.190\*\*\* | -0.963\*\* |
|  | (0.507) | (0.334) | (0.410) | (0.456) |
| localIP | -1.035\*\*\* | -0.596\*\* | -0.524\*\*\* | -1.709\*\*\* |
|  | (0.374) | (0.273) | (0.175) | (0.392) |
| foreignonly | -0.789\*\*\* | -2.338\*\*\* | -1.882\*\*\* | -1.099\*\*\* |
|  | (0.268) | (0.429) | (0.382) | (0.373) |
| amount | -0.0294\*\*\* | -0.0352\*\*\* | 0.0687\* | -0.0539\*\*\* |
|  | (0.0107) | (0.00953) | (0.0375) | (0.0189) |
| prebig | -1.977\*\*\* | -3.017\*\*\* | -1.398\*\*\* | -0.874\* |
|  | (0.685) | (0.565) | (0.374) | (0.526) |
| age | 0.00915 | -0.122\*\*\* | -0.0141 | -0.00263 |
|  | (0.0325) | (0.0369) | (0.0225) | (0.0497) |
| Constant terms | 1.546\*\* | 3.415\*\*\* | 0.907\* | 3.397\*\*\* |
|  | (0.659) | (0.587) | (0.481) | (0.762) |
| Time fixation effect | Yes | Yes | Yes | Yes |
| Observations | 425 | 635 | 764 | 246 |

Note: Robustness standard errors are in parentheses; \*, \*\*, and indicate significant at the significance levels of 10%, 5%, and 1%, respectively.

Some of the environmental variables of the business system are no longer significant in the basic technical services, while the significance level of the system application service and the system operation service remains stable, indicating that the influence of the variables in the contract between the system application service and the system operation service is more obvious and adaptable, that is, the variables such as asset exclusivity input, intellectual property protection level, foreign ownership control, and the frequency of transactions between the two parties to the contract will increase the probability of multinational companies implementing technology diffusion through quality-competitive outsourcing.

# V. Conclusions and Discussion

As a representative of developing countries, how China's business system environment continues to attract high-quality foreign investment has always been the focus of theoretical circles. This paper focuses on the surge of "reverse outsourcing" in the domestic market after China's accession to the WTO, constructs a multi-dimensional analytical framework for the impact of business system environment on innovation outsourcing of multinational corporations through theoretical analysis, and empirically tests how the optimization of business institutional environment affects the change of transaction costs, and then affects the choice of outsourcing mode and the corresponding technology diffusion of multinational companies.

The results of this paper show that the optimization of China's business institutional environment, the destination of contracting, not only leads to the increase of the types of mature technology outsourcing services, but also prompts the multinational companies to expand the investment in sunken technology services. From the perspective of the influencing mechanism, the optimization of China's business institutional environment as a contracting destination, on the one hand, promotes a structured contracting market and significantly intensifies the degree of market competition, which in turn leads to the expansion of the supply of innovative technology services by quality-competitive multinationals and the increase of the supply of mature technical services by cost-competitive multinationals; on the other hand, it can significantly reduce the transaction cost of outsourcing, and prompt both the supply and demand sides of outsourcing to increase the types of transactions of outsourcing services and expand the technical demand for outsourcing services. The study also finds that, compared with the benefits of reduced R&D costs brought by tax incentives, the increase in transaction trust relationship caused by the transparency of information at the destination and the improvement of the level of protection of the intellectual property system have greater incentives for quality competitive outsourcing, which is more conducive to the transfer of sunk technology by MNCs in the host country.

Therefore, behind the surge of "reverse outsourcing", we summarize the relevant laws of the changes in the business institutional environment on the technology diffusion of multinational corporations: when the business institutional environment of the contracting destination enhances the comprehensive advantages of multinational corporations (asset specificity, ownership control, intellectual property protection, etc.), MNCs will be more inclined to carry out quality-competitive outsourcing transactions with foreign-funded enterprises in China and implement sunk technology transfer, while when the institutional environment of the destination of the contract is conducive to the low-cost expansion of MNCs (commercial credit arrangements with variable payments, multi-client discrete transactions, etc.), MNCs are more inclined to carry out cost-competitive outsourcing transactions with domestic enterprises and implement mature technology transfer.[[16]](#endnote-15) This shows that multinationals have been able to expand their entry strategies in the Chinese market through "reverse outsourcing" activities, while reaping the benefits of differentiation and low-cost operations.

Further, the above effects not only support the optimization of China's business institutional environment, but also indicate the inevitable and new trend of the transformation of the outsourcing role of Chinese enterprises: China's accession to the WTO has brought about an increase in domestic and foreign demand orders, and as more Chinese enterprises have turned to the status of employers, domestic enterprises and foreign enterprises in China have attracted and facilitated a large number of multinational R&D institutions to carry out outsourcing activities in China, and contributed to the dual supply of technology (Chesbrough, 2006). )。 This dual technology supply, combined with the low-cost advantages and differentiated advantages brought about by the optimization of the domestic business system environment, has greatly benefited the two types of outsourcing models of multinational companies, and greatly promoted the activity of domestic technology market transactions and the depth of technology diffusion.

Based on the above research conclusions, we summarize the management practice enlightenment brought about by the surge of innovation outsourcing of multinational companies in China:

**First, the "reverse outsourcing" activities in the Chinese market have broken through the stereotypical stereotype of developing countries as the undertaker in the outsourcing market**. Contractors in developing countries, led by China, not only go deep into the developed country markets to learn technology and knowledge through "reverse outsourcing" (external inward-looking), but also attract a large number of multinational companies to come to their domestic markets to carry out technology transfer and spillover (internal outward-looking) through onshore "reverse outsourcing", which actually reflects that open innovation activities have penetrated into the innovation outsourcing market at the beginning of the 21st century and are increasingly accepted by multinational companies. The latest management practice activities from the Chinese market not only verify the prediction of Chesbrough (2006), the father of open innovation, that multinational companies accept open innovation, but also vividly illustrate that after China's accession to the WTO, the expansion and opening up of the domestic market can bring about the source power of "exchanging market for technology" in the real sense.

**Second, multinational companies that come to China to provide outsourcing services have carried out diversified technology diffusion activities with different domestic entities**. In this process, multinational companies not only transfer their mature technologies through cost-competitive outsourcing activities, but also provide the sunken technologies with large inventories to the contractors in the Chinese market in a differentiated way through secondary investment and quality competitive outsourcing. The above-mentioned different strategies of multinational companies for the supply of dual technologies have provided strong support for the prosperity of China's IT market and the satisfaction of the technology needs of domestic employers. At the same time, thanks to the expansion of the Chinese market and the demand incentive of Chinese enterprises, the development and transfer of inventory sinking technology of multinational companies have objectively brought about a new way for Chinese enterprises to improve their technology absorption capacity and implement technological learning. This scenario was realized in the process of China's opening up, and also benefited from China's efforts to improve the environment for the protection of intellectual property rights outside China (which is closely related to the transfer of sunken technologies in more quality-competitive outsourcing), thus effectively refuting many bad accusations and groundless speculations in the international community that China's accession to the WTO and the technological progress and catch-up of Chinese enterprises are due to "technology theft" of Western companies. In addition, in the innovation outsourcing market, the business institutional environment increases the competitiveness of multinational companies through low cost and differentiation advantages, which leads to the surge of "reverse outsourcing" in China, which shows that the orientation from economic efficiency is fundamentally attractive. Based on this perspective, the Biden administration's latest "nearshoring/AIA" attempts to contain China will face higher production and transaction costs, leading to greater economic efficiency losses, and is not sustainable in the long run, at least from the perspective of the economic efficiency and operation of multinational companies.

**Third, there is a structural phenomenon in the "reverse outsourcing" market, and the optimization of the business institutional environment is not only conducive to giving full play to the advantages of multinational corporations, but also promotes the bridging of the capacity gap of domestic enterprises in the dynamic process**。 The empirical results of this paper show that the improvement of the unified business environment in the Chinese market is the prerequisite for multinational companies to carry out outsourcing activities and implement technology transfer in China. Because both domestic enterprises and foreign-funded enterprises in China participate in the awarding of two different contracts, but the proportion is different (domestic enterprises participate more in cost-competitive outsourcing, and foreign-funded enterprises in China participate more in quality-competitive outsourcing), but they all benefit from the satisfaction of the basic premiseThe market institutional arrangement of providing effective protection for the technological exclusivity of the contracted multinational corporations is crucial. The second is the difference between domestic enterprises and foreign-funded enterprises in China in terms of contracting capacity. As a matter of fact, the first 10 years of China's accession to the WTO were the beginning of the systematic integration of Chinese enterprises into the world market. In this process, compared with the foreign-funded enterprises that have already been crawling in the world market, domestic enterprises have shifted from the contractor to the employer, not only in terms of identity conversion and adaptation, but also in terms of service demand and technical insight compared with foreign-funded enterprises in China, there are still many gaps, but it is the existence of this gap, coupled with the pressure of foreign-funded enterprises to face competition, but it has stimulated domestic enterprises to integrate more[[17]](#endnote-16) actively.

The main contributions of this paper are: **firstly**, we reveal the development of the phenomenon of "reverse outsourcing" in the initial stage of China's accession to the WTO from both theoretical and empirical perspectives, and this research perspective enriches the scope of application in the field of innovation outsourcing and its practical understanding in developing countries. **Secondly,** we introduce the business environment from the institutional perspective into the field of innovation outsourcing, and explore the onshore "reverse outsourcing" with a high degree of information asymmetryIn this activity, the impact of the business institutional environment on the outsourcing mode choice and technology diffusion of multinational corporations through changes in outsourcing transaction costs are affected. Through the portrayal of the real behavior of the multinational corporation of the undertaking party, this paper reveals the interaction mechanism between the business institutional environment and the innovation activities of micro enterprises, and enriches the understanding of the internal logic of "institutional environment-competitive advantage (transaction cost change)-strategic behavior (transaction model and technology diffusion)". **Thirdly, in contrast to the classical theory of multinational corporations,** which believes that overseas investment will be guaranteed by the entry mode of ownership control in the face of uncertainty in the technology market (the protection of unique advantages in the production field, Hymer, 1976), this paper explores the diversity of entry modes of non-equity control of multinational corporations (the grasp of advantages in the transaction field) based on the scenario of innovation outsourcing market, thus enriching the exploration of new ways of technology diffusion of multinational corporations[[18]](#endnote-17)[[19]](#footnote-2)。

This paper also observes that Porter's oppositional competitive strategy (low-cost strategy vs. differentiation strategy) can coexist in the innovation outsourcing market and be implemented by the contracting multinational corporation at the same time, thus supporting the positive significance of organizational ambidexterity in strategy implementation (March, 1991). ）。 To a certain extent, this study helps us to understand why the innovation outsourcing activities of multinational corporations can effectively promote the technological progress and catch-up of some countries, and also reverses the stereotype that multinational corporations only bring mature and backward technologies to the development of host countries. Based on the Chinese context, the study shows that the diffusion of this ambidextrous technology needs to consider the impact of the host country's business institutional environment and the multinational corporation's own organization and micro-projects. In other words, in the onshore "reverse outsourcing" activities with high information asymmetry, the effective implementation of different contracting models and technology diffusion of multinational companies needs to build a real technology ecology in order to play a better role. Obviously, this has important implications for the institutional design of the host country, China, to attract high-end capital inflows such as R&D, and at the same time, it also provides clear policy implications for emerging developing countries to better learn from and learn from China's investment experience.

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1. **Notes**

   With the development of information technology and service economy, manufacturing and production outsourcing has become more and more flexible, so in the process of production outsourcing to R&D outsourcing, scholars use "service outsourcing" to summarize and describe the essence of this transformation in the field of outsourcing. Due to the increasing technology and complexity of service outsourcing (from ITO to BPO and KPO), overseas scholars have begun to use "innovation outsourcing" more often to outline and reflect the characteristics of the latest service outsourcing activities (Juliana and Volker, 2011). In practice, innovation outsourcing is related to "R&D outsourcing", "technology outsourcing", "cross-border search", Terms such as "open innovation" are closely related and are intended to indicate the idea that companies can expand their innovation process by combining external exploration activities with internal R&D activities, including research and development (R&D) and new product development (NPD). Two connotations. In this article, we focus on the phenomenon of R&D outsourcing and focus on the characteristics of new activities in the ITO sector in Chinese mainland based on R&D outsourcing contracts. [↑](#endnote-ref-1)
2. Information technology outsourcing (ITO) here mainly refers to the external procurement of centralized software development and application services, business process outsourcing (BPO) refers to the outsourcing of internal activities such as service management and human resource management, and knowledge processing outsourcing (KPO) refers to the transfer of knowledge innovation and R&D links in the business to the outside for completion. The R&D outsourcing studied in this paper mainly covers ITO and has the characteristics of KPO. [↑](#endnote-ref-2)
3. Offshore or onshore business here refers to the place where the business is processed relative to the location of the employer, if it is carried out in the mainland of the employer, it is called onshore business, and if it is not in the mainland of the employer, it is called offshore business. [↑](#endnote-ref-3)
4. From 2006 to 2015, the scale of offshore service outsourcing in Beijing increased by 11 times, with a compound annual growth rate of 31%; at the same time, Beijing's offshore market has developed from a bipolar agglomeration structure of the United States and Japan to three major regional structures in the United States, Europe and Asia, and its source countries have increased from 53 countries to 77 countries. [↑](#endnote-ref-4)
5. In the traditional sense, innovation outsourcing mainly refers to offshoring carried out by enterprises in developed countries as employers, so offshoring carried out by enterprises from developing countries as employers is correspondingly regarded as "reverse outsourcing" (Liu Danlu et al., 2013). ）。 However, the above-mentioned motives of offshore "reverse outsourcing" have not been clearly explained in the previous studies as to whether developing country enterprises go deep into the backyards of developed countries to seek new technologies in the form of contracting, or whether the contracting enterprises themselves are trying to serve the needs of multinational companies in developed countries. [↑](#endnote-ref-5)
6. "Onshore reverse outsourcing" refers to the outsourcing of contracts in China as a developing country (or "reverse outsourcing" in a relatively developed country) because the business is completed in the place where the employer is located ("onshore"). so collectively referred to as "onshore reverse outsourcing" (Zheng et al., 2016). From 2001 to 2011, the R&D agglomeration of multinational companies in Beijing was very obvious, so it was called the "tide" phenomenon. From 2016 to 2018, the scale of onshore reverse outsourcing business has been steadily increasing, from 14.87 billion yuan to 18.47 billion yuan, of which the transaction value of technical service contracts is twice that of technology development contracts, and in terms of intellectual property composition, patent protection is the mainstay, with technical secrets and computer software copyright contracts accounting for 25.5% and 7.5% respectively (source: BTMO). [↑](#endnote-ref-6)
7. According to Chen's (2005) study, in contractual arrangements involving OEMs, there is not only a paid/free transfer of design and production know-how from TNCs to local manufacturing firms, but also TNCs are exposed to the production expertise of local partners in the process. [↑](#endnote-ref-7)
8. This logic is also consistent with the research of Diamond Cluster (2005), which found that the level of expertise is the first criterion for evaluating the contractor, followed by the cost, then the flexibility of the operating model, the existing priorities, etc. [↑](#endnote-ref-8)
9. After the release of the World Bank's Doing Business report in 2003, the academic community has carried out a lot of applications and analyses based on this indicator system, but to a certain extent, it lacks consideration of the uniqueness of the political and economic systems of each country, and the guiding significance is limited. Based on the concept of business environment from the perspective of institutional view (Wei Xiahai et al., 2015), this paper takes into account the elements of the business environment in both software and hardware as well as the institutional arrangements of enterprises, in order to explore the essence of the impact of the business institutional environment in a more comprehensive way. [↑](#endnote-ref-9)
10. The above analysis logic shows that the introduction of the perspective of the business institutional environment to analyze the "reverse outsourcing" activities is actually intrinsically consistent with the transaction cost theory: different business institutional environments often represent different quality of institutional costs, so the reduction of transaction costs is the core. [↑](#endnote-ref-10)
11. We define the subtle differences between the two types of outsourcing activities (the former is more "low-cost" with domestic contractors, and the latter is more "differentiated" from other foreign companies in China). [↑](#endnote-ref-11)
12. In this framework, the impact of the business institutional environment on the service quality of the contractor is manifested in the soft and hard environment of the host country's system, policy and market, and is closely related to the characteristics of micro projects and enterprise organizations. [↑](#footnote-ref-1)
13. As the contractor, the multinational companies studied in this paper can provide two different levels of technology supply when their business in China is contracted: mature technology and sunk technology (Zheng et al., 2018). ）。 In these two types of transaction models, for the supply of mature technology, the employer in developing countries saves transaction costs because it has to go through a complete technology research and development cycle and its application, and the contractor also saves transaction costs by applying a large number of mature technologies in different scenarios (the application of low-cost strategies); 。 [↑](#endnote-ref-12)
14. In the rapidly iterating IT industry, information asymmetry is more common, and general enterprises may have ordinary technical understanding, which leads to enterprises only putting forward their own technical requirements within the budget in the process of contracting and not being familiar with and unwilling to spend too much cost to understand whether the technology involved behind the demand is a mature technology or a sunken technology in the market, so it is impossible to predict the final signed technology contract model. [↑](#endnote-ref-13)
15. The foreign investment enterprise of the employer in China and the multinational corporation of the undertaking company are not the same company in China. At the time of data identification, we have deleted the data of internal and external enterprises (i.e., transaction data between mother and child of multinational companies). [↑](#endnote-ref-14)
16. However, even if it is a low-cost contracting strategy, because these well-known service contracting enterprises have a good reputation and strong contracting ability, they can combine China's low-cost advantages with their own contracting capacity advantages, so that China can quickly participate in the global service outsourcing production network. [↑](#endnote-ref-15)
17. Our data show that after the strengthening of patent protection in China in 2008, the increase in the average transaction value of contracts between domestic enterprises and multinational companies was 1.01 million yuan higher than that of the average transaction value of contracts between foreign enterprises and multinational companies in China, while the difference between the two was 44.9% in terms of the proportion of patent contracts, indicating that multinational companies actively participated in "reverse outsourcing" The level of proprietary investment and its market-oriented protection is constantly improving. [↑](#endnote-ref-16)
18. In fact, the innovation of the research conclusions of this paper lies in bridging the parallel distance between the resource base theory and the transaction cost theory to a certain extent. That is to say, if we divide the technology of multinational corporations into three levels: core technology, inventory technology and mature technology, then the technology diffusion under the resource base theory focuses on the core technology, while the technology diffusion under the transaction cost theory is related to the latter two, thus establishing an organic connection between the two separate theories.

    **Business Environment Optimizing, Reverse Outsourcing and Attraction of High-end FDI**

    **Abstract:** Innovation outsourcing is an action by MNCs to deal with external environmental variation. This paper, using large-sample micro data in Chinese market, explores the influencing mechanism of Chinese business environment on international innovation outsourcing. It reveals that the optimization of business environment in the destination of contractor will not only increase MNC’s mature-tech service provision, but also benefits the expansion of MNCs’ unused-tech service inputs. These results remain significant after considering for endogeneity and robustness tests. From influencing mechanism, the two major channels are that, on one way, it creates a structural outsourcers’ market and greatly enhances the market competition, which draws the quality-competitive MNCs to expand their innovative tech. service, and cost-competitive MNCs to increase their mature tech. service. On the other way, it significantly reduces the outsourcing transaction cost, thus attracts both sides to increase outsourcing service variety and demands for tech. The stronger the innovative demands in the destination of outsourcing, the more positive impacts by the optimizing of business environment on the two innovative outsourcing’s inputs and significantly reduce MNCs’ R&D burden. The findings about the impacts of Chinese business environment on the wave phenomenon of MNCs’ reverse outsourcing can both fill the gaps in research of innovation outsourcing in developing countries and provide experience and summaries for policy formulation by Chinese government especially in the attraction of high-end FDI in the new era.

    **Keywords:** Optimization of Business Environment, Multinational, Reverse Outsourcing, Dual technology [↑](#endnote-ref-17)
19. [↑](#footnote-ref-2)