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Investment effect of regional trade agreements: an analysis from the perspective of heterogeneous agreement provisions

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Global regional trade agreements (RTAs) are experiencing unprecedented rapid development in terms of number and content of provisions, and China's RTAs are no exception. With the increase in the depth of RTA provisions, as an important form of economic and trade relations between countries, investment is bound to be affected. Taking the RTAs signed by China as the research object and using the bilateral foreign direct investment (FDI) data provided by the International Monetary Fund CDIS database and the relevant data from the World Bank RTA text depth database, this paper constructs various indexes to measure the depth of RTA provisions and analyzes the effects of changes in the depth of RTA provisions on inward FDI stocks to China. The study finds that the improvement of all four depth indexes, namely, total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions, significantly promotes China's inward FDI stocks. This conclusion still holds after a series of endogenous problem analysis and robustness tests. Further analysis shows that the improvement of the depth of RTA provisions has a relatively greater effect on FDI stocks from developing countries and countries along the "Belt and Road". At the same time, there exists significant heterogeneity in the effects of different RTA provisions on the FDI stocks. The insights that we obtain in this paper enable us to provide policy recommendations for the construction of China's global high-standard free trade agreement (FTA) network.

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Introduction

Nowadays, global regional trade agreements (RTAs) are showing a trend of unprecedented rapid development. According to the statistics of the World Trade Organization (WTO) RTA database, the cumulative number of RTAs notified globally has increased from 2 in 1958 to 576 in 2021. China, as the world's largest developing country and a major trading country, has actively participated in and developed RTAs in recent years. As of the end of September 2022, China has signed 19 free trade agreements (FTAs) with 26 countries (regions). At present, China is actively building a global high-standard FTA network. The development of RTAs is not only manifested in the rapid growth of quantity, but also in the increasingly widening scope of topics covered by RTAs. From the traditional border issues to behind-the-border issues, more and more RTAs have begun to cover rule consistency, competition neutrality, labor standards, intellectual property rights, environmental policies, and other new topics; and the depth of RTA provisions is showing a deepening trend. Notably, the content of provisions covered by different RTAs is not exactly the same, and different RTAs show great heterogeneity in the depth of provisions.

Over the past 40 years of reform and opening up, specifically after China's accession to the WTO, China has attracted a substantial amount of foreign direct investments (FDI) with its rapid economic growth and an increasingly open investment environment. In 2021, China's actual use of FDI reached 173.48 billion US dollars, ranking among the top in the world. That China remain one of the most attractive investment destinations in the world is not only due to its huge domestic market potential and relatively complete industrial chain, but also because of the relevant policies and measures introduced by Chinese government, such as the relaxation of foreign investment access restrictions and the protection of foreign investors' rights and interests in China. In 2017, the State Council issued "the Notice on Several Measures to Expand the Opening-up and Active Utilization of Foreign Investment", which established a policy direction for further easing foreign investment access restrictions and strengthening the efforts to attract investment. In 2019, the release of "the Catalog of Encouraging Foreign Investment Industries (Draft for Comments)" and the adoption of "the Law of the People's Republic of China on Foreign Investment" provided a relatively relaxed, stable and favorable environment for more foreign investment in China.

Although the main intention of signing RTAs between countries is to lower trade barriers and facilitate the cross-border flow of factors and commodities, with the introduction of more and more investment-related provisions, it is expected that the signing of RTAs and the changes in the depth of their provisions will have an impact on investment among member countries. The economic effects of RTAs have been vastly explored but mainly from the perspective of trade. Scholars have focused on total trade (Rose, 2004; Baier and Bergstrand, 2007; Kohl et al., 2016), value-added trade and global-value chain trade (Johnson and Noguera, 2012; Mattoo et al., 2017; Laget et al., 2018; Boffa et al., 2019), and other perspectives to explore the influences of the signing of RTAs and changes in the depth of provisions on bilateral trade flows. However, thus far, the role of the depth of RTA provisions for bilateral investment has been less studied. What's more, a small number of such studies did not achieve consensus. Büthe and Milner (2014) found that RTA significantly promoted FDI flows, and the deeper the terms of the agreement is, the stronger the promotion effect will be. On the other hand, Gounder et al. (2019) found that changes in the depth of provisions of trade agreements did not significantly affect the bilateral investment among member countries. In short, on the effects of changes in

the depth of RTA provisions on member states, the research angle thus far is mainly from the perspective of trade, an in-depth analysis from the perspective of investment is in need.

To this end, taking the RTAs signed by China as the research object, and using China's inward FDI stock data from 2009 to 2020 and the data from the World Bank RTA text depth database, this paper examines the effects of changes in the depth of RTA provisions on China's inward FDI stocks based on the structural gravity model for FDI. Furthermore, we take into account the different types of partner country and different key provisions in RTA, and then analyze the heterogeneity in the investment effects of RTAs. In-depth studies on the influence of the depth of RTA provisions on inward FDI stocks to China not only enrich the existing research on the investment effect of RTAs to a certain extent but also provide corresponding references for the construction of China's global high-standard FTA network from the perspective of investment.

The main contributions of this paper are as follows. First, different from a large number of existing studies that focus more on the effects of changes in the depth of RTA provisions on bilateral trade flows, this paper, from the perspective of investment, explores in depth the effects of changes in the depth of RTA provisions on investment. At the same time, when constructing indicators to reflect the heterogeneity of RTA provisions, this paper not only considers total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions but also further considers the legally mandatory requirements of different provisions. By constructing indicators to reflect the depth of RTA provisions from multiple perspectives, this paper, to a certain extent, expands the existing research perspective and constitutes a useful enrichment to the existing literature on the investment effect of RTA. Second, this paper takes the RTAs signed by China as the research object and bases its analysis on China's inward FDI stock data from 2009 to 2019. After a series of robustness tests, such as instrumental variable (IV) estimation and dynamic panel model, this paper robustly verifies the conclusion that the increase in the depth of RTA provisions can significantly promote inward FDI stocks to China. Obviously, the analysis in this paper provides empirical evidence from a large developing country to understand and grasp the effects of changes in the depth of RTA provisions on bilateral investment. Finally, this paper not only analyzes the effects of changes in the depth of RTA provisions on FDI stocks as a whole but also conducts group tests by partner country type (developed or developing countries, countries along the Belt and Road or non-Belt and Road countries). In addition, several key investment-related provisions are selected to analyze the effects of these sub-clauses on FDI stocks. This paper provides a richer perspective for understanding the investment effects of RTAs by analyzing them from multiple perspectives, such as types of partner country and specific provisions.

The remainder of this paper is organized as follows. Section "Literature review" reviews the relevant literature. Section "Theoretical analysis and research hypotheses" analyzes the effects of changes in the depth of RTA provisions on bilateral investment from a theoretical perspective and proposes the corresponding research hypotheses. Section "Empirical model setting and data description" briefly introduces the gravity model for FDI, and presents the econometric model setting, the selection of relevant variables, and data sources. Section "Empirical results and analysis" presents the analysis and discussion of the empirical results. Finally, Section "Conclusion" concludes this paper.

Literature review

The studies on the investment effects of the presence and depth of RTAs and the measurement of RTA text depth are relevant to the

research intent of this paper. We review the current research status from the following three aspects.

The first category of literature is about the investment effect of the presence of RTAs. Kindleberger (1966) first combined the theory of international direct investment with the study of regional economic integration, and proposed the theories of “investment creation” and “investment diversion” based on “trade creation” and “trade diversion” to analyze the effect of RTA investment. Empirically, Yeyati et al. (2003) used the outward FDI (OFDI) stock data in the OECD database from 1982 to 1998 to study the relationship between FTAs and OFDI and found that FTAs between home and host countries can increase bilateral OFDI. An analysis by Büthe and Milner (2008) based on 122 developing countries from 1970 to 2000 also confirmed that developing countries participating in more trade agreements received more FDI inflows than other countries. Medvedev (2012) used a comprehensive database of preferential trade agreements (PTAs) to study their effects on net FDI inflows of member countries and found that the signing of PTAs promoted the FDI inflows. Further research by Berger et al. (2013) found that the signing of the agreement can promote the investment flow only if the free access rules for investment are provided in the RTA. However, in the abovementioned studies, RTA was introduced into the econometric model as a 0–1 dummy variable, and the heterogeneity of provisions of different RTAs was not considered. Given that the “black box” of RTAs has not been opened, earlier related studies may not have been able to accurately identify the magnitude of the investment effect produced by RTAs.

The second category of literature concerned is the measurement of RTA text depth. Horn et al. (2010), in an earlier textual analysis of 31 trade agreements signed by the US and the EU, divided the content of the agreements into two categories: WTO + provisions (14) and WTO-X provisions (38). WTO+ provisions refer to the policy areas stipulated by WTO customs regulations, while WTO-X provisions refer to the contents of the dialog and coordination among member countries based on their own policies, which fall out of the provisions of WTO customs regulations. On the basis of the above 52 provisions, Hofmann et al. (2017) further defined 14 WTO+ provisions and 4 WTO-X provisions (competition policy, intellectual property rights, investment, and movement of capital), which are closely related to trade and investment, as “core” provisions. They then constructed an index of total depth and an index of core depth to measure the depth of trade agreement provisions, with which they presented some stylized facts of 279 PTAs and compiled the World Bank RTA text depth database. The method proposed by Horn et al. (2010) is not the only way to collect and analyze the content of RTAs. Dür et al. (2014) constructed a depth index based on seven key provisions (tariff reduction, services, investment, standards, government procurement, competition policy, and intellectual property rights) with values ranging from 0 to 7. The index takes into account the enforceability of the relevant provisions, with larger values implying greater depth of the agreement and enforceability of the provisions. The Design of Trade Agreements (DESTA) database developed by Dür et al. (2014) examines the content and depth of PTAs in more detail for a sample consisting of 587 trade agreements. Previous studies on the measurement of RTA text depth have opened the black box of RTAs, and better reflected the heterogeneity of different RTAs in terms of clause content, providing a solid foundation for our research.

The third category of literature concerns the investment effect of the depth of RTA provisions. Büthe and Milner (2014) analyzed data on FDI flows to 122 countries from 1971–2007 and found that PTAs with strict investment and dispute settlement provisions increase FDI among member countries, whereas

agreements without such provisions do not affect investment. Similar conclusions were drawn by Hu et al. (2022), who found that FTA with investment protocols improves the success rate of China’s investment in the countries along the Belt and Road. Analyzing the bilateral FDI stock from 34 OECD countries to 45 ACP countries for the period of 2000–2017, Gounder et al. (2019) found that RTAs do not significantly affect FDI in the Caribbean, whereas in Africa, such effect is also largely dependent on the signing of bilateral investment agreements. This effect varies by specific agreements. Osnago et al. (2017) constructed an index of total depth and an index of principal component analysis (PCA) depth to measure the depth of RTA provisions based on Hofmann et al. (2017), who found that both indexes significantly promoted vertical FDI. However, due to the availability of FDI data, their study object is limited to Germany, Japan, and the US. Kox and Rojas-Romagosa (2020), using data on FDI flows between 203 countries from 2001–2012 and data from the DESTA database and World Bank database, verified a significantly positive relationship between RTA depth and FDI inward stocks. Gamso and Grosse (2021) also found positive association between RTA depth (from DESTA dataset) and FDI flows by analyzing data covering about 536 PTAs between 179 countries from 1996 to 2006. On contrast, in their analysis of the effect of non-trade issues (NTIs) in PTAs on the bilateral FDI flows between over a hundred countries from 2003 to 2017, Di Ubaldo and Gasiorek (2022) didn’t find a significant and positive association between deeper agreements and FDI.

It should be noted that existing studies on the linkage between FDI and RTAs have mainly focused on multiple RTAs for a group of countries. This paper, however, evaluate whether the overall involvement in RTAs of a developing country such as China increases inward FDI stocks. There exist scarcely little studies on the effect on FDI of RTAs that China has participated in. To the best of our knowledge, the only relatively similar study is Li et al. (2016), who analyzed the overall effect of the ASEAN-China FTA (ACFTA) on FDI flows based on knowledge-capital model, and found that ACFTA has a significant and positive effect on FDI flows to China and ASEAN6¹. Still, they do not take into consideration all of China’s RTAs, not to mention the heterogeneous agreement provisions.

In summary, few studies have investigated the investment effects of RTAs based on the heterogeneity of provision content. Moreover, a limited amount of such studies have not reached a consistent conclusion on how the increase in the depth of RTA provisions affects investment among member countries due to the differences in the selected research subjects and the different indexes constructed to measure the depth of RTA provisions. In addition, the role of China’s RTAs in its FDI remains an open question.

Theoretical analysis and research hypotheses

In recent years, the development of RTAs has shown a trend of continuous expansion of the topics covered and deepening depth of the rules and regulations. Specifically, in terms of investment, more and more RTAs have started to include more detailed provisions on investment liberalization, and have reduced bilateral investment costs and improved the investment environment by including more provisions on investment promotion and protection, national treatment, most-favored-nation treatment, and investment dispute settlement. As more provisions on investment issues are incorporated into RTAs, the increase in the depth of RTA provisions will have an important effect on investment among member countries.

First, the improvement of the depth of RTA provisions will affect FDI flows, which is highlighted in the following aspects.

First, signing of RTA and the enhancement of the depth of provisions can effectively reduce or cut tariff and non-tariff barriers on both sides, thereby promoting the free flow of goods between member countries and increasing trade between them (Kohl et al., 2016). Generally, the reduction of trade costs will weaken the incentive of enterprises to make outward FDI, and the substitution effect between trade and investment will occur. However, “trade regionalism” suggests that the increase in trade between the two sides will induce a direct positive FDI inflow effect to some host countries (Baltagi et al., 2007). At the same time, tariff exemptions will reduce the price level of intra-regional goods, which stimulates intra-regional consumer demand, and the resulting large market potential may also attract FDI (Medvedev, 2012). Second, the investment-related provisions incorporated in the RTA can directly reduce investment barriers, including restrictions on foreign shares, regulations on local content and export performance, and restrictions on transferred profits and capital; in this manner, bilateral investment costs are directly reduced, and bilateral investment facilitation is effectively promoted, thereby facilitating foreign capital flows (Kox and Rojas-Romagosa, 2020). Third, although the investment-related provisions in RTAs have relaxed restrictions on foreign ownership, changed or eliminated performance requirements, and granted investor protection, which have greatly boosted foreign investors’ confidence, these investment provisions do not guarantee an increase in FDI, and only the implementation of complementary policies that help improve the overall investment environment is likely to attract more foreign investment. Therefore, investment chapters of more and more RTAs have started to include elements of behind-the-border measures, such as national treatment, most-favored-nation treatment, property rights protection, and competition policies (Te Velde, Fahnbulleh, 2017). These behind-the-border measures are conducive to forming a favorable investment environment, reducing investment costs, and promoting the FDI inflow. For example, the national treatment and most-favored-nation provisions in the RTA ensure that investors, regardless of their nationality, enjoy equal treatment no less than that of investors in the host country and no less than that of investors in any non-party. This condition can ensure that foreign investors, as market players, obtain a fairer status; the existence of property rights protection system and competition policy in the RTA can effectively improve investment transparency, reduce the uncertainty of investment in the region, and reduce transaction costs while improving transaction efficiency. In addition, the host country will generally regulate multinational corporations for the concerns of public interest and national security, whereas the regulatory provisions, cooperation provisions, transparency, non-discrimination, and procedural fairness in the competition policy are conducive to the adoption of relevant investment promotion policies by member countries, thereby promoting the establishment of competition rules and creating an atmosphere of fair competition. Obviously, along with the continuous inclusion of these provisions in the content of RTAs, the enhancement of the depth of RTA provisions will create a more favorable environment for FDI and will display a positive effect.

Second, the enhancement of the depth of RTA provisions will have a heterogeneous effect on FDI from different types of partner country. Given the differences in development stages and levels of individual countries, the investment effects of RTAs may also be heterogeneous among different types of partner country. Developed countries have sound domestic policies and good institutional environment, and generally, their investments in developing countries are mainly based on the vertical division of labor or other specific purposes. When making investment location choices, developed countries have

higher requirements for the host country’s institutional environment and business environment, which requires developing countries to incorporate more high-quality investment and institutional provisions into RTAs. Given the similar development stages and unsound domestic institutions, developing countries have relatively lower investment thresholds when making OFDI choices, and more of what they consider are resource endowments of host countries. In addition, investment barriers among developing countries are mainly focused on industry access and approval procedures, and such barriers can be easily removed through the relaxation of industry access in RTAs. Therefore, the increase in the depth of RTA provisions will have a heterogeneous effect on FDI from different types of partner country (developed or developing).

At the same time, China’s Belt and Road initiative has greatly promoted economic and trade cooperation between China and countries along the Belt and Road, and governments of both sides have improved the soft and hard environments for bilateral investment through the construction of transportation infrastructure and industrial park projects along the route, which has effectively reduced investment costs. Free trade agreements can effectively promote the institutionalization and rule of law of the initiative, and the signing of free trade agreements with countries along the route has enhanced the legal effectiveness of cooperation between the two sides and promoted the level of economic integration in the Belt and Road cooperation (Peng et al., 2020). Along with the increase of RTAs and the expansion of the RTA network along the Belt and Road, the overall trade and investment cooperation in the Asian region is being strengthened. Obviously, the improvement of the depth of RTA provisions signed between China and countries along the route will effectively promote the closeness of ties between China and these countries and further promote bilateral investment cooperation. Therefore, the increase in the depth of RTA provisions may also have a heterogeneous effect on FDI from Belt and Road and non-Belt and Road partner countries.

Third, different key provisions in the RTA can have heterogeneous effects on FDI. For one thing, certain provisions promote investment liberalization and thus attract FDI by easing investment access and lowering investment barriers. For example, investment provisions in RTAs attract FDI by relaxing restrictions on foreign ownership, changing or eliminating performance requirements, and granting investor protection. Similarly, government procurement provisions attract FDI mainly by opening up government procurement among members and thus lowering the investment entry barriers among members (Anderson et al., 2011). Provisions such as environmental and labor standards promote the improvement of labor efficiency and product technology levels in member countries, which, to a certain extent, help improve the country’s business competitiveness and thus promote trade and investment (Saucier and Rana, 2017).

For another thing, the existence of certain provisions enhances investment transparency and promotes the formation of a level playing field, which, in turn, affects FDI. For example, provisions concerning intellectual property rights and competition policy promote the adoption of intellectual property rights protection and regulatory policies by member countries to reduce investment uncertainty and thus attract FDI. In addition, provisions concerning state trading enterprises stipulate that governments should reduce subsidized credit or direct support to state-owned enterprises to create a level playing field, which also attracts FDI. Thus, different provisions in the agreement impose different effects on FDI through different channels. Thus, the existence of different provisions will have heterogeneous effects on FDI.

On the basis of the above analysis, this paper proposes the three research hypotheses:

Hypothesis 1: The increase in the depth of RTA provisions can effectively promote FDI.

Hypothesis 2: The increase in the depth of RTA provisions will have a heterogeneous effect on FDI from different types of partner country.

Hypothesis 3: Different key provisions in RTA will have heterogeneous effects on FDI.

Empirical model setting and data description

This section briefly introduces the structural gravity model for FDI, based on which we establish our empirical specification. Then, details on variable selection and data are provided.

Structural gravity model for FDI. The structural gravity model has been widely used in international trade to study the ex post effects of RTAs on bilateral merchandise trade flows. The idea of it is derived from the law of gravity in classical physics, and its basic implication is that the size of trade is proportional to the respective economic aggregates of the two countries and inversely proportional to the distance between them. Tinbergen (1962) was the first to use the gravity model to evaluate the effect of RTA on trade, but his and other early applications of the gravity model were not grounded in formal theoretical foundations. The gravity equation derived by Anderson and Wincoop (2003) using a general equilibrium approach solved this problem. However, the application of gravity model in the study of FDI determinants is mainly at the empirical level; at the theoretical level, although there are some recent studies that predict gravity-like patterns, these new models are too complex and data-demanding for testing with actual data, and therefore only allow calibrated exercises (Anderson et al., 2019, 2020; Bergstrand and Egger, 2007, 2010; Ramondo and Rodríguez-Clare, 2013). To overcome the gap between the refinement of theoretical models and the availability of bilateral direct investment data, adapting the FDI module of Anderson et al. (2019), Kox and Rojas-Romagosa (2020) developed a stand-alone partial equilibrium model for exploring the impact of RTAs on bilateral FDI:

$$FDI_{ij}^{stock} = \omega_{ij} \frac{\alpha Y_i \beta Y_j}{P_i \Pi_j} \quad (1)$$

where FDI_{ij}^{stock} represents the value of bilateral FDI stock originating from country i and hosted in country j ; Y_i and Y_j are proxies for the size of the origin and destination country.

Kox and Rojas-Romagosa (2020) assume that the free flow of FDI is hindered firstly by absolute FDI frictions, which are legal and statutory barriers that a country imposes on the access of foreign capital. Apply such insight into Eq. (1), if $\omega_{ij} = 1$, country j is fully open for entry of FDI from country i , and if $\omega_{ij} = 0$, no FDI from country i is admitted. Secondly, the free flow of FDI is obstructed by relative FDI frictions that reflect the opportunity costs of choosing one particular FDI destination country versus all other countries. In Eq. (1), for origin country i , P_i represents the average of inward relative friction costs in all destination countries, weighted by their economic mass. Origin countries regulating for firms that have outward FDI may also render relative friction costs themselves. This matters for the destination countries, and it will lower inward FDI from such countries. In Eq. (1), Π_j is included to account for such possibilities. Π_j represents the average of outward friction costs of all countries that invest in destination country j . We expect that bilateral FDI should be positively related to the GDP of origin and host countries (Y_i and Y_j). However, it should be negatively affected by relative FDI friction costs (P_i and Π_j), such as transportation and communication costs (physical distance, lacking a common language and lacking a common border), costs of having different

legal and regulatory regimes (lacking common institutions and no common history), and so on.

Model setting and variable selection. Similar to the practices employed in structural gravity model for bilateral trade, a RTA dummy variable is firstly introduced into the model to study the effect of RTAs on bilateral FDI. Secondly, the gravity model is further expanded by including a set of gravity variables to account for unobservable time-invariant FDI barriers. Thirdly, drawing on the insights of Baier and Bergstrand (2007), we use panel data, which lead to more reliable estimates of the investment effect of RTAs. Based on these practices, to examine the influence of RTA on FDI from China's perspective, the structural model of Eq. (1) is then applied to a data panel (with time t) using the following econometric specification for our benchmark regression:

$$\ln FDI_{cjt} = \beta + \varphi RTA_{cjt} + \gamma X_{cjt} + \delta_t + \varepsilon_{cjt} \quad (2)$$

where c , j , and t refer to China, partner country, and year, respectively. The dependent variable FDI_{cjt} refers to the inward direct investment stock from partner country j to China in period t . We use FDI stock data, which are much less volatile than flow data, and which are close to the theoretical concept described by Kox and Rojas-Romagosa (2020). RTA_{cjt} is a dummy variable representing RTAs and takes the value of 1 if China signs an RTA with country j in period t , and 0 otherwise. X_{cjt} is a set of other control variables, δ_t is a year fixed effect that captures unobservable time-varying factors that affect inward FDI stocks from all partner countries, and ε_{cjt} is the random error term.

To control for the effects of some other important factors on FDI (stock), this paper introduces the following control variables in Eq. (2):

1. Market size (*msize*). Market size is often thought to induce FDI because larger markets offer efficiency of diminishing returns to scale. The market size between China and partner country j is calculated as $msize = \ln(gdp_{ct} + gdp_{jt})$, where gdp_{ct} and gdp_{jt} are GDP at 2010 prices for China and partner country j , respectively (in millions of USD).
2. Market size similarity (*gdpsim*). The market size similarity between China and partner country j is calculated as $gdpsim = \ln[s_{it}(1 - s_{it})] = \ln\left(\frac{gdp_{ct} \times gdp_{jt}}{(gdp_{ct} + gdp_{jt})^2}\right)$, where $s_{it} = \frac{gdp_{ct}}{gdp_{ct} + gdp_{jt}}$.
3. Technological similarity (*tsim*). The technological similarity between China and its partner country j is calculated as $tsim = \ln[sh_{it}(1 - sh_{it})] = \ln\left(\frac{(gdppc_{ct} \times gdppc_{jt})}{(gdppc_{ct} + gdppc_{jt})^2}\right)$, where $sh_{it} = \frac{gdppc_{ct}}{gdppc_{ct} + gdppc_{jt}}$; and $gdppc_{ct}$ and $gdppc_{jt}$ are the GDP per capita at 2010 prices of China and partner country j , respectively (in USD).
4. Geographical distance between China and partner country j (*Dist_{cj}*).
5. A dummy variable of common boundary between the two parties (*Contig_{cj}*).
6. A dummy variable of common language between the two parties (*Comlang_{cj}*).

In Eq. (2), we introduce RTAs as a dummy variable in the regression model, which does not fully consider the heterogeneity in the depth of provisions across RTAs. To better capture the heterogeneity of RTAs in terms of clause content, we draw on the method in Hofmann et al. (2017) and construct indexes of total depth and core depth to reflect the depth of RTA provisions, where the index of total depth is a simple count of the WTO+ and WTO-X provisions in the agreement. And by the definition

of the “core” provisions in Hofmann et al. (2017), the index of core depth is a simple count of 14 WTO+ provisions and 4 WTO-X provisions (competition policy, intellectual property rights, investment, and movement of capital).

Moreover, WTO+ provisions are more based on the deepening and expansion of terms, obligations, and commitments under the WTO framework. Conversely, WTO-X provisions completely go beyond the WTO framework in terms of content and require the agreement parties to make commitments in some completely new areas. To better reflect the changes in the depth of RTA provisions, we further construct the indexes of the depth of WTO+ provisions (*wto*) and the depth of WTO-X provisions (*wtox*), the former being a simple count of the number of WTO+ provisions included in the agreement, and the latter being a simple count of the number of WTO-X provisions included in the agreement. Thus, after accounting for the heterogeneity of different provisions, the core explanatory variables in Eq. (2) include a dummy variable for whether the parties signed an RTA and indexes of total depth (*totaldepth*), core depth (*coredepth*), depth of WTO+ provisions (*wto*), and depth of WTO-X provisions (*wtox*).

In the specific estimation of the above regression model, given that there exist zero-valued and negative-valued data involving reversal or disinvestment in the inter-country investment stock data, to avoid missing these data in the process of logarithmic transformation and the problem of sample data selection bias, this paper uses the inverse hyperbolic sine transformation (Burbidge et al., 1988).

Data. Data on investment stocks between China and partner countries are obtained from the International Monetary Fund CDIS database, which reports data on FDI stocks between 247 countries (regions) in the world from 2009 to the present year. Data on the depth of RTA provisions are obtained from the World Bank RTA text depth database², which collects information on 52 provisions and their legal enforceability for 279 RTAs notified to WTO during the period of 1958–2015. However, this database does not contain provisions of trade agreements signed after 2015. Thus, on the basis of the method of Hofmann et al. (2017), we analyze and define the textual contents of China–Korea, China–Australia, and China–Georgia FTAs signed into force after 2015. In addition, we construct the indexes of total depth, core depth, WTO+ depth, and WTO-X depth to reflect the depth of the provisions of RTAs signed by China, by which the effects of changes in the depth of RTA provisions on investment between China and its investment partner countries is explored. In addition, data on GDP and GDP per capita are obtained from the World Bank WDI database, and data on other gravity variables are obtained from the CEPII-GeoDist database.

This paper is mainly based on China’s perspective to explore the influence of the increasing depth of RTA provisions on FDI. We use the investment stock data between China and partner countries from the CDIS database, match them with the CEPII database, and then exclude countries with relevant missing data. Finally, we select the data between China and 184 investment partners from 2009 to 2019 as analysis sample. By the end of 2020, China has signed trade agreements with Hong Kong, Macao, Association of Southeast Asian Nations (ASEAN), Chile, Pakistan, New Zealand, Singapore, Peru, Costa Rica, Iceland, Switzerland, South Korea, Australia, Georgia, Maldives, and Mauritius. However, due to the late entry into force of the China–Maldives FTA and China–Mauritius FTA, these FTAs are excluded from the analysis that follows in this paper. Table 1 shows the descriptive statistics of each depth indicator measuring the depth of China’s signed RTA provisions, which show that the index of total depth ranges from 0 to 31; the index of core depth ranges from 0 to 17; the index of WTO+ depth ranges from 0 to 13; and the index of WTO-X depth ranges from 0 to 20.

Empirical results and analysis

Baseline regression results. Table 2 reports the estimation results of Eq. (2). From the regression results, the estimated coefficient of

Table 1 Descriptive statistics of the main variables.

Variables	Observations	Mean	SD	Min	Max
FDI	2024	3.984	3.571	−4.760	14.867
RTA	2024	0.107	0.309	0	1
<i>totaldepth</i>	2024	1.477	4.868	0	31
<i>coredepth</i>	2024	1.023	3.225	0	17
<i>wto</i>	2024	0.852	2.655	0	13
<i>wtox</i>	2024	0.700	2.840	0	20
<i>msize</i>	2024	15.594	0.249	15.520	17.211
<i>gdpsim</i>	2024	−5.618	2.277	−12.467	−1.386
<i>tsim</i>	2024	−1.840	0.473	−3.730	0.151
<i>dist</i>	2024	9.000	0.523	6.862	9.867
<i>contig</i>	2024	0.081	0.273	0	1
<i>comlang</i>	2024	0.021	0.145	0	1

Table 2 Baseline regression results.

Variables	(1)	(2)	(3)	(4)	(5)
RTA	2.1992*** (0.1817)				
<i>totaldepth</i>		0.0951*** (0.0115)			
<i>coredepth</i>			0.1849*** (0.0171)		
<i>wto</i>				0.2232*** (0.0199)	
<i>wtox</i>					0.0939*** (0.0162)
<i>msize</i>	9.8939*** (0.9248)	9.5724*** (0.8698)	9.7134*** (0.8874)	9.7212*** (0.8888)	9.3042*** (0.8434)
<i>gdpsim</i>	0.5634*** (0.0333)	0.5798*** (0.0327)	0.5682*** (0.0329)	0.5679*** (0.0329)	0.6040*** (0.0325)
<i>tsim</i>	−1.2089*** (0.1475)	−1.1757*** (0.1488)	−1.1818*** (0.1478)	−1.1818*** (0.1480)	−1.1828*** (0.1499)
<i>dist</i>	−0.9276*** (0.1464)	−1.3177*** (0.1503)	−1.1579*** (0.1464)	−1.1524*** (0.1470)	−1.3995*** (0.1566)
<i>contig</i>	−2.1692*** (0.1566)	−2.3920*** (0.1571)	−2.2185*** (0.1542)	−2.1823*** (0.1550)	−2.5983*** (0.1718)
<i>comlang</i>	2.6353*** (0.1831)	2.8347*** (0.1912)	2.6537*** (0.1834)	2.6173*** (0.1850)	3.0764*** (0.2117)
Constant	−144.7062*** (15.1386)	−135.8033*** (14.2101)	−139.6258*** (14.5020)	−139.8039*** (14.5274)	−130.5785*** (13.7815)
Observations	2024	2024	2024	2024	2024
R ²	0.4657	0.4505	0.4601	0.4597	0.4401

The values in parentheses are standard deviations.
 *** denotes significance at the 1% level.
 Year fixed effects are included in regression. The same applies to subsequent tables.

Table 3 Regression results after replacing core explanatory variables.

Variables	(1)	(2)	(3)	(4)	(5)
<i>L_totaldepth</i>	0.0834*** (10.3070)				
<i>L_coredepth</i>		0.0944*** (9.6597)			
<i>L_wto</i>			0.1142*** (9.5299)		
<i>L_wtox</i>				0.1306*** (6.4602)	
<i>destadepth</i>					0.5018*** (11.0373)
Control Variables	YES	YES	YES	YES	YES
Observations	2024	2024	2024	2024	2024
R ²	0.453	0.454	0.453	0.441	0.453

*** denotes significance at 1% level.

RTA dummy variable is significantly positive, indicating that the signing of RTAs can significantly promote FDI to China from partner countries. This finding is to some extent consistent with positive impacts of the ACFTA on FDI flows to China and ASEAN6 (Li et al., 2016). In terms of each depth index, the estimated coefficient of *totaldepth* is significantly positive, indicating that when the index of total depth is used to measure the depth of RTA provisions, the increase in the depth of RTA provisions significantly increases the FDI from the investment partner countries to China. That is, the deeper the depth of provisions is, the stronger the promotion effect of RTA on inward FDI stocks to China will be. At the same time, the increase in the index of core depth has a greater effect on the promotion of FDI stocks to China than the increase in the index of total depth, mainly because the 18 core provisions define a set of basic rules for market access and the smooth operation of global value chains. Thus, the index of core depth is a better measure of the change in the depth of RTA provisions than the index of total depth. An increase in the index of core depth implies agreement in some key areas, which inevitably has a stronger effect on investment on both sides. The estimated coefficient of *wto* is significantly positive, indicating that the increase in the depth of WTO+ provisions in RTA significantly boosts FDI in China from partner countries. At the same time, the estimated coefficient of *wtox* is also significantly positive, indicating that the increase in the depth of WTO-X provisions in RTA can also significantly increase FDI from partner countries to China. At the same time, the increase in the depth of WTO+ provisions has a greater boosting effect on FDI stocks to China than the increase in the depth of WTO-X provisions, which may be mainly related to the fact that the RTAs signed by China have a higher coverage rate in the WTO+ area and the clauses are mostly substantive.

On the whole, the improvement of the depth index of various provisions of RTAs has a significant positive effect on China's inward FDI stocks, which, to a certain extent, not only in agreement with positive effects of RTA depths on FDI inward stocks (Kox and Rojas-Romagosa, 2020) but also verifies Hypothesis 1 in the theoretical analysis. For one thing, RTAs cover not only the liberalization of trade in goods but also services, investment, competition, intellectual property rights, and various other regulatory issues that may affect corporate decision making. An increase in the depth of agreement provisions can improve the openness of a country's economic and investment border and reduce the set-up costs associated with FDI, thereby positively affecting FDI flows into the country. For another thing, the investment-related provisions covered in RTAs will also have a direct effect on the investment among member states. Investment provisions, such as national treatment, higher protection of human capital and intellectual property rights of enterprises, free movement of people, dispute settlement mechanisms, and appropriate investor protections, can effectively boost investor confidence, thereby helping facilitate FDI flows.

Robustness tests

Replacement of core explanatory variables. Horn et al. (2010) considered the legal content of provisions in their analysis of RTAs signed by the EU and the US, indicating that if the legal language of a provision is unclear or insufficiently clear, then the policy area covered by it may not be legally enforceable and its effects on trade and investment among member states may vary. Therefore, we need to consider the legal enforceability of the relevant provisions in the agreement when analyzing the investment effect of changes in the depth of RTA provisions. The database constructed by Hofmann et al. (2017) analyzes and defines the legal enforceability of each provision. That is, if the provision is not mentioned in the agreement or is not legally enforceable, then it is assigned a value of 0; if the provision is mentioned in the agreement and is legally enforceable but is excluded by dispute settlement provision under the RTA, then it is assigned a value of 1; if the provision is explicitly mentioned in the agreement and is legally enforceable, then it is assigned a value of 2. Table 3 reports the regression results after replacing the depth indexes with the legally enforceable ones. The estimated coefficients of total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions are all significantly positive. This finding is similar to the previous benchmark regression results. Thus, the increase in the depth index of legally enforceable provisions is beneficial to the increase in FDI stocks. At the same time, the estimated coefficient of *wto* is larger than that of *wtox* in the benchmark regression; however, after considering legal enforceability, the estimated coefficient of *wtox* is larger than that of *wto*. This finding is quite understandable because WTO+ provisions are usually legally enforceable, and the variability of WTO+ provisions covered by various agreements is insignificant; conversely, for WTO-X provisions, fewer agreements provide for their legal enforceability, and once a WTO-X provision is legally enforceable, it will have a greater effect on trade and investment.

To test the reliability of the previous estimation results, this paper further introduces the depth index used to measure the depth of RTA provisions from DESTA database. We combine the text data of each RTA in DESTA database³ and construct a new index *destadepth* to measure the depth of RTA provisions based on the method of Dür et al. (2014). Column (5) of Table 3 reports the estimation results using *destadepth* as a measure of RTA's text depth. The estimated coefficient of *destadepth* is significantly positive, which again shows that even if the method of Dür et al. (2014) is used to construct the indicator to measure the depth of RTA provisions, the main conclusion of previous analysis is still robust. That is, the improvement of the depth of RTA provisions is conducive to FDI stocks to China. At the same time, the estimated coefficient of *destadepth* is significantly larger than the estimated coefficients of other depth indexes. The reason behind may be that provisions selected when constructing the index of RTA provisions by the method of Dür et al. (2014) are very crucial ones. Moreover,

Table 4 Regression results by different sample intervals.

Variables	(1)	(2)	(3)	(4)	(5)
(2-year interval)					
RTA	2.2680*** (9.0644)				
totaldepth		0.1000*** (6.3875)			
coredepth			0.1902*** (8.2427)		
wto				0.2292*** (8.5113)	
wtox					0.1023*** (4.5790)
Control Variables	YES	YES	YES	YES	YES
Observations	1104	1104	1104	1104	1104
R ²	0.465	0.449	0.459	0.458	0.438
(3-year interval)					
RTA	2.2516*** (7.5252)				
totaldepth		0.0988*** (4.9798)			
coredepth			0.1943*** (6.6730)		
wto				0.2327*** (6.8701)	
wtox					0.0954*** (3.4938)
Control Variables	YES	YES	YES	YES	YES
Observations	736	736	736	736	736
R ²	0.465	0.450	0.461	0.460	0.438
(4-year interval)					
RTA	2.1642*** (6.2137)				
totaldepth		0.0973*** (4.2716)			
coredepth			0.1881*** (5.5429)		
wto				0.2266*** (5.7665)	
wtox					0.0956*** (3.0854)
Control Variables	YES	YES	YES	YES	YES
Observations	552	552	552	552	552
R ²	0.468	0.455	0.464	0.464	0.444

*** denotes significance at 1% level.

the entry into force of these provisions can promote the liberalization of bilateral investment to a greater extent.

Sample interval division. Given that investment is a relatively long-term process, it takes a relatively long time from the decision of investment to the layout of it, and all RTAs have a certain time lag from the signing to the entry into force and then to the substantive impact on investment. To avoid the influence of the expected effect of investment brought by RTA on the previous estimation results, as a robustness test, this paper refers to the existing literature and divides the sample period into intervals and then re-estimate Eq. (2). Given that the sample period in this paper is 2009–2019, referring to the practice of the existing literature, the sample interval in this paper is two years (Guillin, 2013; Miroudot and Rigo, 2019), three years (Anderson et al., 2016), and four years (Anderson and Yotov, 2016). Table 4 reports the corresponding regression results. After dividing the sample into 2-, 3-, and 4-year intervals, the regression results remain similar to the previous benchmark regression results. The increase in the depth of RTA provisions has significantly promoted the FDI stocks to China. To a certain extent, this finding indicates that even if the sample interval is re-divided, the main conclusions of the previous analysis are relatively robust.

Estimate with time-varying variables of one lag period. Existing studies have shown that there exists a reverse causality between the deep integration brought about by the signing of RTAs and the investment flows between member states (Osnago et al., 2017). On the one hand, the signing of RTAs alleviates policy uncertainty through direct or indirect channels, reduces investment-related costs, and increases investment among member countries. On the other hand, the increase in investment between member countries will also promote the improvement of

the host country’s institutional environment, which will help the host country to better integrate into the global market, which, in turn, will affect the signing of RTAs between the two sides. Given the possibility of reverse causality between the signing of RTAs and the changes in investment stock among member countries, to avoid the endogeneity problem caused by such reverse causality, we re-estimate Eq. (2) using one-period lag of all time-varying variables. Table 5 reports the corresponding estimation results. The estimated coefficients of the RTA dummy variable and each depth index are significantly positive, which are extremely similar to the previous benchmark regression results, indicating that even if the reverse causality between the signing of RTAs and the change in the investment stock among countries is considered, the main conclusions of the previous analysis are relatively robust. That is, the improvement of the depth of RTA provisions has effectively promoted the inward FDI stocks to China.

Dynamic panel model estimation. Given that changes in investment flows between China and partner countries are likely to be influenced by past investments, this paper further includes one-period lag term of the explained variable as an explanatory variable in the baseline regression model, which is re-estimated using a dynamic panel model. Table 6 reports the estimation results of the dynamic panel model using the System GMM method. The estimated coefficient of $L.ln(FDI)$ is significantly positive, indicating that China’s FDI stocks in the previous period have significant effects on FDI stocks in the current period. More importantly, the estimated coefficients of RTA dummy variable and each depth index are all significantly positive, similar to the previous benchmark regression results. That is, the increase in the depth of RTA provisions is conducive to the increase in FDI stocks. The estimation results of the dynamic panel model again indicate that the previous main findings are relatively robust.

Table 5 Results of estimation using time-varying variables of one lag period.

Variables	(1)	(2)	(3)	(4)	(5)
L.RTA	2.1653*** (11.6908)				
L.totaldepth		0.0944*** (7.8209)			
L.coredepth			0.1855*** (10.2975)		
L.wto				0.2236*** (10.7281)	
L.wtox					0.0921*** (5.4896)
L.lmsize	9.8158*** (10.3038)	9.5061*** (10.5982)	9.6520*** (10.5337)	9.6589*** (10.5272)	9.2392*** (10.6344)
L.gdpsim	0.5724*** (16.4499)	0.5885*** (17.1724)	0.5768*** (16.7575)	0.5766*** (16.7366)	0.6124*** (18.0109)
L.tsim	-1.3116*** (-8.3138)	-1.2811*** (-8.0466)	-1.2874*** (-8.1428)	-1.2876*** (-8.1305)	-1.2890*** (-8.0411)
dist	-0.9516*** (-6.3458)	-1.3353*** (-8.6736)	-1.1739*** (-7.8302)	-1.1689*** (-7.7625)	-1.4169*** (-8.8352)
contig	-2.2572*** (-13.9582)	-2.4714*** (-15.1917)	-2.2969*** (-14.3922)	-2.2611*** (-14.0850)	-2.6755*** (-15.0111)
comlang	2.7425*** (14.9352)	2.9275*** (15.3148)	2.7479*** (14.9782)	2.7117*** (14.6484)	3.1643*** (14.8978)
Observations	1839	1839	1839	1839	1839
R ²	0.471	0.457	0.466	0.466	0.447

*** denotes significance at 1% level.

Table 6 Estimation results of the dynamic panel model.

Variables	(1)	(2)	(3)	(4)	(5)
RTA	0.2569** (0.1286)				
totaldepth		0.0107* (0.0064)			
coredepth			0.0155* (0.0093)		
wto				0.0217* (0.0115)	
wtox					0.0233* (0.0131)
L.ln(FDI)	0.9131*** (0.0075)	0.9079*** (0.0070)	0.9078*** (0.0075)	0.9067*** (0.0074)	0.9065*** (0.0067)
Control Variables	YES	YES	YES	YES	YES
Observations	1839	1839	1839	1839	1839
AR(1)	0.000	0.000	0.000	0.000	0.000
AR(2)	0.808	0.845	0.795	0.761	0.871
Hansen J	0.405	0.388	0.425	0.397	0.295

***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

IV estimation. Given that the signing of RTAs between countries may be endogenous, the indexes of total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions, which have been used to reflect changes in the depth of RTA provisions, may all be endogenous variables, and the direct OLS estimation of Eq. (2) may be subject to a large bias. To further avoid the interference of the endogeneity problem of RTA with the previous estimation results, we further consider the IV regression. Baldwin and Jaimovich (2012) suggested that there exists a domino effect of PTAs, that is, the deeper the degree of integration between country *j* and its partners is, the possibility of country *i* signing a PTA of similar depth with country *j* to avoid the trade diversion will be higher. To this end, we take the number of RTAs signed by both parties with third parties and the average total depth, the average core depth, the average depth of WTO+ provisions, and the average depth of WTO-X provisions of RTAs signed by both parties with third parties as the IVs of the RTA dummy variable, total depth, core depth, depth of WTO+ provisions and depth of WTO-X provisions. Then, a two-stage least squares estimation of Eq. (2) is re-run. The World Bank RTA Text Depth Database provides data on the number of RTA signatures by country only up to 2015. Hence, we limit the sample period to 2009–2015 in the instrumental regressions. Columns (1)–(5) of Table 7 report the corresponding estimation results. The estimated coefficients of each depth index are basically significantly positive and pass the unidentifiable test and weak IV test, which is very similar to the previous benchmark regression results.

Heterogeneity analysis

Countries along the Belt and Road and non-Belt and Road countries. To test Hypothesis 2 in the theoretical analysis and explore whether there exists heterogeneity in the effects of changes in the depth of RTA provisions on FDI from partner countries along the Belt and Road and non-Belt and Road countries, this paper divides the overall sample into two subsamples based on whether the partner country is along the Belt and Road. Table 8 reports the results of estimating Eq. (2) using these two subsamples. The estimated coefficients of the RTA dummy variables and the depth indexes of the provisions are basically positive in both the subsamples. However, in terms of the magnitude of the estimated coefficients, the ones of the RTA dummy and each depth index in the sample of Belt and Road countries are larger than those in the other sample. Thus, the variation of RTA text depth has a significant heterogeneous effect on FDI from Belt and Road and non-Belt and Road partner countries. Specifically, in the sample of Belt and Road countries, the promotion effect of the increase in the depth of RTA provisions on China’s FDI stocks is relatively greater; conversely, in the other sample, the promotion effect is relatively smaller. The reason behind may be that the partner countries that have signed RTAs with China are mainly located along the Belt and Road, and the Belt and Road initiative proposed by China has investment and trade cooperation as the key content. Moreover, the deepening of investment content in RTAs is conducive to the reduction of investment barriers and the improvement of investment environment, thereby further promoting investment cooperation with countries along the route.

Table 7 IV estimation results.

Variables	(1)	(2)	(3)	(4)	(5)
RTA	7.7554* (3.9364)				
totaldepth		0.3220* (0.1671)			
coredepth			0.4388** (0.2121)		
wto				0.9219 (3.0809)	
wtox					0.7457 (0.4557)
Kleibergen-Paaprk LM statistic	6.188 [0.0129]	8.337 [0.0039]	10.883 [0.0000]	0.158 [0.6912]	4.867 [0.0274]
Kleibergen-Paaprk Wald F-statistic	6.479	8.619	12.546	0.157	4.701
	{16.38}	{16.38}	{16.38}	{16.38}	{16.38}
Cragg-Donald Wald F-statistic	63.259	92.600	143.883	0.694	31.317
	{16.38}	{16.38}	{16.38}	{16.38}	{16.38}
Control Variables	YES	YES	YES	YES	YES
Observations	1288	1288	1288	1288	1288
R ²	0.2935	0.3756	0.4326	0.2522	0.1862

Kleibergen-Paap LM statistic reports the results of the underidentification test of IV, and the number in the middle bracket is the p-value. Kleibergen-Paaprk Wald F-statistic and Cragg-Donald Wald F-statistic are the results of the weak IV test, and the number in the large bracket is the critical value at the 10% level. ** and * denote significance at 5% and 10% levels, respectively.

Table 8 Results of regression by countries along the Belt and Road and non-Belt and Road countries.

Variables	(1)	(2)	(3)	(4)	(5)
Countries along the Belt and Road					
RTA	2.9839*** (12.6893)				
totaldepth		0.2784*** (12.5665)			
coredepth			0.3733*** (12.0225)		
wto				0.4584*** (12.3928)	
wtox					0.2011*** (5.7910)
Control variables	YES	YES	YES	YES	YES
Observations	660	660	660	660	660
R ²	0.659	0.661	0.666	0.673	0.569
non-Belt and Road countries					
RTA	1.0582*** (3.9971)				
totaldepth		0.0313*** (3.3512)			
coredepth			0.0753*** (4.9161)		
wto				0.0918*** (5.1026)	
wtox					0.0221 (1.2715)
Control variables	YES	YES	YES	YES	YES
Observations	1364	1364	1364	1364	1364
R ²	0.462	0.460	0.462	0.462	0.458

*** denotes significance at 1% level.

Developed and developing countries. To explore whether there also exists heterogeneity in the effects of changes in the depth of RTA provisions on FDI from developed and developing countries, on the basis of the classification criteria of the World Bank WDI database, we divide the overall sample into two subsamples based on whether the investment partner country is a developed country. By using these newly divided subsamples, we re-estimate Eq. (2) to examine whether there exists a significant difference in the effects of changes in the depth of RTA provisions on FDI from developed and developing countries. The corresponding estimation results are reported in Table 9. The results of the estimated coefficients of the RTA dummy variables and the depth indexes are significantly different in both subsamples. Specifically, in the sample of developed countries, the estimated coefficients of RTA dummy variable, depth of WTO+ provisions, and core depth are significantly positive, but the estimated coefficients of total depth and depth of WTO-X provisions are not significant. By contrast, in the sample of developing countries, the estimated coefficients of RTA dummy variable and each depth index are all significantly positive. In terms of the magnitude of coefficients, the estimated coefficients of RTA dummy and each depth index

are larger in the sample of developing countries than in the sample of developed countries. Therefore, in the sample of developing countries, the increase in the depth of RTA provisions has a relatively greater effect on the promotion of China's FDI stocks, whereas in the sample of developed countries, the increase in the depth of RTA provisions has a relatively smaller effect on the promotion of China's FDI stocks. The reason behind may be that developing countries are closer to China in terms of development level, and their domestic supporting policies are not sound enough; thus, the reduction of investment costs and improvement of investment environment brought by the signing of RTAs are more likely to attract multinational enterprises from countries with similar development stages to invest. Overall, these results, to some extent, validate Hypothesis 2 in the theoretical analysis, which indicates that there exists a significant heterogeneous effect of the change in the depth of RTA provisions on FDI from developed and developing countries.

Key provisions. Thus far, we have measured the changes in the depth of RTA provisions by constructing various depth indexes of provisions. However, the effects of specific provisions in the RTA

Table 9 Regression results by developed and developing countries.

Variables	(1)	(2)	(3)	(4)	(5)
Developed countries					
RTA	1.4637*** (4.5007)				
totaldepth		0.0223 (1.4525)			
coredepth			0.0730*** (3.6071)		
wto				0.0870*** (3.4777)	
wtox					-0.0077 (-0.2819)
Control variables	YES	YES	YES	YES	YES
Observations	682	682	682	682	682
R ²	0.495	0.485	0.489	0.488	0.484
Developing countries					
RTA	1.9646*** (10.6070)				
totaldepth		0.0798*** (5.7492)			
coredepth			0.1656*** (6.7746)		
wto				0.2111*** (7.2953)	
wtox					0.0538*** (4.1146)
Control variables	YES	YES	YES	YES	YES
Observations	1340	1340	1340	1340	1340
R ²	0.370	0.343	0.354	0.356	0.332

*** denotes significance at 1% level.

Table 10 Regression results of investment effects of specific provisions.

Variables	FDI	Variables	FDI
ste	1.8651*** (0.2559)	ipr	1.7940*** (0.2595)
public	2.2081*** (0.1970)	investment	2.4683*** (0.1737)
trims	1.7533*** (0.1828)	labor	1.7364*** (0.2071)
competition	-0.0898 (0.3236)	capital	0.7400*** (0.2832)
environment	0.3823 (0.3173)	industry	1.2877*** (0.2666)

*** denotes significance at 1% level.

on FDI stocks may vary from one provision to another due to the specific content covered, that is, heterogeneity may exist in the investment effects of different provisions. To have a more comprehensive understanding of the effects of certain specific provisions in the RTA on FDI stocks, in this section, we analyze the investment effects of some key investment-related provisions in the RTA. Specifically, we initially select 10 key investment-related provisions in the RTA, namely: state trading enterprises (*ste*), government procurement (*public*), TRIMs (*trims*), competition policy (*competition*), environmental protection (*environment*), intellectual property rights protection (*ipr*), investment (*investment*), labor rights (*labor*), movement of capital (*capital*), and industry cooperation (*industry*). Then, we construct 10 dummy variables, which take the value of 1 if an RTA contains the corresponding provision, and 0 otherwise. Finally, we replace the RTA dummy variable in Eq. (2) with the 10 dummy variables, which measure whether a specific provision is included in an RTA, and re-estimate Eq. (2). Table 10 reports the corresponding regression results.

The regression results in Table 10 show that the estimated coefficients of all the key provisions are significantly positive, except for that of the competition policy and environmental policy, which are insignificant. Overall, the effects of provisions on state trading enterprises, government procurement, TRIMs, intellectual property rights protection, investment, labor rights, and industrial cooperation on FDI stocks are relatively greater, especially the investment provisions, which have the greatest effects on FDI stocks. This finding indicates that the direct

inclusion of investment provisions in the RTA can significantly contribute to the increase of FDI stocks. By contrast, provisions on the movement of capital have relatively smaller effects. In addition, the influences of competition and environmental policies are insignificant, probably because China has signed few agreements that include environmental provisions and competition policy, which are generally not legally enforceable, so their effects are not obvious. In summary, the above results suggest that a significant difference exists in the effects of different specific provisions in RTAs on FDI stocks. To some extent, these results validate Hypothesis 3 in the theoretical analysis, that is, a large heterogeneity exists in the investment effects of different specific provisions.

Conclusion

On the basis of the textual content of China’s signed RTAs, this paper constructs the indexes of total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions for measuring the depth of RTA provisions, based on which we conduct an in-depth analysis of the effects of the changes in the depth of China’s signed RTA provisions on the country’s inward FDI stocks using Chinese FDI inward stock data from 2009 to 2019. The study finds that the increase in total depth, core depth, depth of WTO+ provisions, and depth of WTO-X provisions all have significantly positive effects on Chinese FDI stocks. This result remains robust after a series of robustness tests, such as estimation with time-varying variables of one lag period, dynamic panel model estimation, endogeneity issues handling by IV estimation and replacing variable measurements, and sample interval division. Further heterogeneity analysis results show that a significant heterogeneity exists in the influence of the increase in the depth of RTA provisions on FDI stocks from different types of partner country. Specifically, for one thing, the boosting effect of the increase in the depth of RTA provisions on FDI stocks from developing countries is relatively greater, whereas the effect on FDI stocks from developed countries is relatively smaller. For another thing, the increase in the depth of RTA provisions has a relatively greater effect on FDI stocks from countries along the Belt and Road and a relatively smaller influence on FDI stocks from non-Belt and Road countries. At the same time, heterogeneity also exists in the investment effects of different specific provisions in the RTA. Overall, the effects of the provisions on

state trading enterprises, government procurement, TRIMs, intellectual property rights protection, industrial cooperation, investment, and labor rights on FDI stocks is relatively greater, whereas the effects of the provisions on competition and environmental policies on FDI stocks are insignificant.

At present, China is in an important period of actively building a global high-standard FTA network. The analysis in this paper, based on the perspective of the change in the depth of RTA provisions, not only enriches our understanding of the investment effects generated by RTAs, but also provides important policy insights for the construction of China's global high-standard FTA network from the perspective of investment. First, the research in this paper shows that although the increase in the depth of RTA provisions is beneficial to the FDI stocks to China, the effects of different specific provisions on the FDI stocks vary considerably. For this reason, China should actively consider increasing the coverage of relevant provisions when developing RTAs abroad and include key provisions, such as state trading enterprises, government procurement, TRIMs, intellectual property rights protection, industrial cooperation, investment, and labor rights in RTA negotiations in a timely manner. By actively participating in the negotiation of provisions and timely constructing RTAs with deeper depth, the positive role of RTA in the FDI stock can be better played. Second, this paper shows that there exists a significant heterogeneity in the influence of the improvement of the depth of RTA provisions on FDI stocks from different types of partner country. Specifically, the promotion effect on the FDI stocks from countries along the Belt and Road is relatively greater, whereas the promotion effect on the FDI stocks from developed countries is relatively smaller. Thus, for one thing, when promoting the construction of the global FTA network, China should focus on the Belt and Road initiative as an opportunity to actively accelerate the negotiation and signing of RTAs with countries concerned, thus promoting the formation of RTA network along the route. For another, given that foreign investors from developed countries attach more importance to whether a country has a transparent and predictable business environment, to better play the positive effect of RTA on FDI stocks from developed countries, China should actively adapt to newer rules and requirements of higher standard trade agreements; promote the upgrading of domestic policies to international investment objectives with internal regulations; and establish a more open, transparent, and fairly good investment environment.

Data availability

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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Notes

- 1 ASEAN6 refers to Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam.
- 2 World Bank RTA text depth database: <http://data.worldbank.org/data-catalog/deep-trade-agreements>.
- 3 DESTA database: <https://www.designoftradeagreements.org/>.

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