

after 2018 were all important reasons for the tightening of FDI in the United States.

— After World War II, Japan was prepared to reconstruct its economy from scratch. In order to prevent foreign capital from taking the opportunity to enter and control its market, the Japanese government implemented a conservative policy for foreign direct investment in Japan. With the rise of the Japanese economy, Japan has begun to gradually loosen control of FDI, although its effect remains questionable. The Japanese government has always encouraged ODI and the country has eventually become a major ODI power.

— Brazil's attitude towards FDI has also undergone changes. In the early post-war period, the Brazilian government had guided and encouraged foreign investment to enter machinery, automobile and other manufacturing industries. However, in the 1970s, the problems of profit remittance by multinationals and trade deficits became more and more serious. The Brazilian government imposed restrictions on foreign direct investment in terms of localization rate and proportion of profit remittance. In the 1980s, a debt crisis broke out in Brazil. To relieve the pressure brought about by the crisis, the Brazilian government started again to encourage the entry of foreign capital, marking another U-turn of its policy stance.

IV. A Framework on Opening-up Model of National Economy

An opening-up economy can form a *sub-system*, that is, an open economy. If it is attached with geographical or territorial limits, such as a country, it can be made more concrete, such as an “open Chinese economy” or an “open world economy”. There can be another cycle within this sub-system, including four major links: production, distribution, exchange and final use. In fact, this open sub-system is not independent of other “non-open sub-systems” of the economy to which it belongs, but is inextricably linked to them, whether their linkage is strong or weak.

In the field of economic openness, cross-border exchanges undoubtedly have had the longest history, including but not limited to cross-border trade. Economic opening-up to the outside world has long been dominated by the opening-up of cross-border trade, and cross-border trade has long been dominated by goods. In recent decades, the proportion of services has gradually increased, and it has almost become predominant in some economies. Foreign trade in goods has long been dominated

by primary and final products, although the proportion of intermediate products has gradually risen and even become the main part of cross-border trade in some economies. Cross-border trade is actually a direct manifestation or extension of a country's endowment of resources (including natural resources and human resources) and production technology endowments. This is exactly the basic principle discussed in the classical theory of international trade. Therefore, this report uses the cross-border trade theory as a starting point to construct a theoretical model of opening-up to the outside world.

As mentioned earlier, there are different schools of cross-border trade theory, but they can be unified within the same framework and reflected by setting different parameters. In other words, the various schools of cross-border trade theory can be nested in the same theoretical framework, which can contain the essence of the various schools of the theory. Costinot & Rodríguez-Clare (2014) proposed a macro framework that embeds various frontier mainstream cross-border trade models to reflect the price determination mechanism of products in cross-border trade. The independent variables related to cross-border openness are as follows: production costs, export costs, bilateral variable trade costs, fixed costs for entering a partner economy, and costs for a partner economy to enter the reporting economy. Based on this framework and our measurement of openness, this report makes the following assumptions.

1. Cross-border trade openness

Trade openness factors that affect bilateral variable trade costs include tariff rates and non-tariff measures. Cross-border trade opening-up includes the opening-up of final product trade as well as that of intermediate product trade. Among them, the cross-border intermediate goods will enter the production process of the partner economy, thereby having a bearing on the production cost of the corresponding production process. Obviously, trade policy of intermediate goods has a significant bearing on trade of intermediate goods. In the past two decades, trade in intermediate goods has gradually become a powerful factor that has a significant bearing on the development of trading partners.

2. Cross-border investment openness

It includes the opening-up of foreign investment and the opening-up of outbound

domestic capital investment. The introduction of foreign capital can not only ease capital shortage, but also improve productivity of local enterprises in the host country through the competition effect and the spillover of technology and management know-how. The main role of foreign investment is also to make full use of overseas resources to enhance international competitiveness. Therefore, the degree of investment openness mainly affects production technical parameters.

3. Cross-border financial openness

Financial openness can reduce the financing costs of export and foreign investment of enterprises, and significantly promote internationalization activities that carry huge fixed costs. Both theoretical models and empirical studies emphasize the impact of the financial system on the fixed export costs of enterprises.

4. Cross-border knowledge openness

The openness of knowledge, especially technology, can enable a country to make use of the world's advanced technologies. It is of great significance, especially for late-comer countries that China represents.

5. Cross-border institutional openness

Institutional openness is committed to removing institutional barriers to international economic and trade exchanges, fostering a good business environment, and improving the quality of institutions. The impact of institutional quality on the production and operation of enterprises is related to two theoretical frameworks in institutional economics; one is the contract theory; the other is the property theory. When these two theoretical frameworks are introduced into the basic model of international trade, they can be treated as an institutional cost variable, which is a structural variable that is composed of a series of parameters measuring contract quality and strength of property rights protection.

After incorporating the above five assumptions, the determinants of the price of cross-border trade products would cover these five openness factors. For theoretical framework and detailed mathematical derivation of the various schools of international trade, please refer to the appendix of this report.

It should be emphasized that although the above model includes openness factors

in the fields of investment, finance, technology, and institutions, it still belongs to the international trade model. This is very consistent with the reality of global cross-border opening-up. The breadth and depth of the current cross-border investment, finance, technology and institutional openness have reached an unprecedented level, but cross-border trade openness remains the most attractive area in global opening-up. There is a close link between cross-border non-trade openness and cross-border trade openness.

Based on the above-mentioned theoretical model, the main contents that should be measured for opening-up to the outside world are as follows.

- Cross-border trade, including export and import of goods and services, and the traded goods and services can be seen as either final products or intermediate products;

- Cross-border direct investment, including foreign direct investment (FDI) and outbound direct investment (ODI);

- Cross-border financial investment, which mainly refers to inbound and outbound cross-border financial investment with a debt maturity of less than one year. It mainly refers to cross-border securities investment;

- Cross-border knowledge openness, especially technology openness, including the import and export of knowledge and technology;

- Cross-border institutional arrangements, including institutional or policy arrangements, such as cross-border contracts and property rights protection.

Cross-border trade, cross-border direct investment, and cross-border financial investment are all very mature fields of international economics research, on which there has been general consensus and so there is no need to go into details here. However, cross-border knowledge, technology, and institutional openness should be further expounded.

Cross-border flow of knowledge, especially technology, can be put in not only the economic category, but also the social and cultural categories. This is because knowledge and technology are intangible and need to be externalized in other tangible carriers or recorded in a certain form so that it becomes easy for them to be observed and measured. They are either externalized in products, such as cultural and high-tech products, or exist in a specific carrier, such as people (cross-border students, tourists, and migrants), or are recognized as specific rights, such as patents and other intellectual property rights. This means that the observation of knowledge or technology needs to be defined in a broader sense. Therefore, this report will indirectly monitor the cross-border flow of knowledge

and technology through openness in the cultural and social fields.

The same is true for cross-border institutional arrangements. A general system can only become conveniently observable when it is transformed into a specific cross-border system or even a cross-border policy. When we analyze cross-border system or policy, we need to start from studying cross-border behavior, that is, we need to make legal, regulatory and policy arrangements for a specific cross-border behavior. To facilitate monitoring, this report has mainly measure cross-border institutional arrangements through cross-border policies.

In summary, this report defines cross-border openness as cross-border economic openness and the directly related cross-border social, cultural and policy and institutional openness as follows.

1. Economic openness. That is, cross-border economic openness, including cross-border trade, direct investment and securities investment;
2. Social openness. That is, cross-border social openness, mainly referring to specific cross-border interpersonal movement, including flows of cross-border tourists, students, and migrants;
3. Cultural openness. That is, cross-border cultural openness, including cross-border flows of cultural goods, intellectual property rights, patent applications, and science documents citations;
4. Policy openness. That is, cross-border policy and institutional arrangements closely related to the above-mentioned economic, social and cultural openness.

The above division of cross-border openness areas aims to distinguish the performance of cross-border openness from cross-border openness policies: the first three categories are the performance of cross-border openness, and the fourth category is cross-border openness policy. This is because one of the main focuses of the cross-border openness measurement is to clarify whether the target of measurement is the performance of cross-border openness, or the cause of cross-border openness, or some sort of combination of these two categories of factors. This is also where major differences arise in existing literature: policymakers and those who are heavily influenced by policies mainly focus on cross-border openness policy, while others mainly focus on the performance of cross-border openness. Index compilers may want to meet these two needs simultaneously, but they have to face the challenges of corresponding difficulties.