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# China's direct investment in Indo-Pacific: A quantitative assessment

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## Abstract

We provide in this chapter a quantitative assessment of the global effects, i.e., the effects on the countries concerned, as well as on mainland China, the European Union, the United States and the rest of the world, following an increase of Chinese direct investment in the Indo-Pacific region. The empirical methodology makes use of a Computable General Equilibrium model, which allows obtaining the consequences of changes in a particular variable on the whole economy under analysis, together with the specific effects across the different productive sectors. The results show that an increase in Chinese direct investment would have a mostly positive and significant effect on the GDP levels of the Indo-Pacific countries, especially in Pakistan, Indonesia, Vietnam, Malaysia and India; and, to a lower extent, Australia, New Zealand, Singapore and Thailand. These results were mostly driven by increases in consumption, since investment fell in almost all cases. The effects on the other world regions proved to be very small.

Keywords: Direct investment, China, Indo-Pacific, Computable General Equilibrium.

JEL classification: C68, F21, F23

## 1. Introduction

The role of capital movements, i.e., the International transactions of financial assets, is of a first order importance in the current configuration of the world economy. From a historical point of view, capital movements played a most relevant role in the first globalization that culminated in 1914 (Baldwin and Martin, 1999), although the turbulences associated with the First World War and the subsequent Great Depression reduced their importance in later years. After the Second World War, the prevailing consensus about the international economic order, associated with the Bretton Woods Agreements, was based on promoting the removal of all barriers to trade exchanges, but not for financial transactions. The memories of the huge financial volatility of the inter-war period, together with the wish of preserving the autonomy of the domestic macroeconomic policies, left open the possibility of establishing cross-border controls to capital flows. However, in the decades of 1980-1990 this consensus was reversed, so that the main International organizations, such as the International Monetary Fund (IMF) or the Organisation for Economic Co-operation and Development (OECD), and even the European Union (EU), supported the full liberalization of international financial transactions for their member countries.

Capital movements are registered in the financial account of the balance of payments, which is elaborated according to the rules established by the IMF in its Balance of Payments Manual, currently in its sixth edition; and, within capital movements, direct investment becomes their most relevant component from an economic point of view. According to the IMF's definition, "direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy" (International Monetary Fund, 2009, p. 100). Unlike the other main component of capital movements, i.e., portfolio investment, direct investment typically shows a greater stability over time, and conforms to the fundamental conditions of the economy of the country where it is located. However, portfolio investment, directed to maximize financial profitability, uses to follow criteria that are often purely speculative and dependent on short run, and frequently erratic, influences. Most generally, direct investment makes up a most relevant form of involvement in the international economy; and is performed by the multinational enterprise (MNE), which represents an extremely powerful agent in the operation of the world economy.

Which factors would explain direct investment? The most standard theory of the MNE starts from Hymer's (1976) pioneering contribution, and state that MNEs must own some particular advantage over domestic firms in the host country. So, given such an ownership advantage (in terms of better technologies, managerial skills, access to financing, and so on), it must be beneficial for the MNE to internalize it within the firm by means of direct investment. And this in turn requires that the foreign country possesses a location advantage over the home country, which makes direct investment more profitable than exporting. This is the essence of the well-known Dunning's "eclectic theory" or OLI (i.e., ownership-location-internalization) paradigm; see Dunning (1977, 1993). The literature on MNEs and direct investment has been surveyed in, e.g., Blonigen (2005), Latorre (2009) or, more recently, Blonigen and Piger (2014). In particular, the latter study emphasizes, as the main variables influencing direct investment, the real GDP of both the host and parent countries, the distance between them, cultural distance factors, relative labour endowments, and trade agreements; unlike some policy variables controlled by the host country (such as multilateral trade costs, business costs, infrastructure or political institutions), which seem to have not much effect on direct investment.

On the other hand, one of the most relevant facts that have happened in the world economy over the last decades, is the spectacular development of the Chinese economy. From being a secondary actor in international affairs, China has become a superpower in both

economic and political grounds. China was until recently the world's fastest-growing major economy, with growth rates averaging 10% over 30 years. As of 2022, China is the world's second largest economy in terms of nominal GDP, with Chinese GDP accounting for 18% of world GDP. Also, China's presence in international trade is noteworthy, being the world's largest exporter and the second-largest importer of goods, which amounts to 14.4% and 10.6% of total world exports and imports, respectively. In addition, Chinese involvement in direct investment is fairly remarkable, with a particular interest in the neighbouring region of Asia-Pacific, an area characterized itself by high rates of growth in last years.

More specifically, we will focus on Indo-Pacific, a concept designed in principle to term a biogeographical region, but that has spread to an increased use in geopolitics over the last years. In particular, the term "Indo-Pacific" would include the more traditional term Asia-Pacific, i.e., the region around the western Pacific Ocean, plus the Indian subcontinent. Indo-Pacific comprises some of the fastest growing economies in the world, and is an important destination of direct investment from abroad; at the time that is the scenario of the ever-increasing strategic competition between the United States and China (He and Li, 2020). For all these reasons, the analysis of the developments of the Chinese economy and their possible effects on the rest of the world, and especially on the neighbouring Indo-Pacific area, becomes a very relevant issue from both an economic and political perspective.

In this chapter, we will offer a quantitative assessment of the global effects, i.e., the effects on the economies of the countries concerned, as well as on mainland China, the EU, the United States and the rest of the world, following an increase of Chinese direct investment in the Indo-Pacific region. The empirical methodology will make use of a Computable General Equilibrium (CGE) model, which allows obtaining the consequences of changes in a particular variable on the whole economy under analysis, together with the specific effects across the different productive sectors. Some descriptive evidence on the importance of Chinese direct investment, with a special emphasis in Asia, is given in section 2. A brief description of the model and the data used in the empirical analysis, is presented in section 3. Next, the results from the simulations are discussed in section 4. Finally, the main conclusions are summarized in section 5.

## **2. China's direct investment abroad: an assessment**

In this section, we provide some descriptive information on the extent and main characteristics of China's direct investment abroad. All data come from the 2022 edition of the Foreign Investment Bulletin published by the Chinese Ministry of Commerce (Ministry of Commerce of the People's Republic of China, 2023).

At the end of 2022, 46563 Chinese firms performed direct investment abroad, and Figure 1 shows its distribution across continents. Most firms operated in Asia (59.2%), followed by North America (13.0%), Europe (10.2%), Latin America (7.9%), Africa (7.1%), and Oceania (2.6%). Regarding its distribution across countries, 20 of them accounted for 76.8% of China's total number of overseas enterprises, namely, Hong Kong, the United States, Singapore, the British Virgin Islands, the Cayman Islands, Germany, Japan, Vietnam, Russia, Australia, Indonesia, Malaysia, South Korea, Thailand, Canada, Cambodia, Laos, the United Kingdom, India, and Myanmar.

[Figure 1 here]

The distribution across sectors of the Chinese firms performing direct investment abroad in 2022 appears in Table 1. As can be seen, Wholesale and retail, Manufactures, and Leasing and business services are the preferred sectors for Chinese overseas investment, with a

total number of above 27000, accounting for 59.2% of the total number of overseas enterprises. In particular, firms operating in Wholesale and retail, Manufactures, and Leasing and business services amount, respectively, to 27%, 18.7%, and 13.5% of the total number of Chinese overseas enterprises. Other sectors accounting for a significant number of firms are Construction, Information transmission and software, and Scientific research and technology services, with an 8.3%, 7.4%, and 5.8% of total firms, respectively.

[Table 1 here]

In Table 2 we present the distribution of China's direct investment across major economies, for both flows and stocks, in 2022, where stocks have been computed as the accumulated sum of flows since 2002 (i.e., the first year for which data are available). Hong Kong China serves as an opening window of China to the world and has played a dominant role, accounting for 57.6% and 59.8% of Chinese overall direct investment stock and flow, respectively, in 2022. As for the rest of countries, due to geographical proximity, ASEAN<sup>1</sup> is the region receiving most of Chinese direct investment, compared to the EU, the United States and Australia.

[Table 2 here]

Turning to China's direct investment in Asia, Table 3 shows the sectoral distribution of Chinese investment in the ASEAN countries, both in terms of flows and stocks, referred to the year 2022. As can be seen in the table, in 2022 China's direct investment flows to ASEAN amounted to 18649 million US dollars, with a decrease of 5.5% from the previous year. At the end of the year, the stock of direct investment amounted to 154662 million US dollars so, at the end of 2022, China had established more than 6500 directly invested firms in the region and employed over 660000 local employees.

[Table 3 here]

From a sectoral perspective, Manufactures account for 44% of total flows, being the main destinations Indonesia, Vietnam, Singapore, and Malaysia. The second more important industry is Wholesale and retail, which accounts for 22.5% of total flows, mainly addressed to Singapore. Mining ranks third with a 9.7% of total, mainly flowing to Singapore and Indonesia; followed by Production and supply of electricity/heat/gas/water with an 8.5% of total, mainly flowing to Indonesia, Malaysia, and Singapore. Of a lower importance is Finance, which accounts for a 5% of total, mostly addressed to Singapore.

Regarding the stock of direct investment, Manufactures is also the most important sector, followed by Wholesale and retail, with a 31.9 % and a 16% of total, respectively. Other sectors accounting for a relevant share are Leasing and business services and Production and supply of electricity/heat/gas/water, which account for a 14.5% and 9.4% of the total stock of direct investment.

Next, the distribution across countries of China's stock of direct investment in ASEAN at the end of 2022 is shown in Figure 2. Singapore ranks first, accounting for 47.5% of the investment stock in ASEAN, mainly in Leasing and Business services, Wholesale and retail, Manufactures and Finance. Next comes Indonesia that accounts for 16% of total, mainly in Manufactures, Production and supply of electricity/heat/gas/water and Mining. Malaysia ranks

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<sup>1</sup> The Association of Southeast Asian Nations (ASEAN) includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

third with a 7.8% of total, mainly in Manufactures, Production and supply of electricity/heat/gas/water, Construction and Wholesale and Retail.

[Figure 2 here]

### 3. Model and data

As mentioned in the introduction, the empirical methodology will be based on a CGE model; see Burfisher (2021) for an extensive presentation of this methodology. CGE models have been widely used for policy analysis in fields such as fiscal policies, trade policies, environmental policies, and the like. Since they catch multiple and simultaneous interactions across the economies, markets, sectors and agents, this feature makes any analyses very flexible and detailed, and helps policymakers to make prior anticipations of outcomes and data-driven decisions. Some recent examples of applications of CGE modelling are Bajo-Rubio and Gómez-Plana (2022) and Zhou (2023), on fiscal policy and direct investment, respectively.

Our CGE model is built as an extension of the Global Trade Analysis Project (GTAP) model. GTAP is a global network of researchers from private and public institutions, which is coordinated by a team based on the Department of Agricultural Economics at Purdue University, West Lafayette, Indiana, United States. The core module of GTAP is a static worldwide CGE model, used to assess the short and medium-term impacts of either exogenous shocks or public policies. Mathematically, it is a system derived from a set of nonlinear equations, with four economic agents, i.e., producer, consumer, government and trading partner, with each one of them maximizing its profit or welfare. The team produces a global economic data set, i.e., the GTAP Data Base, widely used to perform economic policy analyses on several issues<sup>2</sup>.

Specifically, our model is an extension of the model developed by Lanz and Rutherford (2016), called GTAP9inGAMS, who improved and standardized the GAMS programs, where GAMS (General Algebraic Modeling System) is a software used for mathematical programming and optimization. We further extend Lanz and Rutherford's model to incorporate direct investment shocks simultaneously in a multi-region setting; see Zhou and Latorre (2014, 2021) for details.

Based on Version 10 of the GTAP Data Base (Aguiar et al., 2019), we build our data set made up of 23 sectors and 19 economies. The definition of the 23 sectors is shown in Table 4, together with its correspondence with the sectors included in the GTAP 10 Data Base.

[Table 4 here]

In turn, the 19 regions include 16 Indo-Pacific countries, namely,

- Australia
- New Zealand
- China
- Hong Kong
- Japan
- South Korea
- Taiwan
- Indonesia
- Malaysia
- Philippines

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<sup>2</sup> For more information about GTAP, see the website <https://www.gtap.agecon.purdue.edu/>.

- Singapore
- Thailand
- Vietnam
- Bangladesh
- India
- Pakistan

as well as Europe (i.e., the EU, plus Switzerland, Norway, Rest of EFTA, and Rest of Europe), United States, and Rest of the world. The benchmark year in the GTAP 10 Data Base is 2014.

Next, we will simulate in the model the effects of an increase in the Chinese stock of direct investment in each of the countries analysed, on both the main macroeconomic and sectoral variables. In the rest of the section, we will explain how the simulations have been performed.

After mapping the sectors defined in the database “fDi markets” (<https://www.fdimarkets.com/>), which provides sectoral data on direct investment, with the sectors aggregated from the GTAP Data Base (see above), we can list out China’s investment in the corresponding industries in Indo-Pacific regions and calculate the increase in capital stock after the entrance of Chinese MNEs in specific sectors of the host economy. This means that the equation in the original GTAP model needs to be adjusted. Specifically, if:

- $vfm_{Kjr}$  is the value of capital inputs (net of taxes) in sector  $j$  and region  $r$
- $dfm_{Kjr}$  is the demand for capital in sector  $j$  and region  $r$
- $ps_{jr}^K$  is the price of capital in sector  $j$  and region  $r$
- $pf_r^K$  is the composite price of capital in region  $r$
- $\eta$  is the elasticity of transformation between sectors for sluggish primary factors, i.e., a parameter that indicates how easy is to transfer a sluggish (partially mobile) factor from one sector to another

a new parameter  $DI_{Kjr}$  should be introduced in the clearing equation of the capital market, to reflect the capital increase in sector  $j$  via direct investment. So, the original equations are modified as follows:

$$vfm_{Kjr} DI_{Kjr} (ps_{jr}^K / pf_r^K)^\eta = dfm_{Kjr} \quad (1)$$

Equation (1) means that Chinese direct investment will increase the capital stock in sector  $j$  of region  $r$ . So, if  $evom_{Kr}$  is the aggregate supply of capital in region  $r$ :

$$evom_{Kr} = \sum_{j=1}^{23} vfm_{Kjr}$$

and  $FT_{Kr}$  is the capital transformation (i.e., the process of changing the structure of capital from one type to another, mostly driven by technological change) of  $dfm_{Kjr}$ , also in region  $r$ , the new overall capital endowment after receiving the new capital inflows will be given by  $NEWevom_{Kr}$ :

$$NEWevom_{Kr} = evom_{Kr} FT_{Kr} \quad (2)$$

Once the shock in the level of capital stock is introduced, factors’ revenue will change leading to chain effects of changes in factor inputs, intermediate inputs, output, and prices; which spreads in turn to the host and home country’s income, consumption, exports and imports. These chain effects enlarge and bring about a series of adjustments according to the input-output structure, trade linkages, and consumption structure.

In short, starting from the initial stock of Chinese direct investment at the benchmark year (i.e., 2014) for every sector and region, we add the flows of direct investment over the period 2015-2020, and compute the percentage changes in the stock of direct investment during that period. Finally, once we got these simultaneous increases in the stock of Chinese direct

investment for every sector and region, we introduce them as a shock in the CGE model in order to estimate the subsequent changes in both macroeconomic and sectoral variables with respect to the benchmark year.

#### 4. Simulation results

In this section, we present the results from simulating an increase in Chinese direct investment within our CGE model, in terms of both the main macroeconomic and sectoral variables of the regions (countries) under analysis.

We start with the macroeconomic results. In Table 5 we show the effects of the simulations on the level of GDP and its components for each region (country). Recall that:

$$\text{GDP} = \text{Consumption} + \text{Investment} + \text{Government expenditure} + \text{Exports} - \text{Imports}$$

The figures in the table represent the counterfactual changes in those variables, measured in percentage with respect to the benchmark equilibrium, following the actual changes in Chinese direct investment over the period 2015-2020, as explained in the previous section.

[Table 5 here]

As can be seen in the table, the effects on the GDP levels of the Indo-Pacific countries derived from an increase in Chinese direct investment are positive, and relevant, in most cases. So, Pakistan and Indonesia would experience a GDP increase of around 7%, as well as a 5% in Vietnam, and almost a 4% in Malaysia and India; somewhat lower values appear in Australia, New Zealand, Singapore and Thailand. Some negative, although relatively small values, occur however in China, as well as in Japan, South Korea and Taiwan (i.e., the most developed countries in the area). Turning to the components of GDP, the results are mostly driven by the increases in consumption, since investment falls in almost all cases, the only relevant exception being Pakistan. In other terms, it would seem that a higher Chinese investment would lead to a lower (i.e., it would crowd out) domestic investment, which can explain the smaller positive, or even negative, effects on GDP for some countries. Government expenditure would decrease in most cases, being the most important exceptions Pakistan, Indonesia and India.

Regarding the foreign sector, exports would increase in almost all countries, except for Pakistan that shows a decrease in exports of 9%. However, imports usually increase more than exports, especially in Pakistan and Indonesia, where they would grow a 12 and a 10%, respectively. Finally, the effects on the other world regions, i.e., Europe, United States and Rest of the world, are rather small, an outcome in line with that obtained in other studies using CGE models, which did not find significant effects for those countries not directly involved in the shock analysed. Such a result was justified in Bajo-Rubio and Gómez-Plana (2022) in terms of the existence of a home bias in international trade, i.e., when domestic consumers have a greater preference for domestic, rather than foreign, goods, due to the pervasiveness of trade costs, defined in a broad sense; see, e.g., Obstfeld and Rogoff (2000).

Next, we will present some microeconomic results, i.e., the effects of an increase in Chinese direct investment across the different sectors of the countries analysed. In particular, we will show the effects on sectoral output (Table 6), sectoral exports (Table 7) and sectoral imports (Table 8), as percentage changes with respect to the benchmark equilibrium, as before.

[Table 6 here]

[Table 7 here]



[Table 8 here]

Starting with sectoral output, we can observe important increases, of above 20%, in some sectors such as Electronic equipment (for Indonesia, Pakistan and India), Mineral products (for Vietnam, Indonesia, Pakistan and Malaysia), Electricity, Gas and Water (for Pakistan and Malaysia), Machinery and equipment (for Pakistan), or Biochemical and Pharmaceutical products (for Hong Kong); and no relevant changes seem to appear in services activities. Turning to sectoral exports, the pattern is rather similar, with the highest increases appearing in Electronic equipment (for Indonesia, Pakistan and India), Mineral products (for Indonesia, Vietnam and Pakistan), Electricity, Gas and Water (for Pakistan, Malaysia and Indonesia), Motor vehicles (for India), and Biochemical and Pharmaceutical products and Construction (for Hong Kong, in both sectors). The pattern, however, differs for sectoral imports, with some countries experiencing simultaneously significant increases and decreases in sectoral imports. This is the case of Indonesia, showing high increases in Agriculture, in Food and Beverages and in several services sectors, together with high decreases in Electricity, Gas and Water and in Mineral products; a similar situation, though at smaller figures, appears in Malaysia. In turn, Vietnam experiences high imports increases in Minerals, Electricity, Gas and Water and services sectors; whereas Pakistan (and, at a lower extent, India) shows her imports increase in Agriculture, Food and Beverages, Textiles, Other manufactures and several services sectors, together with a strong decrease in Electricity, Gas and Water. Finally, as with the macroeconomic results, the effects on the other world regions would be very small.

## 5. Conclusions

One of the most relevant facts occurring in the world economy over the last decades, is the spectacular development of the Chinese economy, and its emergence as a big superpower. At the same time, China has become one of the main sources of direct investment abroad, addressed to a great extent to the neighbouring region of Indo-Pacific, an area characterized itself by high rates of growth in last years.

In this chapter, we have provided a quantitative assessment of the global effects, i.e., the effects on the economies of the countries concerned, as well as on mainland China, the EU, the United States and the rest of the world, following an increase of Chinese direct investment in the Indo-Pacific region. The empirical methodology was based on a CGE model. These models, widely used for policy analysis in fields such as fiscal policies, trade policies or environmental policies, permit to get the consequences of changes in a particular variable on the whole economy under analysis, together with the specific effects across the different productive sectors.

Our CGE model is built as an extension of the GTAP model, developed by team of researchers at Purdue University (Indiana, United States), who also provides a global economic data set (the GTAP Data Base), widely used to perform economic policy analyses on several issues. In this way, based on Version 10 of the GTAP Data Base, our model incorporates direct investment shocks simultaneously in a multi-region setting, in a framework made up of 23 sectors and 19 economies: 16 Indo-Pacific, including China, plus Europe, United States and Rest of the world. In particular, starting from the initial stock of Chinese direct investment at the benchmark year (i.e., 2014) for every sector and region, we add the flows of direct investment over the period 2015-2020, compute the percentage changes in the stock of direct investment during that period, and introduce them simultaneously as a shock in the CGE model in order to estimate the subsequent changes in both the macroeconomic and sectoral variables with respect to the benchmark year.

The results show that an increase in Chinese direct investment had a mostly positive and significant effect on the GDP levels of the Indo-Pacific countries, especially in countries such as Pakistan, Indonesia, Vietnam, Malaysia and India; and, to a lower extent, Australia, New Zealand, Singapore and Thailand. Some negative, although small effects, appeared for China and the most developed countries in the area (Japan, South Korea, Taiwan). These results were mostly driven by increases in consumption, since investment fell in almost all cases, indicating that a higher Chinese investment would lead to a decrease in domestic investment. In turn, exports increased in almost all countries, except for Pakistan; with imports increasing more than exports, especially in Pakistan and Indonesia. Finally, the effects on the other world regions (Europe, United States, Rest of the world), were very small.

Finally, regarding the results across sectors, output increased especially in some sectors such as Electronic equipment, Mineral products, Electricity, Gas and Water, or Machinery and equipment, in those countries experiencing the most favourable effects from Chinese direct investment. While the results for sectoral exports followed a similar pattern, in the case of sectoral imports coexisted both increases and decreases in different sectors, at the same time that now imports rose in some services sectors.

To conclude, our results would confirm the positive role that foreign capital might play on the economic evolution of the host countries, provided that inflows are stable and permanent enough, and addressed at those sectors more relevant to host countries, so they were able to incorporate the more advanced technologies usually associated with direct investment. However, it should be noticed that these favourable effects of direct investment might be stronger in the first years of a growth process, rather than in later stages, once the host economy had become less dependent on such new technologies<sup>3</sup>.

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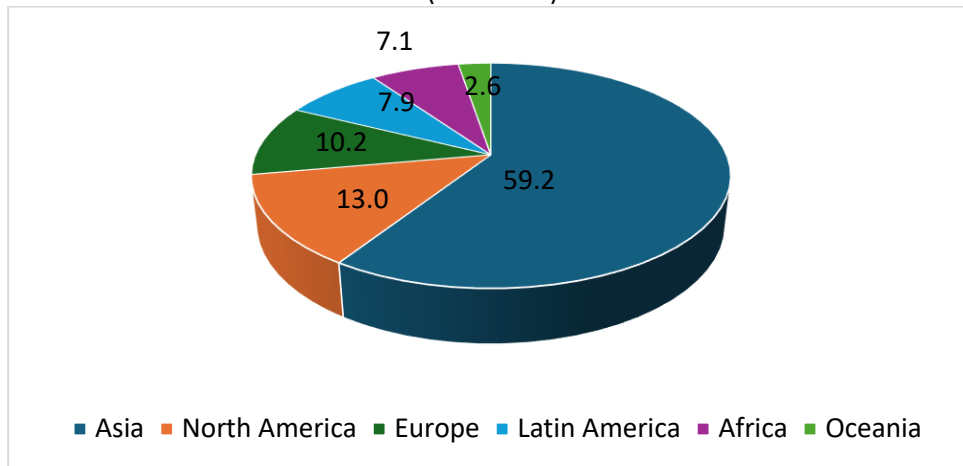
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<sup>3</sup> See Bajo-Rubio (2022) for a recent study of the favourable contribution of foreign capital to the growth of the Spanish economy since the first 1960s, which seemed however to have been greater during the first years of the period analysed.

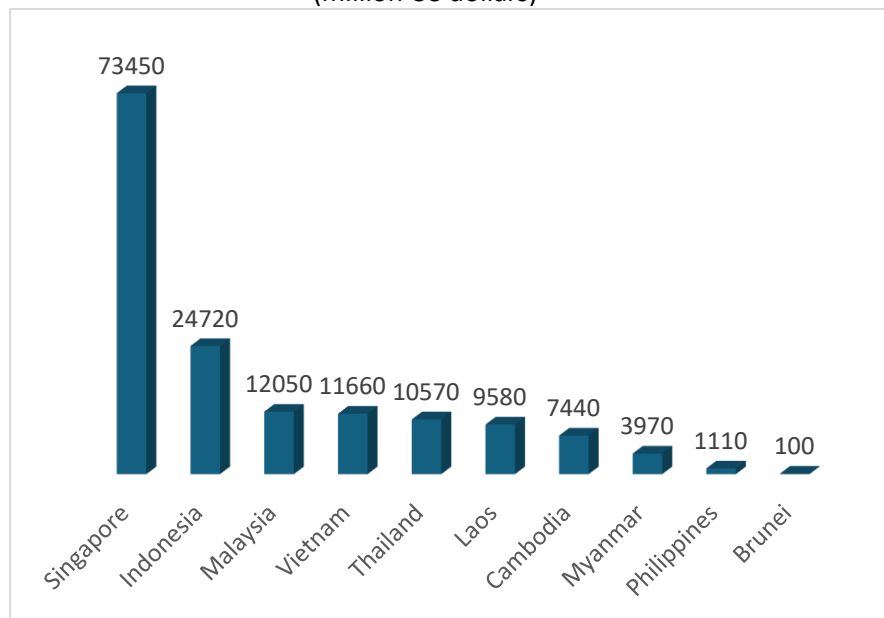
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**Figure 1. Distribution of Chinese overseas firms across continents, 2022**  
(% of total)



Source: Ministry of Commerce of the People’s Republic of China (2023).

**Figure 2. Stock of China’s direct investment in ASEAN: distribution across destinations, 2022**  
(million US dollars)



Source: Ministry of Commerce of the People’s Republic of China (2023).

**Table 1. Distribution of Chinese overseas firms across sectors, 2022**

	Number of firms	%
Wholesale and retail services	12559	27.0
Manufactures	8734	18.7
Leasing and business services	6273	13.5
Construction	3860	8.3
Information transmission, software and information technology services	3451	7.4
Scientific research and technology services	2725	5.8
Agriculture, forestry, animal husbandry and fishery	1762	3.8
Transportation, storage and postal services	1467	3.1
Mining	1296	2.8
Residential services, repair and other services	823	1.8
Production and supply of electricity/heat/gas/water	788	1.7
Finance	801	1.7
Real estate	727	1.6
Culture, sports and entertainment	513	1.1
Accommodation and catering	315	0.7
Education	212	0.5
Water conservancy, environment and public facilities management	148	0.3
Health and social work	109	0.2
<b>Total</b>	<b>46563</b>	<b>100.0</b>

Source: Ministry of Commerce of the People's Republic of China (2023).

**Table 2. China's direct investment in major economies, 2022**

(million US dollars)

	Flows		Stocks	
	value	%	value	%
Hong Kong China	97530	59.8	1588670	57.6
ASEAN	18650	11.4	154660	5.6
European Union	6900	4.2	101190	3.7
United States	7290	4.5	79170	2.9
Australia	2790	1.7	35790	1.3
<b>Total</b>	<b>133160</b>	<b>81.6</b>	<b>1959480</b>	<b>71.1</b>

Source: Ministry of Commerce of the People's Republic of China (2023).

**Table 3. China's direct investment in ASEAN: sectoral distribution, 2022**  
(million US dollars)

	Flows	%	Stocks	%
Manufactures	8214.72	44.0	49283.69	31.9
Wholesale and retail services	4199.84	22.5	24767.67	16.0
Leasing and business services	601	3.2	22485.21	14.5
Production and supply of electricity/heat/gas/water	1578.12	8.5	14482.66	9.4
Construction	158.59	0.9	9508.99	6.1
Finance	935.86	5.0	8080.88	5.2
Transportation, storage and postal services	149.49	0.8	6002.97	3.9
Mining	1814.55	9.7	5733.14	3.7
Agriculture, forestry, animal husbandry and fishery	76.57	0.4	5281.77	3.4
Information transmission, software and information technology services	412.68	2.2	3411.51	2.2
Real estate	78.66	0.4	1545.95	1.0
Residential services, repair and other services	199.27	1.1	1419.06	0.9
Scientific research and technology services	-128.43	-0.7	1315.25	0.9
Water conservancy, environment and public facilities management	68.32	0.4	416.57	0.3
Education	216.17	1.2	381.4	0.2
Other industries	73.4	0.4	545.91	0.4
<b>Total</b>	<b>18648.81</b>	<b>100</b>	<b>154662.63</b>	<b>100</b>

Source: Ministry of Commerce of the People's Republic of China (2023).

**Table 4. Sector definitions and correspondence with GTAP 10 Data Base**

Sector	Abbreviation	GTAP 10
Agriculture	AGR	1-14
Coal, Crude oil, Gas, Minerals nec	MIN	15-18
Food, Beverages and Tobacco	FBT	19-26
Textiles, Wearing apparel, Leather products	TWL	27-29
Wood without furniture, Paper products, Publishing	WPP	30-31
Petroleum coal products	PTR	32
Biochemical, Pharmaceutical products	BPH	34
Rubber, Plastic products	CRP	33,35
Mineral products, Ferrous metals, Metals nec, Metal products	MTL	36-39
Motor vehicles and parts, Transport equipment nec	MVO	43-44
Electronic equipment	EEQ	40-41
Machinery and equipment nec	OME	42
Other manufactures nec	OMF	45
Electricity, Gas manufacture, Water	EGW	46-48
Construction	CNS	49
Trade, Business services nec	TRO	50-52
Professional scientific and technical activities	OBS	60
Transport nec	AWT	53-55
Communication	CMN	56
Financial services nec, Insurance	FNS	57-58
Recreational and other services	ROS	61
Public Administration and defense, Education, Health	OSG	62-64
Dwellings	DWE	65

Source: Own elaboration from Aguiar et al. (2019).

**Table 5. Simulation results: Effects on GDP and its components**  
(% change from benchmark)

	<b>GDP</b>	<b>Consumption</b>	<b>Investment</b>	<b>Government expenditure</b>	<b>Exports</b>	<b>Imports</b>
Australia	1.58	2.84	-0.28	0.96	0.36	1.74
New Zealand	1.35	2.04	0.30	0.83	1.73	1.88
China	-0.27	-0.38	-0.17	-0.32	-0.08	-0.45
Hong Kong	0.85	4.02	-5.14	-0.24	1.57	2.02
Japan	-0.37	-0.36	-0.39	-0.35	0.33	-0.27
South Korea	-0.24	-0.05	-0.48	-0.36	0.49	0.05
Taiwan	-0.45	-0.66	-0.33	-0.41	0.24	-0.10
Indonesia	6.92	15.32	-2.91	4.52	4.35	10.02
Malaysia	3.97	12.26	-0.92	-0.11	2.62	5.50
Philippines	-0.02	0.02	-0.16	-0.17	0.03	-0.15
Singapore	1.35	4.05	-1.19	0.14	1.65	1.59
Thailand	1.44	3.02	-1.08	1.01	2.21	2.02
Vietnam	5.19	7.39	-0.18	2.78	7.74	6.38
Bangladesh	0.06	0.15	-0.19	-0.08	-0.10	-0.31
India	3.64	6.70	-0.59	2.37	0.57	1.98
Pakistan	7.17	11.66	2.21	6.70	-9.04	11.71
United States	-0.12	-0.10	-0.17	-0.15	-0.02	-0.08
Europe	-0.09	-0.06	-0.15	-0.11	-0.07	-0.11
Rest of the world	0.00	-0.14	-0.15	-0.16	0.06	-0.15

Source: Own elaboration.

**Table 6. Simulation results: Effects on sectoral output**  
(% change from benchmark)

Sector	Australia	New Zealand	China	Hong Kong	Japan	South Korea	Taiwan	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Bangladesh	India	Pakistan	Europe	United States	Rest of the world
AGR	0.4	1.7	0.1	3.0	0.3	0.3	0.3	1.3	1.7	0.1	0.5	0.3	0.2	0.2	0.9	0.3	0.2	0.0	0.1
MIN	1.0	-0.4	0.6	-0.1	0.8	0.3	0.3	1.1	-0.2	0.2	0.2	0.2	0.1	0.1	-0.2	-0.1	0.1	0.0	0.1
FBT	0.5	5.5	0.0	3.2	0.1	0.6	0.0	3.5	3.8	0.1	2.5	0.4	0.7	0.3	1.4	0.6	0.1	0.0	0.1
TWL	-0.3	-1.4	0.6	3.5	0.7	0.9	2.0	-0.1	1.2	0.1	1.2	0.1	16.5	0.0	0.2	-3.9	0.1	0.0	0.2
WPP	0.2	-0.1	0.2	2.6	0.3	0.6	0.8	-0.2	5.4	0.2	1.1	0.1	3.1	0.1	0.4	-1.1	0.1	0.0	0.1
PTR	1.1	0.3	-0.1	0.7	-0.1	0.6	0.1	3.9	4.5	0.1	3.6	2.4	0.7	0.7	1.4	8.5	-0.3	0.0	0.1
BPH	2.1	-0.6	0.0	22.4	0.2	0.4	0.3	7.6	0.5	0.0	1.1	0.0	-0.2	0.1	0.0	0.0	0.1	0.0	0.1
CRP	4.1	-1.2	0.2	3.0	0.2	0.1	-0.2	1.8	6.0	0.2	0.5	7.3	17.9	0.1	1.2	7.8	0.0	0.0	0.0
MTL	-1.1	-1.2	-0.4	-1.2	-0.4	0.1	-0.4	18.8	15.1	-0.7	-1.9	3.0	29.4	-0.9	4.4	15.7	-0.4	0.0	-0.4
MVO	4.5	-1.9	-0.1	4.0	0.2	0.7	0.0	3.2	9.9	-0.4	3.7	4.6	1.7	-1.7	11.3	9.2	-0.4	0.0	-0.3
EEQ	-1.7	-2.6	-0.8	1.1	-0.1	0.2	-0.1	83.2	2.4	-0.3	-0.1	1.8	7.8	-1.6	28.0	44.3	-0.7	0.0	-0.7
OME	-1.2	-1.5	-0.1	2.3	0.4	0.4	0.7	-0.3	1.0	0.1	0.9	0.1	0.7	-0.4	3.5	19.8	-0.1	0.0	-0.1
OMF	-0.5	-0.9	0.2	1.3	0.5	0.6	0.8	1.6	2.0	-0.1	0.7	-0.1	2.2	0.1	-1.0	-1.2	0.1	0.0	0.1
EGW	2.0	0.5	-0.1	1.6	-0.1	0.2	-0.2	16.5	20.3	0.5	1.3	1.2	8.5	-0.1	4.1	26.2	-0.1	0.0	-0.2
CNS	0.1	0.0	0.0	0.8	0.0	0.1	0.0	0.3	6.5	0.0	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0
TRO	1.2	0.7	0.1	1.6	0.1	0.4	0.1	2.6	3.6	0.0	1.7	0.6	3.6	0.0	1.8	1.5	0.0	0.0	0.0
OBS	0.4	0.6	0.0	1.6	0.2	0.4	0.4	-0.8	2.5	0.1	3.0	1.3	-0.6	0.0	-0.3	-0.3	0.1	0.0	0.0
AWT	0.8	0.2	0.1	3.4	0.2	0.4	-0.1	5.9	6.0	-0.1	1.1	1.5	6.3	0.0	1.9	2.5	-0.1	0.0	-0.1
CMN	0.5	0.7	0.0	7.9	0.1	0.4	0.4	4.9	5.1	0.1	7.0	2.3	1.8	0.0	2.3	11.2	0.0	0.0	0.0
FNS	0.6	0.8	0.2	3.4	0.1	0.3	0.1	2.9	3.7	0.0	2.9	0.9	0.6	0.0	1.7	1.3	0.1	0.0	0.1
ROS	1.1	0.4	0.1	2.2	0.0	3.6	0.0	4.5	2.4	0.1	1.6	0.9	-0.2	0.0	1.0	0.7	0.1	0.0	0.1
OSG	0.5	0.1	0.0	0.0	0.0	0.1	0.0	1.5	1.6	0.1	1.1	0.1	0.5	0.1	1.2	-0.8	0.0	0.0	0.0
DWE	0.2	0.2	0.0	0.6	0.0	0.1	0.0	0.4	2.7	0.0	0.8	0.2	0.3	0.0	0.9	0.1	0.0	0.0	0.0

Source: Own elaboration.



**Table 7. Simulation results: Effects on sectoral exports**  
(% change from benchmark)

Sector	Australia	New Zealand	China	Hong Kong	Japan	South Korea	Taiwan	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Bangladesh	India	Pakistan	Europe	United States	Rest of the world
AGR	0.3	-3.7	3.2	1.5	1.9	1.2	2.3	-9.8	-2.7	0.6	0.6	-0.9	-3.9	2.7	-5.2	-8.2	0.2	0.6	0.9
MIN	1.2	-0.3	3.1	1.4	2.3	1.2	3.4	-3.4	-2.7	0.4	0.0	0.7	-5.8	5.4	-2.2	-10.4	0.4	1.4	0.3
FBT	-0.5	6.0	1.4	2.1	1.3	1.3	1.0	-6.5	1.7	0.5	2.7	-0.4	-3.1	0.5	-4.9	-12.8	0.1	0.6	0.5
TWL	-0.6	-1.6	1.2	1.8	1.8	2.3	2.6	-6.4	0.1	0.0	1.8	-0.5	14.8	-0.2	-5.4	-12.2	0.1	0.7	0.2
WPP	-0.9	-0.4	0.7	1.3	1.4	1.1	1.7	-5.1	4.0	0.2	1.1	-0.9	0.9	0.8	-4.0	-9.1	0.1	0.6	0.2
PTR	0.9	0.1	1.7	-1.2	1.3	1.8	1.9	-2.1	1.2	1.0	4.3	1.8	-3.4	0.1	-2.0	1.0	-0.2	-0.3	0.7
BPH	2.1	-1.4	1.1	23.2	0.5	1.2	0.7	1.4	-3.4	0.6	1.0	-0.1	-3.8	0.7	-1.9	-9.0	0.1	0.2	0.1
CRP	6.0	-2.0	1.0	2.0	0.5	0.0	-0.2	-5.7	5.1	0.9	0.7	7.6	17.6	0.6	-0.6	5.9	0.0	0.4	0.1
MTL	-1.8	-2.3	-1.5	-1.7	-0.6	-0.1	-0.3	48.5	14.8	-0.6	-2.2	2.9	33.1	-0.3	3.8	21.0	-0.4	-0.2	-0.5
MVO	5.2	-2.3	-0.3	4.1	0.3	0.8	0.1	-5.1	5.7	0.0	3.7	5.7	0.0	-0.6	21.3	11.0	-0.4	-0.5	-0.3
EEQ	-2.2	-2.8	-1.0	0.5	0.0	0.1	-0.1	91.9	1.7	-0.2	0.0	1.8	7.4	-1.2	42.1	52.6	-0.7	-1.4	-0.8
OME	-1.6	-2.0	0.0	2.0	0.6	0.4	0.8	-4.0	0.1	0.1	0.9	-0.2	0.3	-0.3	4.6	20.1	-0.1	0.0	-0.1
OMF	-1.7	-1.7	0.5	0.7	1.1	1.0	1.2	-1.8	0.4	-0.2	0.7	-1.0	0.1	0.0	-3.2	-12.1	0.2	0.6	0.1
EGW	8.1	-4.1	2.9	-1.7	0.2	-1.1	-0.8	59.7	118.4	4.7	-2.0	-3.8	-8.0	0.2	7.4	119.0	0.2	-0.1	-0.5
CNS	0.9	-1.4	-0.2	22.3	0.4	0.8	0.0	8.0	20.2	-0.3	3.3	5.2	0.0	-0.3	0.2	-7.6	-0.2	-0.2	-0.2
TRO	-1.0	-0.7	1.0	-0.4	0.9	0.8	1.5	-20.1	-4.9	0.4	0.4	-3.8	-5.2	-0.1	-7.5	-17.6	0.4	0.7	0.5
OBS	-1.5	-0.4	0.6	1.1	0.9	0.9	0.9	-7.7	-0.7	0.1	3.1	1.1	-4.7	-0.1	-1.8	-4.7	0.2	0.3	0.3
AWT	0.1	-1.3	0.8	5.0	1.2	0.6	0.2	-4.6	7.0	0.1	1.0	1.1	6.7	0.4	-4.4	-14.3	-0.1	-0.1	0.1
CMN	-1.5	-0.3	0.3	17.6	0.2	0.8	1.8	-4.7	0.2	0.0	14.3	8.0	-4.6	-0.6	-0.2	14.5	0.1	0.0	0.1
FNS	-2.1	0.2	0.8	3.2	0.8	0.6	1.2	-16.8	-8.1	0.2	2.6	-2.3	-2.3	-0.2	-8.0	-12.8	0.3	0.4	0.4
ROS	-0.7	-1.2	0.7	-0.4	0.6	8.3	0.9	-7.8	-2.1	0.2	-0.6	-1.4	-5.3	-0.5	-3.3	-19.0	0.4	0.1	0.4
OSG	-1.7	-1.2	0.7	-0.2	0.6	0.6	0.9	-7.7	0.9	0.3	0.2	-2.2	-5.6	0.0	-4.7	-11.6	0.2	0.4	0.3
DWE	-3.9	-2.0	1.8	-4.7	1.7	1.0	1.9	-22.8	-12.3	1.0	-3.7	-3.9	-11.3	-0.4	-9.1	-18.1	0.8	1.2	1.0

Source: Own elaboration.

**Table 8. Simulation results: Effects on sectoral imports**  
(% change from benchmark)

Sector	Australia	New Zealand	China	Hong Kong	Japan	South Korea	Taiwan	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Bangladesh	India	Pakistan	Europe	United States	Rest of the world
AGR	3.8	13.4	-2.1	2.3	-1.0	0.3	-1.3	27.4	17.7	-2.3	2.4	3.2	10.7	-2.9	17.5	22.8	-0.4	-0.7	-1.2
MIN	0.3	0.9	-1.3	0.9	-0.2	0.4	0.0	15.2	13.6	-0.1	3.0	2.9	32.2	-0.8	2.8	15.7	-0.2	-1.0	0.1
FBT	4.8	-2.9	-1.9	3.1	-1.6	-1.0	-1.0	31.4	10.8	-1.3	3.4	2.9	8.7	-3.5	12.7	32.1	-0.3	-1.3	-0.9
TWL	2.9	2.8	-0.9	4.1	-0.2	0.9	0.3	17.1	10.2	-0.1	3.8	4.1	10.6	-0.4	17.0	33.6	-0.1	-0.1	-0.3
WPP	2.9	2.4	-1.1	3.1	-1.0	0.1	-0.5	11.5	4.4	-0.5	2.8	3.0	6.1	-0.6	10.1	19.3	-0.1	-0.8	-0.2
PTR	0.8	0.1	-1.6	3.3	-0.9	-0.2	-0.7	12.5	8.6	-0.7	2.2	4.4	8.4	-0.5	9.0	17.4	-0.3	-0.8	-0.9
BPH	0.9	2.5	-0.3	-2.2	-0.6	-0.1	-0.3	14.5	11.7	0.1	1.6	2.3	6.1	-0.1	5.1	22.6	0.0	-0.2	-0.1
CRP	-1.8	3.0	-0.5	2.3	0.3	0.7	0.4	22.4	5.2	0.0	1.9	0.5	5.3	0.0	4.6	4.0	-0.1	-0.6	-0.1
MTL	3.5	3.1	1.5	2.1	1.9	0.4	0.9	-31.3	0.3	0.5	1.8	1.0	-1.8	2.5	3.5	-9.3	-0.1	0.1	0.2
MVO	-0.4	1.3	0.2	0.4	0.0	-0.6	-0.1	15.1	3.0	0.4	0.9	0.4	5.0	2.7	-19.1	-2.9	0.0	0.4	0.2
EEQ	1.7	1.6	0.4	2.5	0.4	0.2	0.1	-6.9	2.6	0.0	1.2	1.4	5.1	0.6	-20.5	-12.4	0.0	1.0	0.2
OME	1.2	1.5	0.0	1.1	-0.8	-0.1	-0.4	3.6	1.7	0.0	0.8	1.0	3.4	0.2	-2.5	-1.0	0.0	0.0	0.0
OMF	2.5	2.2	-0.6	2.8	-1.0	-0.4	-1.1	8.0	4.6	0.1	2.2	2.1	7.1	0.0	7.0	30.6	-0.2	-0.6	-0.2
EGW	-8.5	12.2	1.8	6.9	0.5	3.8	0.5	-50.4	-68.9	-5.6	9.2	9.0	36.6	2.7	-7.1	-66.0	0.3	0.5	1.5
CNS	0.8	3.6	0.8	-23.2	-0.2	-1.2	0.0	-13.7	-26.2	1.6	-3.3	-8.0	2.0	1.0	0.6	19.1	0.7	1.2	0.8
TRO	4.7	3.7	-1.4	4.9	-1.6	-1.0	-2.1	62.6	23.1	-0.6	2.7	9.2	19.0	-1.0	21.4	51.1	-0.6	-1.1	-0.8
OBS	4.4	2.6	-0.8	2.6	-1.1	-0.6	-1.1	13.4	8.2	0.0	0.9	3.1	11.1	0.1	7.4	10.4	-0.1	-0.2	-0.3
AWT	2.3	3.3	-1.2	-1.3	-1.2	-0.1	-0.7	26.0	0.6	-0.2	1.8	2.5	2.5	-0.7	12.6	41.4	0.0	0.2	-0.3
CMN	4.8	2.5	-0.3	-14.3	-0.7	-0.2	-2.4	24.6	9.4	0.4	-10.5	-4.4	16.0	0.8	6.5	-5.6	0.2	0.5	0.2
FNS	6.2	2.1	-0.9	0.2	-1.1	-0.4	-1.4	52.3	28.6	0.2	1.7	6.4	9.5	-0.2	23.5	35.4	0.0	-0.4	-0.4
ROS	3.6	4.0	-0.9	6.2	-0.9	-8.0	-1.1	29.6	12.3	-0.1	2.8	6.0	11.1	0.7	9.7	54.7	-0.3	-0.3	-0.4
OSG	5.4	3.3	-1.3	0.3	-1.2	-0.8	-1.0	25.5	5.7	-0.4	2.9	6.0	14.6	-0.1	14.0	29.1	-0.4	-0.6	-0.5
DWE	9.4	5.4	-3.0	12.2	-2.4	-1.2	-1.3	57.2	34.1	-0.9	8.7	9.2	26.5	-0.8	18.9	47.0	-1.3	-1.6	-1.7

Source: Own elaboration.