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**The Foreign Direct Investment variables and its Impact on Economic Growth in China**

Master Thesis

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Work Submission Date \_\_\_\_\_

Registration No. \_\_\_\_\_

2020

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## **Abbreviations List**

**GDP – Gross Domestic Product**

**FDI – Foreign Direct Investment**

**TNCS – Transnational Corporations**

**MNCS - Multinational Corporation**

## **Introduction**

**Topic relevance.** Recently, China has become one of the most outstanding developing countries with a high GDP in the world. Foreign investment plays a significant role in China's economic growth. Foreign direct investment (FDI) acts as an engine, driving various kinds of economies to grow rapidly in a short period. A large amount of foreign investment in China has a significant impact to the overall economy and GDP, which strengthens the infrastructure construction of special economic zones, and provides a favorable investment environment for foreign investors.

Economic growth provides a long-term profit. In other words, economic growth means the country is earning money. Successful companies expand their market shares by investing outward and seeking for new potential markets. Before investing a foreign market, a foreign investor needs to consider a lot of factors. Those motives of foreign investors when choosing a country for their investments are diverse: searching for new markets, seeking for new opportunities, occupying early markets, and digging out new corporations. They are aiming at production efficiency, assessing whether there is a natural resource or whether there is an opportunity to increase wealth.

The need to ensure the sustainability and efficiency of the national economy requires the identification and use of conditions and laws inherent in advanced modeling of socio-economic relations. Research shows that the creation of an attractive investment environment occupies a special place in the contemporary terms of globalization, among the dominant factors influencing the development of the national economy. Foreign direct investment promotes the development of China's regional economy, but the unbalanced distribution among regions intensifies the uneven development of the local economy. Besides, female population growth, different industry market value, and foreign direct investment from foreign companies affect those opinions of foreign investors.

**The object of the paper** – foreign direct investments in China.

**The goal and purpose of the paper** - based on the cross-sectional data, this paper examines what factors attract the FDI of China, and how FDI impacts China's economic growth.

**Objectives** in the paper are as follows:

1. Following an analysis of the scientific literature, this essay will disclose the concepts of foreign direct investment and economic growth. After that, this thesis will provide its classification.
2. This thesis will explore the theories and factors of foreign direct investment. It will also analyze the economic growth from a theoretical point of view.
3. Following a study of the scientific literature, this thesis discloses the relationship between foreign direct investments and economic growth.
4. This thesis offers methodology for research on the importance of foreign direct investment in China's economic growth.
5. This thesis examines what factors attract FDI to China, and how FDI impacts China's economic growth.

**Study hypotheses:** (i) inward FDI influences the real GDP of China (and its determinants) positively; (ii) GDP value-added for each industry of China is influenced by inward FDI differently and attract inward FDI to China on a different scale; (iii) the international trade of the enterprises owned by foreign capital attract inward FDI to China and is influenced by it at the same time.

**Research methods.** The research methods used in work are the analysis of systemic scientific literature, purposes of comparison and aggregation, structuring of data, grouping, comparing and interpreting the results obtained, and analysis of the relative indicators. Through analyzing the linear data table analysis and point distribution diagram analysis, the paired and correlated linear regression analysis of FDI and regional relationship in China in the long history was conducted.

**Work structure.**

**In the first chapter (the theoretical part),** various theoretical hypotheses on the impact of FDI on China's regional economic development are analyzed, as well as numerous research sources, legal and scientific literature.

**In the second chapter,** in the methodological section, the research methodology is provided.

**The third chapter** is an empirical study that assesses the attractiveness of China's investment climate means analyzing China's macroeconomic indicators. The influence of international trade and foreign direct investment on China's regional economic development is examined.

Work volume - <58> pages. The literature used consists of <72> sources.

# **1. Foreign direct investment and its influence on economic growth in China**

## **1.1. The theoretical aspects of foreign direct investment**

### *1.1.1. The notion and the theoretical framework of foreign direct investment*

Almfraji, M. A., & Almsafir, M. K. (2014) indicate that Foreign Direct Investment (FDI) is one of the international business-extensive activities, which is resulted from the market internationalization that encourages firms' diverse approaches to international business. Also, they noticed that the International Monetary Fund (IMF) defined the FDI as the investment that involves a long-term relationship reflecting a lasting interest of a resident entity in one economy (direct investor) in an entity resident in an economy other than that of the investor. According to the World Bank, FDI refers to the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise, operating in an economy other than that of the investor and can be further developed as the sum of equity capital, reinvestment of earnings, other long term capital, and short-term capital as shown in the balance of payments in that economy.

There are a lot of and different descriptions of FDI that one can find in the scientific literature (for example, see Table 1). But, in general, FDI refers to the investment by foreign enterprises, economic organizations or individuals in establishing wholly foreign-owned enterprises, jointly holding sino-foreign joint ventures, joint ventures or cooperative development of resources with enterprises or resident economic organizations, and projects approved by relevant government departments, by relevant policies and regulations of the local government.

Despite the abundance of FDI descriptions provided by various authors, the author prefers the OECD benchmark definition of FDI: Foreign Direct Investment is “a category of cross-border investment made by a resident in one economy (the direct investor) to establish a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than of the direct investor” (OECD, 2009). The primary goal of the direct investor is a significant effect on the management of the direct investment enterprise (Grace, G. (2019).

**Table 1. The description of FDI**

<b>Sources</b>	<b>Citation</b>
Griffin & Pustay, 2007	FDI is regarded as the ownership or control of 10 percent or more of an enterprise's voting securities or the equivalent interest in an unincorporated business.
Farrell (2008)	defined FDI as a package of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market.
Maskus (2002) Haile & Assefa (2006)	From a theoretical viewpoint, FDI can be divided into two categories: Horizontal and Vertical. Horizontal FDI (HFDI) is a type of investment which is in the same industry operating abroad as a firm operate, or offers the same services as it does at home, and tends to produce for local or original markets only without exporting much output to host country.
Botrić & Škuflić (2006).	It seeks to take advantages of a new large market, which is considered as traditional motive for FDI. It is widely used by Japanese MNE's in their international expansion because they believe that this model will help to reduce the risk and enable them to share experience, resources, and acknowledgment that already have developed at home.
Mariotti et al. (2003)	stated that FDI inflows to advanced countries are usually horizontal investments driven by market seeking strategies.
Botrić & Škuflić (2006)	HFDI replicates the whole production process of the home country in a foreign country.

*Source: Collected by the author*

With his OLI Model, John H. Dunning explains the incentives that are behind the firms' decision to invest in a foreign country. It states that firms look for advantages that investment might provide as follows: ownership-specific, location, and internationalization pros (Grace, G. (2019).

Firstly, the ownership-specific advantage means the comparative advantages that a firm might exploit in production activity outside the home country: usually more significant comparative advantages result in higher investment inflows to the foreign country. The comparative advantages might arise from advantages related to economies of scale, skills of organization and management, capital, technology, and marketing.

Secondly, location-specific advantages explain the advantages that might be specific to a host country that attracts the firm's investment. These advantages may be related to cheaper available



endowment factors (capital and labor), the potential markets of the host country, their size, macroeconomics perspectives, infrastructure development, taxes, etc.

Lastly, internalization advantages mean the benefits of that country's firms may obtain from foreign partnership agreements. In the host country, foreign investors can join firms in building and exploiting the main competencies, developing production-related activities. Thus, internalization advantages explain how firms operate in a foreign country.

Grace, G. (2019) explains that in terms of motivation, Dunning proposed a famous taxonomy of FDI motivations. He asserts several motives that affect foreign investors when investing abroad: market seeking, resource seeking, efficiency-seeking, and strategic asset seeking. Abumangosha, S. M. (2014) reports that all of these motivation categories were included in the World Investment Report (1998). All these motivations must be addressed by the government's policies, the host country that seeks to attract more FDI (see Table 2).

The market-seeking motivation is behind those investors that look for a bigger market size for their sales expansion by investing abroad. In many cases, FDI grants investors broader markets by entering mergers or acquisition contracts with the distributors or producers of the host country. Such FDI reduces transportation costs because production and marketing activities being in the same area. Therefore, market size becomes important for FDI investors.

The resource-seeking investors look for extraction and processing of natural resources. Therefore, the FDI might be attracted by the supply of various resources: natural, human, and power that are cheaper or abundant in the host country.

The strategic asset-seeking multinational enterprise's (MNE's) investment motivation is to obtain or create new technology. Therefore, a host country that is concerned with research and development can attract foreign investors who are focused on strategic asset seeking

The efficiency-driven FDI is attracted by production costs in terms of labor, taxes, and physical infrastructure. Such investors aim for increasing their comparative advantage by reducing production costs. Therefore, the more competitive the recipient countries in the global market, the higher flows of FDI they can attract. There are a lot of factors that influence efficiency-seeking

investors - for example, trade openness, infrastructure, inflation, real interest rates, and human capital.

**Table 2. The description of FDI**

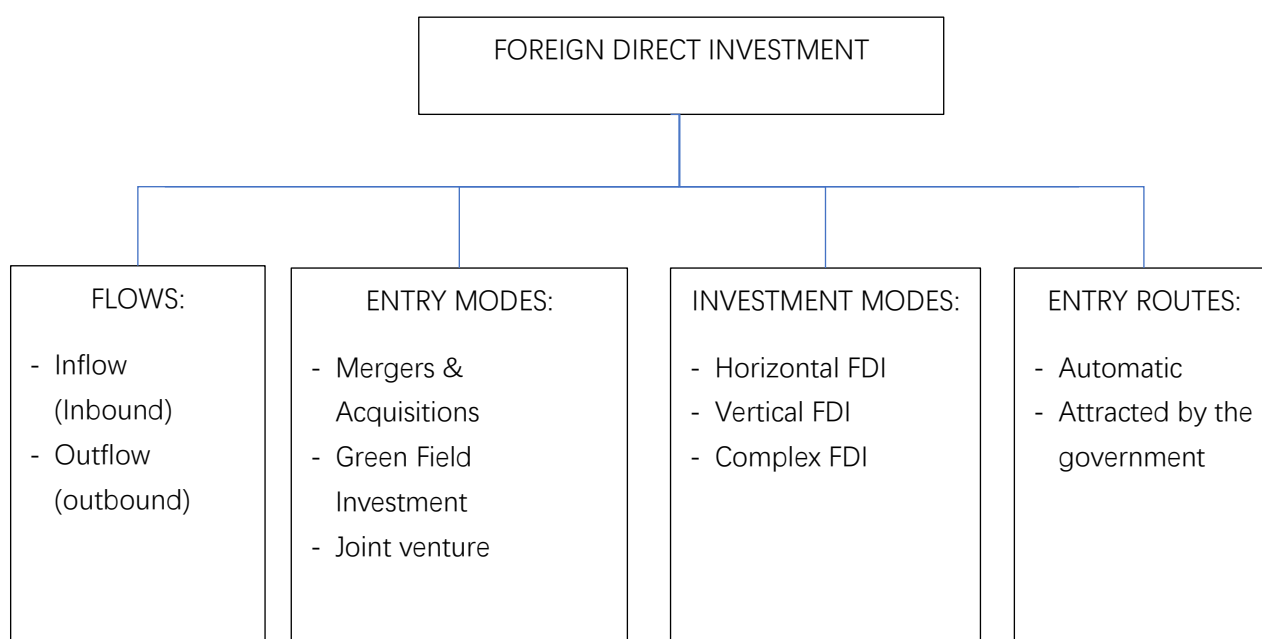
Host country determinants	Type of FDI classified by motives of TNCs	Principal economic determinants in host countries
<p>I. Policy framework for FDI</p> <ul style="list-style-type: none"> <li>• economic, political and social stability</li> <li>• rules regarding entry and operations</li> <li>• standards of treatment of foreign affiliates</li> <li>• policies on functioning and structure of markets (especially competition and M&amp;A policies)</li> <li>• international agreements on FDI</li> <li>• privatization policy</li> <li>• trade policy (tariffs and NTBs) and coherence of FDI and trade policies</li> <li>• tax policy</li> </ul> <p>II. Economic determinants</p> <p>III. Business facilitation</p> <ul style="list-style-type: none"> <li>• investment promotion (including image-building and investment-generating activities and investment-facilitation services)</li> <li>• investment incentives</li> <li>• hassle costs (related to corruption, administrative efficiency, etc.)</li> <li>• social amenities (bilingual schools, quality of life, etc.)</li> <li>• after-investment services</li> </ul>	<p>A. Market-seeking</p>	<ul style="list-style-type: none"> <li>• market size and per capita income</li> <li>• market growth</li> <li>• access to regional and global markets</li> <li>• country-specific consumer preferences</li> <li>• structure of markets</li> </ul>
	<p>B. Resource/asset-seeking</p>	<ul style="list-style-type: none"> <li>• raw materials</li> <li>• low-cost unskilled labour</li> <li>• skilled labour</li> <li>• technological, innovatory and other created assets (e.g. brand names), including as embodied in individuals, firms and clusters</li> <li>• physical infrastructure (ports, roads, power, telecommunication)</li> </ul>
	<p>C. Efficiency-seeking</p>	<ul style="list-style-type: none"> <li>• cost of resources and assets listed under B, adjusted for productivity for labour resources</li> <li>• other input costs, e.g. transport and communication costs to/from and within host economy and costs of other intermediate products</li> <li>• membership of a regional integration agreement conducive to the establishment of regional corporate networks</li> </ul>

Source: Abumangosha, S. M. (2014) from the World Investment Report (1998).

Many categories serve well for the classification of FDI (see Figure 1).

Magnier-Watanabe, R., & Lemaire, J. P. (2018) segregate outflow and inflow FDI where the former one is the investments made by the residents in reporting country broad, and later one means the value of investment made by non-resident investors in the host country. Also, “*the inflow FDI can be broadly segmented into vertical and horizontal investments. The former are investments where firms locate different stages of production in different countries and the latter where multi-plant firms duplicate roughly the same activities in multiple countries. There are*

*fundamentally three arguments whereby FDI is considered to be a source of great benefits to those countries that can attract it. First, unlike international portfolio investment, FDI can bring in much-needed resources and methods in the form of know-how, technology, and products, into the recipient country, and these investments are committed for the long term. Second, inbound FDI has been found to increase employment, output, and productivity. And third, the inbound investment provides a measure of openness which itself is an engine for growth. Also, because inbound FDI means production at home, it can decrease imports, boost exports, and eventually shape up the recipient country's balance of payments”.*



**Figure 1.** Types of foreign direct investment

Source: created by the author

Considering the entry modes, Herrmann, P., & Datta, D. K. (2006) report that there are three types of them: mergers & acquisitions; greenfield investment, and joint ventures. Firms may consider doing they prefer acquiring a local firm or just want to start “*from scratch*” themselves. The former choice is more preferable when the firm expects to gain some knowledge or resources together with management control. Though, the latter one is more suitable for firms that are more confident with their competence and readiness to enter the host country. When each of two or more companies has what is needed for successful market entry, they can choose the joint venture model.

In summary, FDI is a sophisticated establishment of operations in a foreign country by transferring funds to and acquiring property sometimes together with the acquisition of management control of a business entity in the host country. Not surprisingly, many theories try to explain the phenomena of FDI.

*1.1.2. The theories behind the inward foreign direct investment.*

In his dissertation, Abumangosha, S. M. (2014) examines the classic FDI theories “*that give FDI its unique features as a process not only of transfer of capital but also a transfer of the firm-specific advantages such as technology and skills*”. They are as follows: industrial organization theory, product life cycle theory, internationalization theory, international production theory, FDI motives.

Firstly “*since the introduction of Stephen Hymer’s contribution and Industrial Organization theory, economists have tried to find key answers that can lead them to understand the motives of local companies to extend their products internationally. Concerning the earlier attempts that aimed to explain the post-war FDI phenomenon, the contribution of Hymer’s thesis underlies the foundations to most theoretical attempts that aim to provide a better understanding of multinational production activities*” (Abumangosha, S. M., 2014).

Hymer assumes that it is the possibility of obtaining the monopolistic advantages that drive the firm’s decision of investing abroad, i.e. “*it is a strategy to capitalize on certain capabilities not shared by other competitors in foreign countries*” (Abumangosha, S. M., 2014). Firms might look for product differentiation (including branding), special marketing skills, or even horizontal or vertical collusion. Also, the possibility to acquire access to capital markets and technology protected by patents or to reach economies of scale can motivate firms.

Secondly, the theory of Product Life Cycle (PLC) employs the concept of comparative advantage: it explains investment in a foreign country following the approach of comparative costs. Actually, “*PLC gave to the international business scholarship a dynamic location aspect, which was absent in the work of Hymer*” (Abumangosha, S. M., 2014).

Thirdly, since 1937 when Coase published his seminal work on transaction cost theory, it has been used to explain the internationalization of production and the existence of multinational enterprises. The internationalization theory, as it is now, was established by Buckley and Casson (1976), where they offered the insight that the internationalization of production is not separable from the notion of the firm. In opposite, the internationalization of production is the core firm's essence. They saw the MNEs "*as a particular case of a firm that has internalized (by owning and controlling) operations across national borders. The internalization theory of the MNEs, as developed by Buckley and Casson (1976), <...> rests on three principles* (Abumangosha, S. M., 2014).:

- *The boundaries of a firm are set at the margin, where the benefits of further internalization of markets are just offset by the costs.*
- *Firms seek out the least cost location for each activity, taking its linkages with other activities into account.*
- *The firm's profitability, and the dynamics of its growth, is based on a continuous process of innovation stemming from R&D.*

Finally, both the International Production Theory (Dunning's OLI model) and FDI Motives were established by Dunning. In this paper, these theories were approached earlier.

In summary, all these theories that explain FDI phenomena reveal many variables that might influence inward investments in foreign countries. The most important of them are worthy of more detailed examination that follows in the coming chapter of this paper.

### *1.1.3. The determinants of inward foreign direct investment.*

Many authors have been empirically investigating the factor of determining FDI to understand what factors determine, i.e. are relevant in FDI activity (Rodriguez and Pallas, 2008; Kumari and Sharma, 2017).

In the literature, there is no consensus on what factors should be treated as determinants of the inbound FDI. However, the author has chosen to follow the approach offered by Mengistu and

Adhikary (2011). The main reason behind this choice was that their primary focus had been on the determinants of FDI in developing countries. They distinguished the most relevant FDI determinants as follows: market size, trade openness, infrastructure, inflation, interest rates, research and development (R&D), and human capital. Abumangosha, S. M. (2014) stresses that all these variables are available and observable. *“They can be categorized as location-specific advantages of the destination country because location-specific advantages are concerned with the specific advantages of the country to attract MNEs from other countries to enter and invest in the host country”*.

**Market Size.** The primary indicator of a country’s economic size is the real gross domestic product (GDP) that shows the value of all goods and services produced. The broader the market size, the more potential buyers of a product or service. This factor is essential for investors with market-seeking incentives.

**Trade Openness.** In the Asia-Pacific Trade and Investment Report (2015) countries, openness to trade is *“essential for the growth, job vacancies, and poverty reduction of the country. Trade creates new market opportunities for local firms, stronger productivity, and innovation through competition. Therefore, some scholars have claimed how important a country’s openness is to encourage foreign investors”*. Abumangosha, S. M. (2014) reports that *“most of the studies showed that the openness of trade gives a positive effect on FDI. This conclusion was not only found in cross-country studies but also at a regional level”*.

**Infrastructure.** Vijayakumar, N. & others (2010) express their conviction that well established and quality infrastructure is an essential determinant of FDI flows. It is vital because infrastructure facilitates both product distribution and production processes by minimization of operation costs (Abumangosha, S. M., 2014).

**Human Capital.** Facing an increasing level of technology in production, countries are in increasing need of a labor force that is capable of dealing with it. Therefore, the skills of workers are critical to support technological innovation and inward FDI. In other words, the quality of human capital heavily depends on the education level in the host country. There are three measurements as indicators of workers’ education levels: (i) the percentage of the population with

at least elementary school education, (ii) the percentage of the people with at least junior secondary school education, and (iii) the percentage of the population with at least senior secondary school education.

**Research and Development (R&D).** *“Since globalization, most of the countries must deal with global competition, which forces them to reach a higher performance level each day. Countries with good R&D tend to have many innovations that create a high level of performance from the country. R&D can help a country to attain better technology capacity and more products. Hence, the author asserted that R&D is an important aspect to lead a country to become more competitive and innovative. <...> In summary, the differences between proxies, periods, and observations of countries can lead to different results in terms of the relationship between R&D and FDI”* (Abumangosha, S. M., 2014).

**Inflation Rates.** Inflation is strongly related to the concept of economic stability and growth. *“When the inflation rate is high, the country can be categorized as a risky country and give a lower return on investment for investors. Since most of the foreign investors want to get a high return on investment, a country with a low inflation rate is more attractive than a country with a high inflation rate”* (Abumangosha, S. M., 2014). Therefore, the inflation rate is a crucial factor in encouraging FDI.

**Real Interest Rates.** Abumangosha, S. M. (2014) thinks that *“real interest rates are usually used as the measurement of how credible a country’s economic policy is for investors. The interest rate is also used to predict the future economics of the country, including policy changes”*.

In summary, there a lot of factors that determine FDI in the host country. Some of them may be more general, while others are more country-specific, i.e. relevant in some specific countries only. Though there is no consensus on FDI determinants, in general, there is the conviction that FDI is one of the economic growth determinants itself.

## **1.2. The inward FDI as a determinant of economic growth**

### *1.2.1. The notion and the theories, and models of economic growth*

Economic growth refers to the growth rate of a country's gross domestic product in the current year compared with the previous year. Economic growth means the expansion of the potential productivity of goods and services needed by the members of an economic system to live within a certain period (i.e., the outward expansion of the production possibility curve).

According to other authors, the growth of an economy is the renewal or increase of production capacity, which is due to technological development, as a result of the growth of labor productivity (Parkin, M., 2005; Romer, D., 2012; Hess, 2013; Cuaresma, J. C. et al, 2014). In general, economic growth is an increase in production levels and an improvement in technology, i.e. qualitative and quantitative increases in productive resources.

Economic growth is an increase in an economy's production of goods and services (Svennilson, Ingvar, 1961). Economic growth has been based on technological progress and the required institutional and ideological adjustments, the ability and long-term improvement to provide an increasingly diverse range of goods to the population.

Besides the production approach to economic growth, one could consider it from the perspective of income. Economic growth means that the real income of economic entities is growing too (Bennet, D. L., Vedder, R. K., 2013).

Economic growth is only the part of economic development, i.e. the later one is a much broader concept covering an improvement in the quality of life and living standards (Dollar, D. et al, 2013).

The main and most popular indicator of the economy is the inflation-adjusted Real Gross Domestic Product (GDP). Its growth rate per given period is the main indicator of economic growth.

More specifically, GDP is a macroeconomic indicator to measure a country's total economic expenditure. It refers to the total market value of all final products and services produced within a country (or region) within a certain period. According to GDP: (i) is a concept of market value; (ii) measures the value of the final product; (iii) is the value of the final product produced over a while (usually a year) rather than sold; (iv) is flowing, not stock; (v) is the market value of the final products produced within a country, which is a regional concept; (vi) refers only to the value of economic activity in the market.



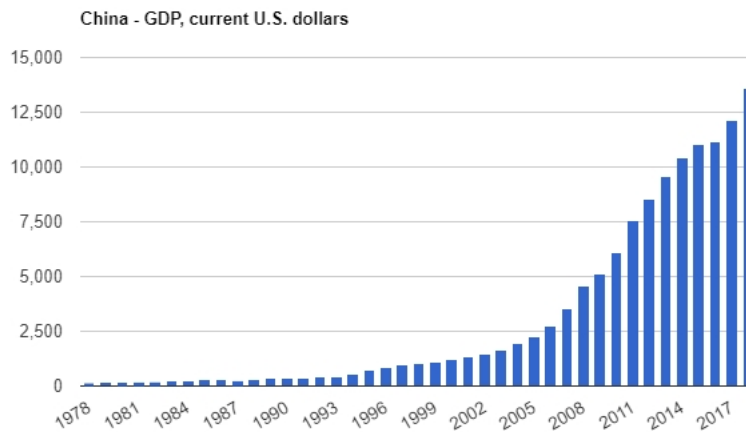
There are three main methods to calculate the normal GDP, namely the production method, the expenditure method, and the income method. The calculation formula is as follows:  $GDP=C+I+G+(x-m)$ , where C is consumption expenditure, I is investment expenditure, G is government purchase expenditure, and (x-m) is net export.

Real GDP per capita is one of the important indicators to measure macroeconomic development, and it is an effective tool for people to understand and grasp the actual macroeconomic operation. Per capita GDP is calculated by comparing the realized real GDP with the actual resident population in the accounting period (usually one year). It is a measure of people's real living standards, often combined with purchasing power parity for more objective measures.

The goal of economic growth is the ultimate goal of the central bank's monetary policy. The goal of economic growth requires the gross national product or per capita GROSS national product to be maintained at a high level of growth, without decline or stagnation, to improve the country's economic strength. The economic growth target depends on the specific situation of each country. For example, China's economic growth target for 2019 is 6.0-6.5%. Developing countries generally have higher growth targets.

According to economic growth rarely is smooth, i.e. in most countries, it goes in cycles.

**The business cycle**, also known as the economic cycle or trade cycle, is the downward and upward movement of gross domestic product (GDP) around its long-term growth trend. The length of a business cycle is the period containing a single boom and contraction in sequence. These fluctuations typically involve shifts over time between periods of relatively rapid economic growth (expansions or booms) and periods of relative stagnation or decline (contractions or recessions) (Madhani, P. M., 2010).



Source: TheGlobalEconomy.com, The World Bank

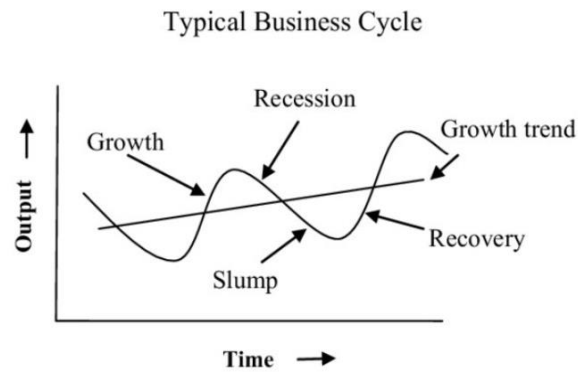
**Figure 2.** China’s nominal GDP

Source: The World Bank

According to business cycle generally refers to the regular expansion and contraction of economic activities along with the overall trend of economic development. It is the fluctuation of gross national output, total income, and total employment, and the alternation or cyclical fluctuation of expansion and contraction of national income or overall economic activity. In the past, it was divided into four stages: boom, recession, depression, and recovery. In the picture, it is more vividly called recession, trough, expansion, and peak, which is also the commonly used name now.

In these four stages, prosperity and depression are the two main stages, the recession and recovery are two transitional phases.

Recession phases: the phase started in the peak of the economic cycle when the economy is running after the peak, this time will gradually decline began shrinking market demand, thus causing supply exceeds demand, the enterprise's profitability is weak, declining margins, along with the commodities, the overall level of prices began falling, lead to enterprise product circulation rate is low, a large number of the product backlog, so that economic growth has slowed or even stagnation.



**Figure 3.** Types of foreign direct investment

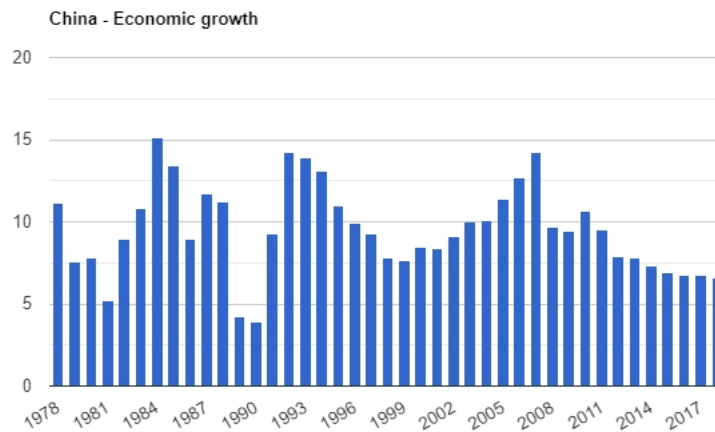
Source: Madhani, P. M. (2015)

Depression stage: the stage of the supply and demand are at lower levels, especially economic outlook is also lost, the social demand, industries and the unemployment rate at a higher level in this case, usually the government's macroeconomic regulation and control some effect will gradually appear, gradually reducing the social panic, so that the people's confidence in the future gradually restored, then the whole social economy began showing signs of recovery after a dip.

Recovery stage: the recession, so the government through a series of control measures to stimulate the economic development, the control effect is preliminarily revealed, when the economy starts to recover, demand begins to release, production gradually active, stabilizing price level and at the same time, the growth rate of GDP may be rising into the interval from negative to positive, from slow to fast, and gradually improve because the enterprises spare production capacity is not fully released, the expansion of the periodic also become strong, so at this stage, corporate profits began to surge in.

Boom: A period in which the demand for investment and consumption continues to expand beyond the output growth so that the price of stimulus products rises rapidly to a higher level and employment is higher.

China-economic growth (1978-2017) in terms of real GDP growth rates???



Source: TheGlobalEconomy.com, The World Bank

**Figure 4.** Real GDP growth of China

Source: The World Bank

**The theories of economic growth.** The following theories of economic growth are distinguished in the scientific literature: (i) the Classical theory of economic growth; (ii) the Neo-Classical theory of economic growth; (iii) the Keynesian economics; (iv) the new theory of economic growth.

**The Classical theory of economic growth** is a theory based on the view that population growth is determined by the level of income per capita.

**The Neo-Classical theory of economic growth** is a theory that explains how savings, investment, and economic growth respond to population growth and technological change.

**In Keynesian and post-Keynesian economics** economic growth is a function of the investment process, where investments are at the same time a source of demand for goods and services and an increase in their ability to produce them. The focus is on the dual role of investment and savings as part of total demand and as part of the development of core capital.

**The new theory of economic growth** is a theory that technological change is taking place because of the choices of people making the most of their profits.

However, foreign direct investment (FDI) is an important vehicle for economic development

as far as the developing nations are concerned. It has a key impact on the country's trade balance, increasing labor standards and skills, transfer of technology and innovative ideas, skills, and the general business climate (Lenka, S. K., & Sharma, P., 2014).

### *1.2.2. FDI and other determinants of economic growth*

Productivity growth is mainly determined by a country's natural resource endowment, the quantitative accumulation and quality improvement of real capital, the accumulation of human capital, the improvement of technological level, and the improvement of the institutional environment. Economic growth, therefore, also implies the expansion and improvement of many factors that determine productivity. Proponents of economic growth argue that it can increase a country's wealth and create more jobs. Positive growth is generally considered a sign of an overall good economy.

Here is a brief list of some of the factors that influence economic growth.

One is **the amount of investment**. In general, the amount of investment is proportional to economic growth. The second is the amount of labor. The number of workers is in direct proportion to economic growth when the number and structure of the means of production are in line with them; Third, productivity. Productivity refers to the efficiency of utilization of resources (including manpower, material resources, and financial resources).

**Higher productivity** also contributes directly to economic growth. The contribution of the above three factors to economic growth is different in different countries or at different stages of economic development. In economically developed countries or stages, productivity improvement makes a greater contribution to economic growth. In economically backward countries or stages, the increase of capital input and labor input contributes more to economic growth. Besides, technological progress plays an enormous role in economic growth. Science and technology are the productive forces of knowledge form, once it is added into the production process, it will be transformed into material productive forces.

**Science and technology** play a decisive role in the development of contemporary productive forces, and technological progress has become the primary factor to promote economic growth. Technological progress promotes economic growth in two ways: first, technological progress enhances productivity and promotes economic growth through the penetration and influence of the three factors of productivity; Second, independent industries formed based on high technology, whose output value directly becomes a component of the GROSS national product and an important source of economic growth.

According to Barro, R. J. (1996), *“while there is yet no consensus on the relationship between foreign direct investment (FDI) and growth, there is a growing view in recent years that FDI is positively correlated with growth. Theoretically, this view has been bolstered by recent development in growth theory, which highlights the importance of improvements in technology, efficiency, and productivity in stimulating growth. In this regard, FDI’s contribution to growth comes through its role as a conduit for transferring advanced technology from the industrialized to the developing economies. For the host country through a “contagion” effect from the more advanced technology and management practices used by foreign firms.*

Table3. The factors of economic growth

<b>Factor in economic growth</b>	<b>Examples</b>
Human resources	Size of labour force Education, skills, discipline
Natural resources	Oil and gas Soils and climate
Capital formation	Equipment and factories Social overhead capital
Technology and entrepreneurship	Quality of scientific and engineering knowledge Managerial know-how Rewards for innovation

Source:www.economicdiscussion.net(Economic Growth of a Country: 4 Main Sources)

*This contagion or knowledge diffusion (often referred to as externalities or efficiency “spillovers”) can lead to improvements in productivity and efficiency in local firms in several ways. In its simplest form, a spillover can occur when a local firm improves its productivity by copying some technology used by multinational affiliates/corporation (MNC) in the local market. Another type occurs when local firms are forced to use existing technology and resources more efficiently or to search for more efficient technologies because of an MNC’s entry as increased competitive pressure in the local market. Besides, spillovers can occur when an affiliate demonstrates new techniques and trains local workers, who later accept employment in local firms or start their firms”.*

In their literature review, Boldeanu, F. T., & Constantinescu, L. (2015) confirms that “*FDI inflows have a positive impact on the economy and can accelerate the rhythm of economic growth, especially in developing countries. By enabling positive externalities like the diffusion of know-how and new technology, FDI can have a direct impact in the sectors in which these funds were allocated, but also an indirect impact on the whole productivity in the economy*”.

The impact of FDI on the economic growth of host countries is mainly explained by GDP growth, better use of Labor force, and the adoption of new technologies (Rupliene, Garshnius, 2008). On the one hand, the impact on the economy of countries recognizes and appreciates foreign investment, on the other hand, worried about foreigner's dominance (Kvainauskait é, 2004). The transfer of foreign capital from one country to another may have both positive and negative effects on the country's economy. Improve access to global markets. Foreign investors can transfer sales of goods and services on world markets to one country. The per capita FDI of the eastern municipality directly under the central government was much higher than that of the other three areas (Helpman E., Melitz M., Rubinstein Y., 2008).

The results of short-term effect regression analysis show that the contribution rate of regional per capita FDI to regional per capita GDP is relatively large, and the four major regions are eastern municipality directly under the central government, eastern coastal region, central region, and western region from high to low. It can be said that regional FDI per capita had an obvious pulling effect on the demand of the regional economy in that year, but the effect of each region was

unbalanced, with the eastern municipality directly under the central government being the highest and the western region the lowest. The enterprises of the home country can use the current capital market and financial system of the host country for local financing, to achieve the purpose of indirect utilization of foreign capital. At the same time, home companies can learn their advanced technology and management experience by investing in developed countries. This effective information will improve the level of industry and management in the home country. (Baldwin R. E., Harrigan J., 2009)

FDI is a combination of capital stock, knowledge, and technology. Therefore, its impact on local economic growth should be multifaceted. As a kind of capital stock, the inflow of foreign capital can increase the overall financial resources for investment and alleviate potential development bottlenecks, such as the shortage of savings and foreign exchange. By alleviating these bottlenecks and restrictions, FDI can promote local capital formation and economic growth (Chenery and Strout, 1966).

FDI is also an important source of human capital concentration and technological change in developing countries. In developing countries, general production technology is relatively backward, the quality of employees is poor, and they lack modern management experience and marketing skills. Therefore, foreign direct investment, especially the entry of large multinational companies, will transfer advanced technology, management, and marketing experience to the host country, to improve the production efficiency and factor productivity of the host country. This role of FDI in enhancing the technical efficiency of the domestic sector in host countries can be significant, although it is sometimes difficult to measure (Helleiner, 1989).

FDI can also stimulate the growth of the domestic sector through linkages between industries. This kind of industrial connection includes both forward connection, such as providing intermediate input for local enterprises, and backward connection, such as purchasing input from local enterprises. The demand for induced factors generated by foreign direct investment will generate various demands on the domestic sector, which will have multiplier and acceleration effects on the growth of domestic investment, output, and employment (Jansen, 1995; the sun, 1996).



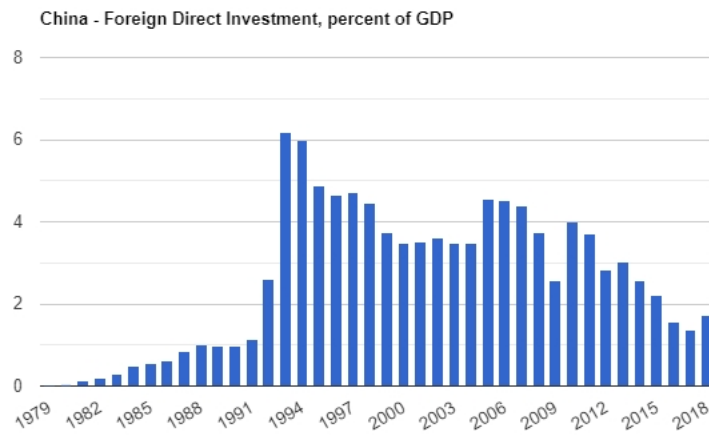
With the continuous promotion of economic globalization, cross-border investment and cross-border M & A are growing rapidly. Many multinational companies began to look for the lowest production cost locations around the world and sell their products around the world. In this new situation, export-oriented FDI is increasing. Therefore, the entry of FDI will also facilitate the host country's access to the international market and increase its exports. This kind of export has a positive impact on the economic growth of the host country. In fact, in the past 20 years, export expansion has become an important driving force for China's rapid economic growth, which is largely driven by foreign investment (foreign-funded enterprises). Because of this, in recent years, the international academic community has conducted a lot of empirical research on the impact of FDI on the economic growth of host countries. For example, Lee, Rana, and Iwasaki (1986) studied the effects of foreign private investment and foreign aid on economic growth and domestic savings in nine Asian developing countries. They found that foreign private investment had an important positive impact on GDP growth, but a less significant positive impact on domestic savings. While foreign aid has an insignificant positive effect on GDP growth and a negative effect on domestic savings. Tu (1990) and Schive (1990), taking Taiwan as an example, examined the impact of FDI on economic growth, private fixed-asset investment, private consumption, and import and export. The results show that FDI promotes the growth of the local economy by stimulating private investment in fixed assets and increasing exports. But there is no significant impact on private consumption and imports. Jansen (1995) found in his research on Thailand that FDI has a direct and strong positive impact on the level of private investment and exports, and through the introduction of new technologies to improve the efficiency of the local economy, resulting in higher economic growth. Athukorala and Menon (1995) found that FDI has played an important role in Malaysia's export-oriented economic growth and employment expansion in the past 20 years. De Mello (1997) believed that the final impact of FDI on the growth of local output depends on the size of the efficiency spillover to domestic companies, which is mainly achieved by increasing the returns to domestic production and the added value of production-related to foreign investment. In the empirical study of China, Kueh (1992) discussed the impact of foreign direct investment on domestic investment, industrial output, and export in China's coastal open areas, and found that foreign investment has made a great contribution to the formation of total capital,

and foreign-invested enterprises have become important industrial producers and exporters in coastal areas. Sun (1998) analyzed the impact of FDI on China's regional economic growth. He believes that foreign direct investment is the most important factor leading to economic growth differences and income inequality between the eastern and western regions since the reform and opening up.

### **1.3. The analysis of empirical research literature on the influence of foreign direct investment in China's economic growth**

#### *1.3.1. China's way to economic growth – an "opening-up" policy*

For China, China's economic development is unique because China has gone through a period of reform and opening up. Reform and opening-up have been a period of rapid economic growth in China, but this is unique to the rest of the world. Since the policy of reform and opening up to China's economic development has been clear, especially the establishment of a market economy, a large number of transnational investments have entered China. China became the world's largest recipient of FDI in 2002. From 1991 to 2003, China's cumulative FDI reached US \$472.4 billion, which significantly promoted the development of China's economy. FDI is not only the flow of capital but also the transfer of technology, technology, and managers' management experience.



Source: TheGlobalEconomy.com, The World Bank

**Figure 5. China-foreign direct investment, percent of GDP (1979-2018)**

Source: The World Bank

Many scholars at home and abroad pay close attention to FDI in China (Cheng, I. K. and Kwan, Y. K., 2000). What are the Determinants of the Location of Foreign Direct Investment? The Chinese Experience analyzes the location determinants of foreign investment in 29 provinces of China from 1985 to 1995 and finds that preferential policies have a significant impact. (Berthelemy, J., and Demurger, S., 2000), the article Foreign Direct Investment and Economic Growth: Theoretical Issues and Empirical Application to China, found that the impact of FDI on Economic Growth far exceeds the effect of the growth of capital stock itself. FDI brings competition to enterprises, forces domestic enterprises to improve labor productivity, and provides an example for local enterprises to improve management level (Borensztein, E., De Gregorio, J., Lee, J.W., 1998).



**Figure 6. Comparison of foreign investment in China and India**

Source: <https://globalwealthprotection.com/china-passes-u-s/>

Therefore, for China during the reform and opening-up period, 2-3% of the economic growth rate should be attributed to the contribution of foreign capital to the Chinese market (Cheng, I. K. and Kwan, Y. K., 2000) about 90% of the difference in GDP growth rate between the developed regions in the east and the backward regions in the west of China is caused by foreign investment. Still, the relationship between FDI and China's technological progress shows a long-term stable equilibrium relationship.

At the same time, some scholars also put forward different views. In *How does a Foreign Direct Investment Affect Economic Growth* (Borensztein, E., De Gregorio, J., Lee, J.W. Lee, J., 1994), these authors emphasized that the amount of FDI in different regions led to the gap between different areas. In a word, FDI has more and more influence on the unbalanced pattern of China's regional economic development. To make better use of the positive impact of FDI on China's local economic development and promote the harmonious development of China's economy, this paper makes an empirical analysis of the effects of international trade and foreign direct investment (FDI) on China's economic growth by using the time series and cross-sectional data of China's economic development.

### *1.3.2. Inward FDI to China's regions*

From the perspective of China's various regions, there are obvious regional differences in China's utilization of FDI. In short, the opening-up policy has led to the regional distribution pattern of FDI. Once the earliest policy areas get preferential policies, they will play a positive role in promoting the potential location advantage of FDI. After the development of a certain region, the formation of an unbalanced development mode will lead to the inclination of FDI policy and further aggravate the difference of FDI between regions in China.

FDI inflows in the current, on the one hand, there is a foreign capital inflow in the domestic capital increment, on the other hand, FDI needs a series of supporting local investment activities, local for enterprises with foreign investment is necessary for the right investment environment, increase energy, transport, and communications infrastructure construction investment, thus promoting domestic investment, add the internal capital formation. Therefore, the current FDI has a prominent "crowding in" effect on the structure of local capital; And when the foreign capital enterprise gradually formed after the production capacity and into the stable development period, often with its in scale, technology, product quality and price, management and marketing advantages in the product market and financial market impact of domestic enterprises, at the same time because of its higher pay and preferential treatment looted by the local enterprise of talents and skilled technical workers, thus to local capital formation should produce particular "crowd out" effect.

FDI has a "net squeeze" effect on capital formation in China. Therefore, to the extent that FDI increases the capital formation and capital accumulation of the host country, and thus increases the input of capital factors in the production of the host country, FDI promotes China's economic growth. Therefore, in terms of foreign investment policy, we should continue to expand the introduction of foreign investment. To better play the role of FDI in promoting China's economic growth, we should try our best to suppress the "crowding out" effect of FDI on domestic capital in the process of introducing foreign capital.

The growth rate of per capita GDP in the four major regions and 30 provinces and cities in China is also very uneven in stages. Still, the difference in the growth rate of per capita GDP in the area is decreasing year by year. From the perspective of the absolute gap, the standard deviation of per capita GDP among the four major regions and the standard deviation of per capita GDP among the 30 provinces and cities in China has been expanding year by year.

From the perspective of the relative gap, the unbalanced economic development between the four regions (name them) is larger than that between the 30 provinces and cities in China. The growth rate of FDI per capita in the four major regions of China is unbalanced at different stages. From 1991 to 2003, the growth rate of FDI per capita in the four major areas showed an unstable characteristic of high growth rate, sharp decline rate, and even growth rate, and the growth rate of FDI per capita in the 30 provinces and cities of China also showed a similar weak characteristic. In the past ten years, the regional gap of China's per capita FDI showed a fluctuating unbalanced feature of expanding, narrowing, and expanding, while the regional imbalance of per capita GDP kept growing, which could be explained by the causal relationship and the difference between variables.

### *1.3.3. Empirical evidence on how the inward FDI influences economic growth in China*

The empirical research literature that focuses on the inward FDI to China can be roughly divided into two categories. The first is to elaborate on the influencing factors of economic growth, mainly FDI, but also other influencing factors. The second is to describe how FDI affects China's economic growth.

In general, the cited references indicate that the main factor affecting economic growth is the inflow of foreign investment.

John WHALLEY and Xian XIN (2010) argue that inward FDI to China's coastal cities has a significant positive impact on the growth of inland cities. Puman Ouyang and ShiheF (2012) see FDI inflows as one of the two key factors in China's economic success. Besides, the rapid rise of China's economy is considered closely related to foreign direct investment. They believe that

FDI increases the complexity of China's products and economy by its better technology, and there is a long-term two-way and short-term one-way causal relationship between economic complexity and FDI. Therefore, FDI is one of the main driving factors to promote China's economic development.

Among the references, FDI has a significant impact on China's economic growth, represented by John WHALLEY and XianXIN (2010) . They believe that foreign enterprises employ less labor force and have higher productivity, thus contributing more to and influencing China's economic growth. In Kevin Honglin Zhan (2014) 's article called How does a foreign direct investment affect industrial competitiveness? Evidence from China, he mentioned that the lower the technical level of enterprises, the more significant the impact of FDI. And when FDI and human capital interact, they promote each other. Besides, in the comparative study on the impact of FDI on the GDP of China and India, scholars found that FDI had a greater impact on China's economy than India's. The individual study of Jiangxi Province in China shows that there is a co-integration relationship between FDI and foreign trade, which has a greater impact on exports than imports.

The other argues that the impact of foreign direct investment (FDI) on China's economy is insignificant and exaggerated. It's much smaller than people think. Jai S.Ah (2010) also believes that FDI has not had a direct impact on China's economic growth, pointing out that China's economic miracle may have occurred for other reasons. For example, Yan QingJiang (2011) believes that China's opening-up has promoted economic growth, and the direct growth effect of opening-up is the main effect, while the convergence effect is not significant.

Besides, a large number of scholars have conducted a series of studies on the spillover effect of FDI. The so-called spillover effect means that when an organization carries out an activity, it will not only produce the expected effect of the activity but also have an impact on people or society outside the organization. In short, it means that the activity should have external benefits that the subject of the activity cannot get. The references mainly provide the analysis of horizontal overflow, reverse overflow, and spatial overflow.

In the article In Search of FDI horizontal spillovers In China: Evidence from meta-analysis, it was mentioned that the average spillovers In China were positive and the effect was quite

significant. Due to the differences in system and technology between foreign-funded enterprises and domestic enterprises, the spillover effects are also different, which leads to the diversity of spillover effects. The other is the study on the reverse spillover of FDI. Hongzhong Fan, Shi He, and Yum K. Kwan (2019) believe that reverse spillover has obvious robustness for various methods and norms and has a significant economic impact. The last one is spatial spillover analysis, which points out that FDI has beneficial effects on the environment and economy, and market potential will promote the substantial growth of the regional economy by controlling the input of labor, capital, and human resources.

#### *1.3.4. Methods employed in the empirical research studies on inward FDI and growth relation*

There are many and different methods used in empirical research literature that focuses on the relation of inward FDI and economic growth.

**Two-stage growth model.** The two-stage growth model is used to analyze the relationship between the FDI economy and non-FDI economy and the sustainability of economic growth in China. The two-stage growth model assumes that there are two stages of enterprise growth. The first stage is the super-normal growth stage, also known as the observation period, whose growth rate is higher than the sustainable growth rate. The prediction period in practice is generally 5 to 7 years. The second stage is the sustainable growth stage, also known as the sustainable period, the growth rate is the normal and stable growth rate.

**Spatial Durbin Model (SDM).** To put it simply, SDM is divided into three parts. First, it is autocorrelated with the space of  $y$  in the adjacent region.  $W$  is the spatial weight matrix, showing that  $Y$  is related to other  $Y$  in the adjacent region. Second, independent variables are related.  $Y$  is related to the independent variable  $X$ , which is the simplest linear regression model. Third, it is spatially autocorrelated with the adjacent region  $X$ .  $Y$  is related to another  $x$ 's in the neighborhood. The spatial Durbin model is used in the analysis of the FDI economy and its environmental impact.

**Principle of maximum entropy.** The principle of maximum entropy is a criterion for probabilistic model learning. The evaluation of a model is based on the entropy, the higher the entropy is, the



better the model is. Therefore, it can be understood that the principle of maximum entropy is to choose the model with the maximum entropy under certain constraints.

**Co-integration test and CVAR.** The purpose of the co-integration test is to determine whether the linear combination of a group of non-stationary series has a stable equilibrium relationship. A special case of pseudo-regression is that two-time series have the same trend components. In this case, the common trend correction regression may be used to make it reliable.

It is precisely accurate because the co-integration transmits a long-term equilibrium relationship that if a reliable connection can be found between several variables that appear to have a single random trend, then the random trend brought by unit root can be excluded by introducing this relatively stable adjustment to the model, that is, the error correction model.

In traditional time series analysis, requirements on the time series must be smooth, no random trends or identify trends, otherwise, it will generate pseudo regression problems, however, in the real economic time series usually is smooth, we can change it become stable for difference, but it will make us lose the amount of information for a long time, it is necessary to analyze the information, so use cointegration to solve the problem.

Co-integration VAR (CVAR) model: Simms proposed the VAR model. In the VAR model, there is no distinction between endogenous and exogenous variables, but all variables are regarded as endogenous variables and no constraint is initially imposed on model coefficients.

**Autoregressive distributed lag model (ARDL).** Compared with the standard co-integration test, the ARDL model can be used to test the long-term relationship between variables, regardless of whether variables are processes or processes that do not require integration of variables of the same order.

**Solow model.** The Solow model was used to analyze the impact of FDI and human capital on economic growth.

**Case study method.** The case study is the study of a particular individual, unit, phenomenon, or topic. This kind of research extensively collects the relevant data, understands in detail, sorts out, and analyzes the process that the research object produces and develops. Internal and external factors and their interrelations to form a thorough and comprehensive understanding of the relevant issues and conclusions.

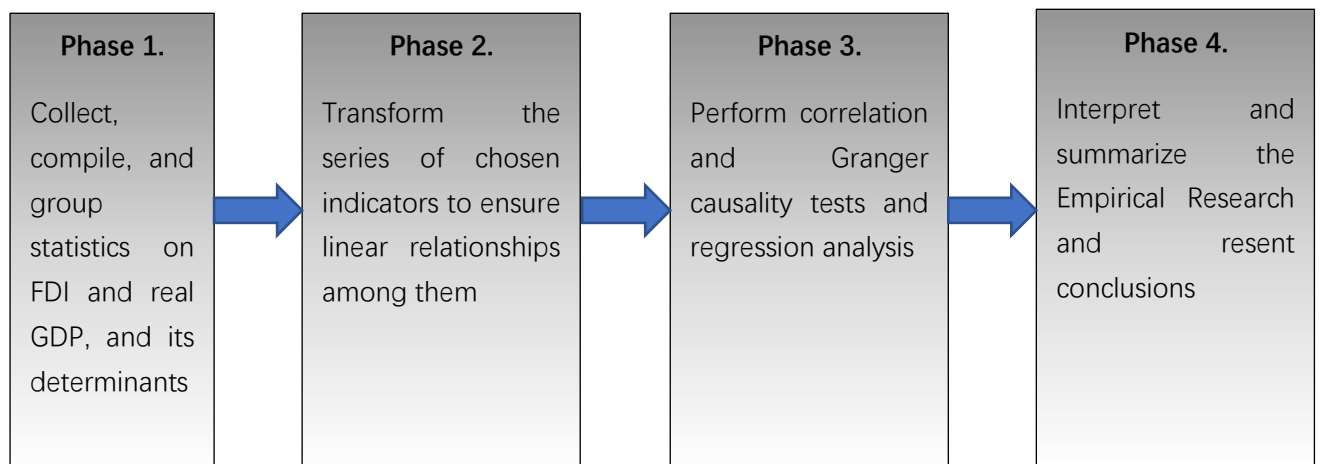


## 2. The methodology for research on the importance of FDI to China's economic growth

The plan is to research to see if and what relationship exists between foreign direct investments (FDI) to China, and its economic growth, and the determinants thereof. For this research, it is important to look at the different industry sectors as to how much they contribute to the attraction of FDI to China and how much they benefit from this process. Therefore, it is important to include related and sufficient measures of economic growth and its determinants to check if there is a relationship between those measures and FDI.

Three main hypotheses will be tested. Hypothesis (H<sub>1</sub>) – inward FDI influences the real GDP of China (and its determinants) positively. (H<sub>2</sub>) – GDP value-added for each industry of China is influenced by inward FDI differently and attracts inward FDI to China on a different scale. (H<sub>3</sub>) the international trade of the enterprises owned by foreign capital attract inward FDI to China and is influenced by it at the same time.

To conduct the empirical research the process is broken up into four phases as shown in figure 7.



**Figure 7.** Research Process Overview

The first step is to find, collect, compile, and group the statistics on FDI, and real GDP, and its determinants. This paper selects the data of China's gross domestic product (GDP) and foreign direct investment (FDI) from 1990 to 2019 "China Statistical Yearbook" (2010 Edition). The

amount of foreign direct investment shall be based on the amount of foreign capital utilized and converted into RMB at the exchange rate of that year (the weighted average of the exchange rate of the current year shall be selected as the exchange rate).

Table 4. The indicators used in the research

<b>Macroeconomic indicator</b>	<b>Theoretic background</b>
Real GDP per capita	The indicator is calculated as the ratio of real GDP to the average population of a specific year. GDP measures the value of the total final output of goods and services produced by the economy within a certain period. It includes goods and services that have markets and products which are produced by general government and non-profit institutions.
GDP value-added of various industries	The value of the output of individual industry less the value of intermediate consumption.
Actual utilized FDI	Investments made by entities from the country into a business located in another country.
China's urban and rural population	Yearly average rural and urban population
Import and export volumes of foreign-invested enterprises	Export and import volumes of enterprises owned by foreign capital owners

In the second phase, the transformation of the data series is performed to ensure linear relationships among the indicators and series stationarity. The preferred transformation – differences in logarithmic scale.

In the third phase, the Granger causality test among all chosen variables to be performed.

Method. If a time series is a stationary process, the test is performed using the level values of two (or more) variables. If the variables are non-stationary, then the test is done using first (or higher) differences. The number of lags to be included is usually chosen using an information criterion, such as the Akaike Information Criterion. Any particular lagged value of one of the variables is retained in the regression if (1) it is significant according to a t-test, and (2) it and the other lagged values of the variable jointly add explanatory power to the model according to an F-test. Then the null hypothesis of no Granger causality is not rejected if and only if no lagged values of an explanatory variable have been retained in the regression.

Let  $y$  and  $x$  be stationary time series. To test the null hypothesis that  $x$  does not Granger-cause  $y$ , one first finds the proper lagged values of  $y$  to include in a univariate autoregression of  $y$ :

$$y_t = a_0 + a_1y_{t-1} + a_2y_{t-2} + \dots + a_my_{m-1} + error_t \quad (1)$$

Next, the autoregression is augmented by including lagged values of  $x$ . One retains in this regression all lagged values of  $x$  that are individually significant according to their t-statistics, provided that collectively they add explanatory power to the regression according to an F-test (whose null hypothesis is no explanatory power jointly added by the  $x$ 's). In the notation of the above-augmented regression,  $p$  is the shortest, and  $q$  is the longest, lag length for which the lagged value of  $x$  is significant. The null hypothesis that  $x$  does not Granger-cause  $y$  is accepted if and only if no lagged values of  $x$  are retained in the regression. Up to 6 lags are tested.

A dynamic linear regression analysis will be based on the results of the Granger causality test to examine the scale of the identified causal relationships:

$$y_t = \beta_0 + (\sum_{i=1}^n \beta_i L^i)x_{1t} + \dots + (\sum_{i=1}^n \beta_i L^i)x_{kt} + \epsilon_t \quad (2)$$

where:  $L$  – a lag operator of a variable  $k$ ;  $k$  – several variables;  $n$  – several specific (selected) lags;  $i$  – a selected lag of a variable;  $t$  – several periods.

In the final steps of the regression analyses, the variables with the most significant variance inflation factor and probability higher than 0.10 will be eliminated from the equation.

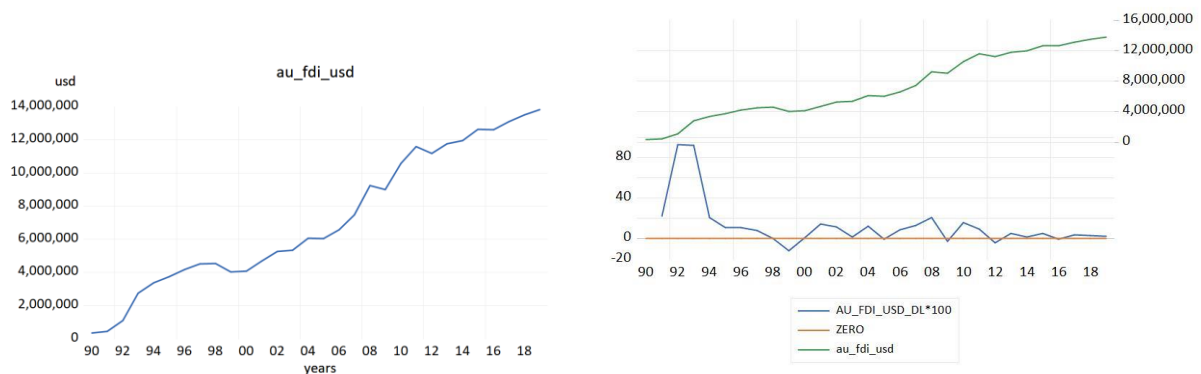
### 3. The study of the inward FDI relation to China's economic growth variables

The study discussed here below starts with a graphical dynamic analysis of relevant variables. The dynamic graphic analysis of inward FDI to China is based on the data collected and reproduced with the program EViews 11. All these graphs were done by gathering data, comparing variables. Graphs illustrate how FDI was affected by and affected other variables.

Further, the analysis is extended up to correlation analysis and the Granger causality tests. Having that done, this research proceeds with regression analysis based on the correlation and the Granger test results.

#### 3.1. The dynamic graphic analysis of inward FDI to China

In China, FDI investment exploded in the early 1990s, with annual FDI growth surpassing as much as 80%. Subsequently, the increase in FDI fluctuated over the various periods, but in the years of rising ranged from 10% to 20%. In recent years, the increase in FDI has stabilized by about 4-5% (Figure 8).



**Figure 8.** FDI Linear Graph in US Dollars and its growth in percentage

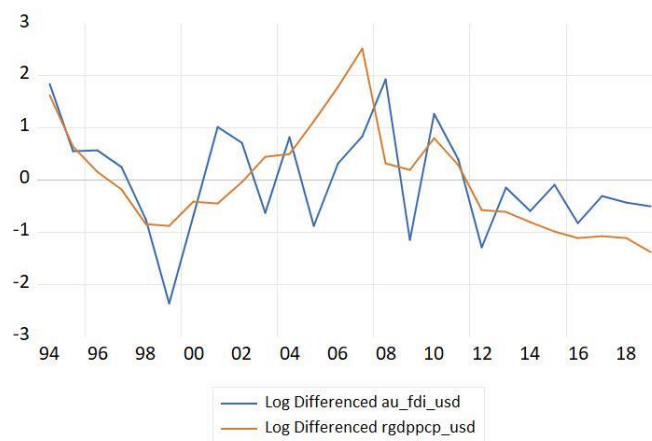
Along with the development of transportation and the internet, the whole world bonds together

more tightly and closely. Chinese corporations get more chances to know other countries. With further understanding of foreign corporations and associations, Chinese investigators have more optimistic opinions, and they will focus more on foreign direct investment. In 1990, Chinese FDI was less than \$350,000 (US dollars). In 2019, Chinese FDI gets more than \$13,800,000 (\$US dollars). FDI of China increased 294.29% in the past 30 years. These general tendencies of FDI are also affected by other valuables, such as the export amount from the current year, from one year, and two years ago.

Generally, the future tendency of actual used FDI is rapidly increasing. In figure 8, the line of the FDI has a sharp slope, which means the increasing rate of FDI is high and the slope stays at a relatively stable level. Besides, the actual used FDI fluctuated and decreased a bit in 1999, 2005, 2009, and 2012. Within the margin of error, it illustrates that foreign investors are getting more and more confident in investing in China’s economy. Therefore, it is worth analyzing further.

As will be explained more detailly in the further coming description of the Granger causality tests, there is a specific list of variables that affect inward FDI in China.

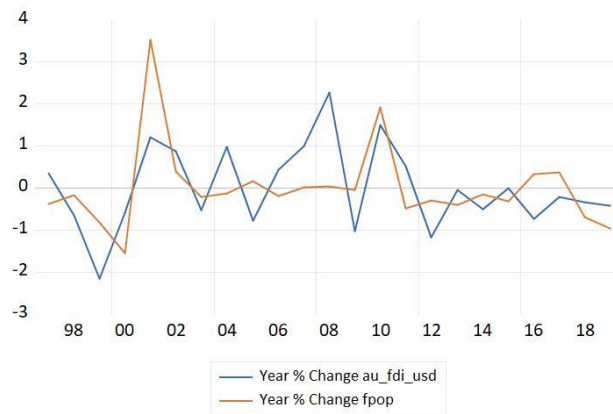
The first one among them is a real GDP itself (Figure 9).



**Figure 9.** FDI and real GDP growth (normalized scale)

GDP growth of China reached its peak point in 2007, and FDI reached its peak point a year later. Figure 9 illustrates that real GDP growth can be positively related to China's inward FDI. It is positive to say real GDP growth in the Granger causation test is one of the reasons for the further growth of inward FDI in China. However, further research is required for coming up with a more specific relation between FDI and real GDP. It is likely to get a reception that real GDP growth makes sectors feel they have more chances to receive direct investments from foreign corporations.

Another variable that affects inward FDI in China is female population growth dynamics (Figure 10).

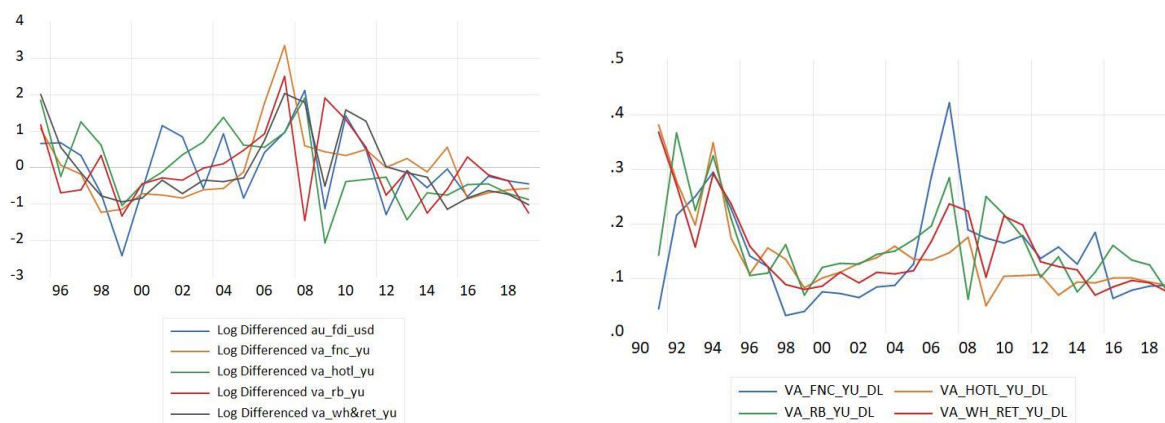


**Figure 10.** FDI and female population growth (normalized scale)

It is difficult to say why the female population in the Granger causation test is the reason for the further growth of inward FDI in China. More research is needed to answer this question. Now it is only possible to follow the intuition that the inward FDI attracts those sectors of the Chinese economy where the importance of the female workforce is growing.

Some different industries affect inward FDI in China too. They are financial, hotel, realty business, and wholesale and retail sectors (Figure 11).





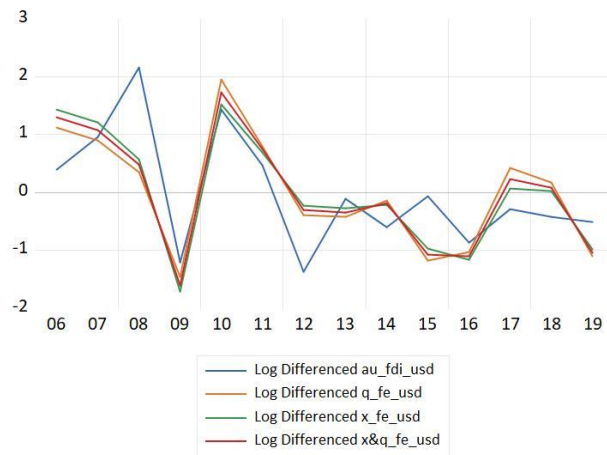
**Figure 11.** Growth of FDI and value additive in different industry sectors (normalized and percentage scales)

In general, it is positive to come up with a hypothesis that different industry sectors in the Granger causation test are one of the reasons for the further growth of inward FDI in China. Sectors from financial, hotel, realty business, wholesale and retail stores feel optimistic to make the foreign investment after their market value grows. Oppositely, those sectors will cut off foreign investment when they are suffering from the loss of market value. It is possible to imagine that the improvement of the Internet creates more challenges for those reality industries, and they are losing customers year by year. That is the reason for industries to cut off foreign investment after losing market value.

It is a remarkably interesting finding that reveals the importance of exporting and importing companies owned by non-Chinese residences for inward FDI. Figure 12 shows a very vivid correlation between FDI and exports and imports of non-Chinese residences.

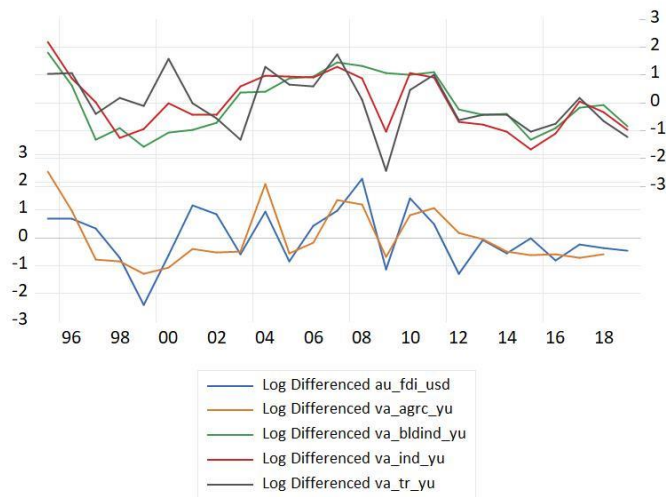
Export and import of firms owned by non-Chinese residences could explain the channel through which the further growth of inward FDI in China is going on. One possible hypothesis is that with more export and import for firms owned by non-Chinese residences, they will have more chances to know foreign industries. At that time, those firms could do more foreign investment. However, recently, it gets harder for those firms to get exports or imports. In other words, the descending FDI is caused by the descending of export and import of firms owned by none-Chinese

residences.



**Figure 12.** Growth of FDI and values of export and import of firms owned by non-Chinese residences (normalized scale)

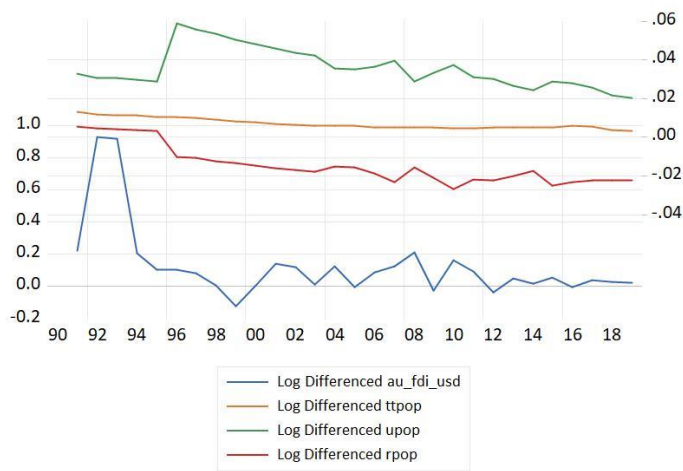
Granger causality tests also showed that FDI in China affects such industries as follows: agriculture, building industry, manufacturing, and transport (Figure 13 and Table 5).



**Figure 13.** The industries that are affected by inward FDI (normalized scales)

Most industries get affected by inward FDI. However, it is hard to tell whether there is any relation to the Granger causality test among those industries and FDI. It is possible to say that since there is more foreign investment, there will be fewer funds for those industries. There should be more relevant tests to check whether there would be any relation between one industry (from agriculture, building industry, manufacturing, and transport) and inward FDI.

Figure 14 reveals that FDI affects the population’s movement from rural to urbanized areas.



**Figure 14.** The industries that are affected by inward FDI (normalized scales)

Figure 14 illustrates that the urbanized population grows and the rural population decreases. There should be further analysis to see whether the urbanized population and the rural population will explain the Granger causality test of FDI. It is possible to say that since more people move to urban areas, sectors will get interested to invest more there.

As all these dynamics reveal, intuition tells that there are a lot of factors that affect inward FDI, and there are a lot of different industries that get affected by FDI. First, GDP growth encourages sectors to invest in different foreign industries. Second, the population of females affects sectors’ decision-making in inward FDI. Third, different sectors from different industries will have different opinions for inward FDI. However, gaining more market value will help most industries to invest more in foreign industries. Fourth, export and import from firms owned by non-Chinese residences also affect inward FDI. Fifth, inward FDI of China could affect some

industries, such as agriculture, building industry, manufacturing, and transport. Last but not least, the growth of the urbanized population and the change of the rural population could also affect the future market of FDI. Even though there could be a lot of hypotheses for those relations, there should be more tests and analyses for coming up with more specific results for Granger causality tests for inward FDI.

### **3.2. The quantitative research of China's inward FDI variables**

This study was started with correlation (Tables 5-6) and Granger causality test (Table 7) analysis following the techniques described in the chapter of the methodology of the research. The results of these different techniques were a little bit different – possibly due to a lack of data.

Correlation results are shown for the period starting from 1995 up to 2018 and from 2009 up to 2018.

**Table 5.** Correlation analysis results (1)

Covariance Analysis: Ordinary  
Date: 11/19/20 Time: 15:34  
Sample: 1995 2018  
Included observations: 24  
Balanced sample (listwise missing value deletion)

Correlation	DLOG(AU_FDI_USD)	p
DLOG(RGDPPCP_USD)	0.45	0.0275
DLOG(RGDPPCP_USD(-1))	0.57	0.0040
DLOG(RGDPPCP_USD(-2))	0.22	0.2948
DLOG(RGDPPCP_USD(-3))	0.25	0.2418
DLOG(RGDPPCP_USD(-4))	0.11	0.6126
DLOG(FPOP)	0.41	0.0488
DLOG(FPOP(-1))	0.24	0.2514
DLOG(FPOP(-2))	-0.08	0.7225
DLOG(FPOP(-3))	-0.09	0.6823
DLOG(FPOP(-4))	-0.17	0.4390
DLOG(MPOP)	-0.33	0.1199
DLOG(MPOP(-1))	-0.23	0.2905
DLOG(MPOP(-2))	0.00	0.9973
DLOG(MPOP(-3))	0.08	0.7014
DLOG(MPOP(-4))	0.20	0.3400
DLOG(UPOP)	-0.01	0.9696
DLOG(UPOP(-1))	-0.03	0.8910
DLOG(UPOP(-2))	-0.27	0.1960
DLOG(UPOP(-3))	-0.11	0.6144
DLOG(UPOP(-4))	0.28	0.1901
DLOG(VA_AGRC_YU)	0.65	0.0006
DLOG(VA_AGRC_YU(-1))	0.15	0.4714
DLOG(VA_AGRC_YU(-2))	0.10	0.6386
DLOG(VA_AGRC_YU(-3))	0.04	0.8526
DLOG(VA_AGRC_YU(-4))	-0.27	0.2008
DLOG(VA_BLDIND_YU)	0.46	0.0239
DLOG(VA_BLDIND_YU(-1))	0.40	0.0515

Correlation	DLOG(AU_FDI_USD)	p
DLOG(VA_BLDIND_YU(-2))	0.26	0.2252
DLOG(VA_BLDIND_YU(-3))	0.15	0.4875
DLOG(VA_BLDIND_YU(-4))	-0.09	0.6919
DLOG(VA_FNC_YU)	0.41	0.0467
DLOG(VA_FNC_YU(-1))	0.51	0.0106
DLOG(VA_FNC_YU(-2))	0.09	0.6648
DLOG(VA_FNC_YU(-3))	0.00	0.9923
DLOG(VA_FNC_YU(-4))	-0.12	0.5695
DLOG(VA_HOTL_YU)	0.55	0.0058
DLOG(VA_HOTL_YU(-1))	0.06	0.7747
DLOG(VA_HOTL_YU(-2))	0.16	0.4639
DLOG(VA_HOTL_YU(-3))	0.31	0.1442
DLOG(VA_HOTL_YU(-4))	0.09	0.6811
DLOG(VA_IND_YU)	0.57	0.0036
DLOG(VA_IND_YU(-1))	0.36	0.0795
DLOG(VA_IND_YU(-2))	0.21	0.3258
DLOG(VA_IND_YU(-3))	0.17	0.4329
DLOG(VA_IND_YU(-4))	-0.09	0.6853
DLOG(VA_RB_YU)	0.17	0.4395
DLOG(VA_RB_YU(-1))	0.50	0.0119
DLOG(VA_RB_YU(-2))	0.05	0.8158
DLOG(VA_RB_YU(-3))	0.18	0.4002
DLOG(VA_RB_YU(-4))	0.08	0.7057
DLOG(VA_TR_YU)	0.40	0.0508
DLOG(VA_TR_YU(-1))	0.15	0.4906
DLOG(VA_TR_YU(-2))	0.21	0.3223
DLOG(VA_TR_YU(-3))	0.26	0.2151
DLOG(VA_TR_YU(-4))	0.05	0.8037
DLOG(VA_WH_RET_YU)	0.64	0.0008
DLOG(VA_WH_RET_YU(-1))	0.30	0.1611
DLOG(VA_WH_RET_YU(-2))	0.05	0.8210
DLOG(VA_WH_RET_YU(-3))	0.06	0.7811
DLOG(VA_WH_RET_YU(-4))	-0.16	0.4414

Table 5 illustrates how much related it is between different sectors from different industries and direct foreign investment. In Table 5, the probability between log differenced real GDP growth and log differenced FDI is small enough ( $0.0275 < 0.1$ ). The hypothesis is non-rejectable, which means real GDP and FDI are related. Besides, GDP growth from one year ago is also correlated with FDI. Moreover, the population of females affects FDI. For different industries, the probability is small enough ( $0.0006 < 0.1$ ) to prove there is a relation between agriculture and FDI. Similarly, building industries from this year and one year ago, manufacturing industries from the same year and from one year ago, manufacturing industries, and transport industries also influence the future market of FDI. Sectors from financial from the same year and one year ago, hotel, retail business, wholesale get motivated and feel optimistic to make the foreign investment after their market value grows. However, for male population growth, it does not affect sectors' investing opinions much.

Similarly, the urbanized population does not affect FDI as well. Therefore, regardless of the urbanized population and male population growth, we need to make more research and analysis to see whether they could explain the Granger causality tests of FDI.

**Table 6.** Correlation analysis results (2)

Covariance Analysis: Ordinary  
 Date: 11/19/20 Time: 15:00  
 Sample: 2009 2018  
 Included observations: 10  
 Balanced sample (listwise missing value deletion)

Correlation	DLOG(AU_FDI_USD)	p
DLOG(X_FE_USD)	0.789924	0.0066
DLOG(X_FE_USD(-1))	-0.359003	0.3083
DLOG(X_FE_USD(-2))	-0.345661	0.3279
DLOG(X_FE_USD(-3))	0.426888	0.2186
DLOG(X_FE_USD(-4))	-0.27893	0.4351
DLOG(Q_FE_USD)	0.790963	0.0064
DLOG(Q_FE_USD(-1))	-0.206646	0.5668
DLOG(Q_FE_USD(-2))	-0.387416	0.2687
DLOG(Q_FE_USD(-3))	0.352086	0.3184
DLOG(Q_FE_USD(-4))	-0.292084	0.4128

Table 6 illustrates how export and import correlate with foreign direct investment from 2010 to 2019. Export from the same year affects the future market of foreign direct investment (probability = 0.0066). Similarly, import from the same year also affects the future market of foreign direct investment. However, because of those large possibilities, export from one year ago, two years ago, three years ago, and four years ago will not affect FDI. Import from one year ago, two years ago, three years ago, and four years ago will also not affect FDI. Therefore, log differenced export and log differenced import will affect inward foreign direct deposit of China in the Granger causality tests.

After analyzing the correlation results between different variables and FDI of China, we found that log differenced real GDP growth from this year and the same year, log differenced female population, log differenced agricultural, log differenced building from the same year and one year ago, log differenced financial industries from the same year and one year ago, log differenced hotels, log differenced manufacturing industries from the same year and one year ago, log differenced retail business, log differenced export and log differenced import will affect inward

FDI of China. Therefore, the Granger causality test results will show how other variables affect the inward FDI of China.

**Table 7.** Granger causality: variables that affect inward FDI of China

the_variable_that_affects_	lags	the_affected_variable	prb
fpop_dl	1	au_fdi_usd_dl	0.0007
rgdppcp_usd_dl	2	au_fdi_usd_dl	0.0018
rgdppcp_usd_dl	3	au_fdi_usd_dl	0.0055
rgdppcp_usd_dl	4	au_fdi_usd_dl	0.0119
upop_dl	4	au_fdi_usd_dl	0.0491
va_fnc_yu_dl	2	au_fdi_usd_dl	0.0459
va_hotl_yu_dl	1	au_fdi_usd_dl	0.0032
va_hotl_yu_dl	2	au_fdi_usd_dl	0.0394
va_rb_yu_dl	2	au_fdi_usd_dl	0.0006
va_wh_ret_yu_dl	1	au_fdi_usd_dl	0.0026
q_fe_usd_dl	3	au_fdi_usd_dl	0.0146
x_fe_usd_dl	3	au_fdi_usd_dl	0.0072

In Table 7, Granger causality test results are shown for the period starting from 2010 up to 2019. Transformations of variables and ADF tests were performed to prepare variables for the Granger causality test. For the female population, the probability is 0.0007 ( $< 0.1$ ). Because of the small probability, the hypothesis is non-rejectable. In other words, in the Granger test, similar to the results of correlation analysis, the female population affects FDI. For real GDP growth, two-lag (0.0018) and three-lag (0.0055) probabilities are small enough. Also, four-lags probability ( $0.0119 < 0.1$ ) is good too. Therefore, different from those correlation results, the Granger test shows that real GDP growth does affect the FDI of China in the longer term. For the urbanized population, the probability is 0.0491. Therefore, the urbanized population does affect FDI. Similarly, in the Granger causality test, financial industries (0.0459), hotel industries (0.0394), and export (0.0146) affect the FDI of China. Different from correlation analysis, retail business, wholesale industries also affect FDI in the Granger causality test. The last variable, export also affects the FDI of China because the probability in the Granger causality test is 0.0072 and the probability in correlation analysis is 0.0064. Therefore, comparing to correlation analysis, among those variables, overall, the Granger causality test results are similar to the results of correlation, though the Granger causality test proved to be more informative.

**Table 8.** Regression analysis results



Dependent Variable: DLOG(AU\_FDI\_USD)  
Method: Least Squares  
Date: 11/19/20 Time: 16:15  
Sample (adjusted): 2008 2019  
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.143651	0.072656	-1.977128	0.0834
DLOG(AU_FDI_USD(-1))	-0.479145	0.170893	-2.803771	0.0231
DLOG(FPOP(-1))	34.71327	13.27530	2.614877	0.0309
DLOG(Q_FE_USD(-3))	0.175106	0.033737	5.190308	0.0008
R-squared	0.803229	Mean dependent var		0.051153
Adjusted R-squared	0.729440	S.D. dependent var		0.073099
S.E. of regression	0.038023	Akaike info criterion		-3.440063
Sum squared resid	0.011566	Schwarz criterion		-3.278427
Log likelihood	24.64038	Hannan-Quinn criter.		-3.499906
F-statistic	10.88548	Durbin-Watson stat		1.819095
Prob(F-statistic)	0.003386			

Table 8 illustrates the regression analysis among log differenced FDI, log differenced FDI from one year ago, log differenced female population from one year ago. In Table 8, inward FDI is affected by these three variables: its former values, log differenced female population from one year ago and log differenced import from three years ago. These three variables (import from three years ago, the female population from one year ago, and FDI from one year ago) explain the movement of FDI around 73% (Adjusted R-squared is 0.729440). Since the probability of F-statistic is smaller than 0.1 (Prob(F-statistic) = 0.003386), this equation is significant statistically, and the equation shows how to log differenced FDI is explained by log differenced female population, log differenced FDI from one year ago and log differenced import from three years ago. In other words, since the probability is low, the null hypothesis of the insignificant equation is rejected. Besides, all coefficients shall be accepted because probabilities are lower even than 0.5. Other than that, since Durbin-Watson is in the range of 1.6, 2.4, the whole equation is not affected by autocorrelation. Therefore, log differenced female population, log differenced import, and log differenced FDI explain log differenced FDI at around 73%.

**Table 9.** Breusch-Godfrey Serial Correlation LM Test for Residual data.



Breusch-Godfrey Serial Correlation LM Test:  
 Null hypothesis: No serial correlation at up to 3 lags

F-statistic	0.272844	Prob. F(3,5)	0.8430
Obs*R-squared	1.688120	Prob. Chi-Square(3)	0.6396

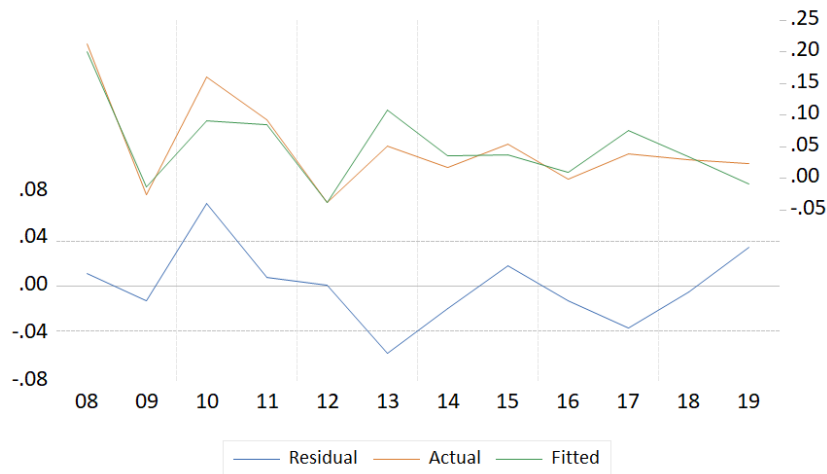
Test Equation:  
 Dependent Variable: RESID  
 Method: Least Squares  
 Date: 11/19/20 Time: 16:28  
 Sample: 2008 2019  
 Included observations: 12  
 Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.008998	0.108500	-0.082929	0.9371
DLOG(AU_FDI_USD(-1))	-0.050230	0.225364	-0.222885	0.8324
DLOG(FPOP(-1))	1.866229	19.26259	0.096884	0.9266
DLOG(Q_FE_USD(-3))	0.008911	0.041317	0.215678	0.8378
RESID(-1)	0.037844	0.595988	0.063498	0.9518
RESID(-2)	-0.182116	0.446868	-0.407538	0.7005
RESID(-3)	-0.384344	0.518548	-0.741192	0.4919

R-squared	0.140677	Mean dependent var	1.16E-17
Adjusted R-squared	-0.890511	S.D. dependent var	0.032426
S.E. of regression	0.044584	Akaike info criterion	-3.091673
Sum squared resid	0.009939	Schwarz criterion	-2.808810
Log likelihood	25.55004	Hannan-Quinn criter.	-3.196398
F-statistic	0.136422	Durbin-Watson stat	1.683403
Prob(F-statistic)	0.984539		

Table 9 illustrates the serial correlation test of residual. The probability (Prob(F-statistic) = 0.984539 > 0.1) is not significant, so we cannot reject the null hypothesis that there is no serial correlation at up to 3 lags.



**Figure 15.** Residual, Actual, Fitted Line Chart.

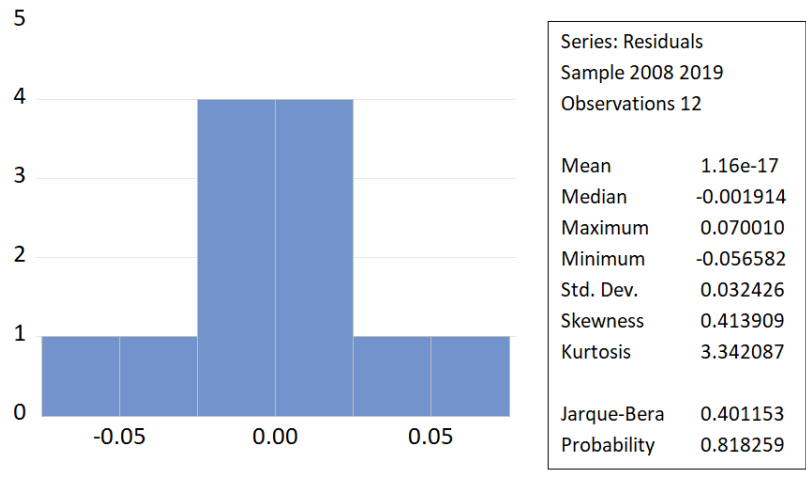
In figure 15, actual is our raw data and fitted is our model (to see how well it fits). Residual means the difference between raw data and our model. If the equation that explains how to log differenced FDI is explained by log differenced export works, residual should not contain any significant data. Besides that, residual data should be purely random. In Figure 15, residuals are purely random. Therefore, the equation explains how much the log differenced FDI is explained by log differenced export.

**Table 10.** Heteroskedasticity Test Results

Heteroskedasticity Test: ARCH				
F-statistic	1.080941	Prob. F(1,9)	0.3256	
Obs*R-squared	1.179488	Prob. Chi-Square(1)	0.2775	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 11/19/20 Time: 16:29				
Sample (adjusted): 2009 2019				
Included observations: 11 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001349	0.000562	2.397856	0.0400
RESID^2(-1)	-0.322616	0.310302	-1.039683	0.3256
R-squared	0.107226	Mean dependent var	0.001040	
Adjusted R-squared	0.008029	S.D. dependent var	0.001592	
S.E. of regression	0.001585	Akaike info criterion	-9.893194	
Sum squared resid	2.26E-05	Schwarz criterion	-9.820850	
Log likelihood	56.41257	Hannan-Quinn criter.	-9.938797	
F-statistic	1.080941	Durbin-Watson stat	2.342284	
Prob(F-statistic)	0.325611			

For the Heteroskedasticity test: ARCH (Table 10), the probability is high, so we could not reject the null hypothesis and there is no heteroskedasticity at up to 3 lags. If the mean of residual is almost 0, the Jarque-Bera works. Therefore, the residual follows the normal distribution pattern (Table 11).

**Table 11.** Normality Test Results



In Table 11, for the normality test, the probability is not significant ( $0.818 > 0.1$ ), the null hypothesis is non-rejectable and there is no impact of residuals on the coefficients of the equation. Therefore, the hypothesis is non-rejectable. In other words, the residual is a purely random number, and the equation works.

After visualizing FDI linear graph in US dollars between 1990 and 2018, this master thesis illustrates that the FDI in China increased rapidly in the past 28 years. With further analysis of standard unit root test of FDI and differenced FDI, this thesis draws the conclusion that differenced FDI could be used for further comparisons and explanations. After considering which data could be used for further tests, covariance analysis, correlation, and probability between FDI and export were visualized. The regression equation shows that FDI is explained by imports. To confirm the accuracy of data, there are more tests for residuals to test the validity of the obtained results. Finally, the Granger causality test explains that the future market for imports optimistically affects the growth of FDI in the future market.

### 3.3. The quantitative research of inward FDI impact

This study allowed us to obtain data as to how China's inward FDI itself affects other macro variables.

The Granger causality test results provided in Table 11 reveal this kind of relationship. Firstly, inward FDI affects population distribution between rural and urban areas, male and female populations. Secondly, inward FDI affects such industries as agriculture, building industry, hotels, manufacturing, transport and wholesale and retail. On average, the effect of inward FDI on tested macro variables lasts about two years.

**Table 12.** Granger causality: variables that are affected by inward FDI of China

the_variable_that_affects_	the_affected_variable	lags	prb
au_fdi_usd_dl	fdipr_tot_dl	1	0.0406
au_fdi_usd_dl	fdipr_tot_dl	3	0.036
au_fdi_usd_dl	fpop_dl	3	0.0038
au_fdi_usd_dl	fpop_dl	4	0.0088
au_fdi_usd_dl	mpop_dl	1	0.0182
au_fdi_usd_dl	mpop_dl	2	0.0467
au_fdi_usd_dl	rpop_dl	1	0.0377
au_fdi_usd_dl	rpop_dl	2	0.0324
au_fdi_usd_dl	ttopop_dl	1	0.0497
au_fdi_usd_dl	upop_dl	3	0.0067
au_fdi_usd_dl	upop_dl	4	0.0013
au_fdi_usd_dl	va_agrc_yu_dl	1	0.0047
au_fdi_usd_dl	va_agrc_yu_dl	2	0.0029
au_fdi_usd_dl	va_agrc_yu_dl	3	0.014
au_fdi_usd_dl	va_bldind_yu_dl	1	0.04
au_fdi_usd_dl	va_hotl_yu_dl	1	0.002
au_fdi_usd_dl	va_hotl_yu_dl	2	0.0001
au_fdi_usd_dl	va_hotl_yu_dl	3	0.0014
au_fdi_usd_dl	va_ind_yu_dl	1	0.0323
au_fdi_usd_dl	va_rb_yu_dl	1	0.0092
au_fdi_usd_dl	va_rb_yu_dl	2	0.0388
au_fdi_usd_dl	va_tr_yu_dl	1	0.0155
au_fdi_usd_dl	va_wh_ret_yu_dl	2	0.029

However, due to the restrictions resulted from too short a time series, the Granger test did not show that the inward FDI would influence economic growth. However, the regression analysis has led to the determination that the inward FDI affects China's economic growth not in the short to medium term. Though, it affects China's economic growth in the long term as shown in Table 13.

**Table 13.** Inward FDI and real GDP regression analysis results

Dependent Variable: DLOG(RGDPPCP\_USD)  
Method: Least Squares  
Date: 11/20/20 Time: 09:18  
Sample (adjusted): 2005 2019  
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031363	0.012373	2.534725	0.0262
DLOG(RGDPPCP_USD(-1))	0.507621	0.159216	3.188263	0.0078
DLOG(AU_FDI_USD(-14))	0.037392	0.010698	3.495383	0.0044
R-squared	0.819253	Mean dependent var		0.080512
Adjusted R-squared	0.789128	S.D. dependent var		0.021776
S.E. of regression	0.010000	Akaike info criterion		-6.195626
Sum squared resid	0.001200	Schwarz criterion		-6.054015
Log likelihood	49.46719	Hannan-Quinn criter.		-6.197134
F-statistic	27.19557	Durbin-Watson stat		1.780993
Prob(F-statistic)	0.000035			

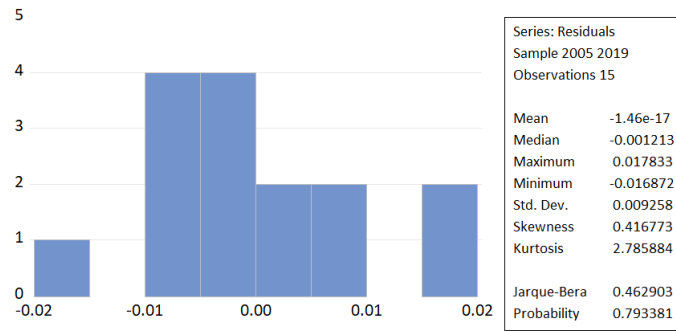
The Breusch-Godfrey serial correlation LM and heteroskedasticity test results confirm that this regression analysis is valid in terms of autocorrelation and heteroskedasticity (Table 14).

**Table 14.** Breusch-Godfrey Serial Correlation LM and Heteroskedasticity Test Results

Breusch-Godfrey Serial Correlation LM Test:				Heteroskedasticity Test: ARCH					
Null hypothesis: No serial correlation at up to 11 lags									
F-statistic	0.149488	Prob. F(11,1)	0.9747	F-statistic	1.008336	Prob. F(1,12)	0.3351		
Obs*R-squared	9.327563	Prob. Chi-Square(11)	0.5917	Obs*R-squared	1.085204	Prob. Chi-Square(1)	0.2975		
Test Equation: Dependent Variable: RESID Method: Least Squares Date: 11/20/20 Time: 09:21 Sample: 2005 2019 Included observations: 15 Presample missing value lagged residuals set to zero.				Test Equation: Dependent Variable: RESID^2 Method: Least Squares Date: 11/20/20 Time: 09:22 Sample (adjusted): 2006 2019 Included observations: 14 after adjustments					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.219184	0.213440	1.026911	0.4915	C	8.70E-05	3.39E-05	2.568333	0.0246
DLOG(RGDPPCP_USD(-1))	-2.209644	2.328591	-0.948919	0.5167	RESID^2(-1)	-0.246772	0.245750	-1.004159	0.3351
DLOG(AU_FDI_USD(-14))	-0.033382	0.037231	-0.896633	0.5347					
RESID(-1)	2.665930	3.096346	0.860992	0.5475	R-squared	0.077515	Mean dependent var		6.65E-05
RESID(-2)	4.035970	4.975962	0.811093	0.5662	Adjusted R-squared	0.000641	S.D. dependent var		0.000101
RESID(-3)	3.795635	5.336095	0.711313	0.6064	S.E. of regression	0.000101	Akaike info criterion		-15.42865
RESID(-4)	1.868945	3.558323	0.525232	0.6921	Sum squared resid	1.23E-07	Schwarz criterion		-15.33535
RESID(-5)	1.587682	3.961814	0.400746	0.7574	Log likelihood	109.9865	Hannan-Quinn criter.		-15.43510
RESID(-6)	-0.681124	2.796062	-0.243601	0.8479	F-statistic	1.008336	Durbin-Watson stat		1.872266
RESID(-7)	-6.604461	5.792685	-1.140138	0.4584	Prob(F-statistic)	0.335121			
RESID(-8)	-8.252371	7.663330	-1.076865	0.4764					
RESID(-9)	-8.240014	7.627634	-1.080284	0.4754					
RESID(-10)	-13.30396	13.90314	-0.956903	0.5140					
RESID(-11)	-11.41679	12.69048	-0.899634	0.5336					
R-squared	0.621838	Mean dependent var	-1.46E-17						
Adjusted R-squared	-4.294275	S.D. dependent var	0.009258						
S.E. of regression	0.021302	Akaike info criterion	-5.701390						
Sum squared resid	0.000454	Schwarz criterion	-5.040543						
Log likelihood	56.78043	Hannan-Quinn criter.	-5.708430						
F-statistic	0.126490	Durbin-Watson stat	2.961125						
Prob(F-statistic)	0.985304								

Table 14 shows the autocorrelation and heteroscedasticity test results. In table 14, the Breusch-Godfrey serial correlation LM and heteroscedasticity test results confirmed that the regression analysis is not affected by autocorrelation and heteroscedasticity (p statistics are higher than 0.1).

**Table 15.** Normality Test Results



The normal distribution of the residuals of this regression is also confirmed (Table 15 By observing the results of the regression residuals normality test, I found that the regression residuals are distributed by normal distribution pattern (Jarque-Bera test  $p=0.79 > 0.1$ ).

## **Conclusions and recommendations**

1. There are a lot of and different descriptions of foreign direct investments (FDI), but, in general, FDI refers to the investment by foreign entities in establishing wholly foreign-owned enterprises, jointly holding joint ventures or cooperative development of resources with enterprises or resident economic organizations. In other words, FDI is a category of cross-border investment made by a resident in one economy abroad.
2. OLI model helps to identify the incentives that might be behind decisions on FDI. One of the most prominent models of FDI motivations is the model proposed by Dunning. These motives are as follows: market seeking, resource seeking, efficiency-seeking, and strategic asset seeking.
3. Scientists segregate outflow and inflow (inward) FDI where the former one is the investments made by the residents in reporting country broad, and later one means the value of investment made by non-resident investors in the host country.
4. There are a lot of economic theories that explain the place of FDI. They are as follows: industrial organization theory, product life cycle theory, internationalization theory, international production theory, FDI motives. They serve as a background for establishing the factors of inward FDI: market size, trade openness, infrastructure development, human capital state, research and development prospects, expectations of inflation, and real interest rates.
5. Economic growth refers to the expansion of the potential productivity of goods and services needed by the members of an economic system to live within a certain time. The main and most popular indicator thereof is Real Gross Domestic Product.
6. FDI can stimulate economic growth through various channels by the inward flows of capital, knowledge, and technology. It is an important source of human capital concentration and technological change in developing countries. In developing countries, general production technology is relatively backward, the quality of employees is poor, and they lack modern management experience and marketing skills. Therefore, foreign direct investment, especially the entry of large multinational companies, will transfer advanced technology, management, and marketing experience to the host country, to

improve the production efficiency and factor productivity of the host country.

7. In the scientific literature, there is still ongoing discussion if FDI affects economic growth because of ambiguous results that were provided by different research.
8. The methodology of this paper was designed to research how inward FDI is attracted to China and how it influences China's economic growth. The research plan covers data collection, time series transformation, and includes correlation and Granger tests together with regression analysis and its validity tests.
9. The research results (correlation and Granger causality tests) revealed that inward FDI is affected by China's population dynamics that are related to increasing urban population and increase of women role in China's economy. While FDI is attracted by such industries as finance, hotels, wholesale, and retail, real GDP affects inward FDI in the short-medium term. Also, it is important to notice that inward FDI is strongly related to China's exporting and importing companies that are owned by foreign capital.
10. Ultimately, the regression analysis demonstrated that the most significant factors to inward FDI are women population dynamics and imports made by China's companies that are owned by foreign capital.
11. Another part of the research was directed at inward FDI's impact on economic growth. It showed that inward FDI does not affect economic growth in short or medium terms – only long-term relationship (up to 14 years) exists, though significant statistically.
12. Also, Granger causality test results showed that in short term inward FDI affects not only population dynamics, but such industries as agriculture, building, manufacturing production, transport, hotels, and wholesale and retail sector.



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