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The Effects of Inward FDI on Chinese Exports

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Abstract

Recently, China has become the largest exporter and stays one of the most extensive inward FDI destinations worldwide. A question arises, to what extent inward FDI had an impact on the exports growth? Firstly, theoretical reviews of China's FDI policies and what influence they have on exports performance are provided. Secondly, two hypotheses focusing on different time periods are proposed. Furthermore, an econometric model analyzing the effects of inward FDI on exports is constructed. This study uses panel data estimation techniques and dataset that covers 29 Chinese provinces during time period from 1986 to 2009. The results suggest that there exists a relationship between FDI and exports; however it varies depending on the time period chosen. Furthermore, the results stay robust to the changes of independent variables as well as to the inclusion of additional variables.

Keywords: *foreign direct investments, China, exports, MNEs*

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1. Introduction

Since the beginning of the reforms and “open door” policy in 1978, China has shown drastic economic growth, during last three decades the Chinese economy has been growing on average with two digits rate. There are many factors that have contributed to this remarkable growth, such as surplus labour supply, explosive productivity growth followed by proper market-oriented reforms, intensive capital investments from both domestic and foreign sides (Hu and Khan, 1997).

The export sector is playing significant role in the Chinese economic growth. China’s export share in GDP is accounted for over 30 per cent in 2004, while for example Export/GDP ratio in USA is about 12%, and even in Japan that is well-known as the export oriented country, this ratio is about 18% (the CIA World Factbook). Meanwhile the exports generated by foreign-funded enterprises were equal to a half of total exports (SSB, 2005). Chinese exports increased from a bit over \$18 billion in 1980 to more than \$438 billion in 2003 and exceeded \$521 billion in 2009 (the CIA World Factbook).

The foreign direct investment (hereafter referred as FDI) to China has also increased dramatically, from an almost isolated economy in 1979, today China is ranked as the world’s second most attractive FDI destination. Rapid growth of FDI inflow started in 1992, when it diffused from coastal to other regions of country. Further FDI promotion was accompanied by China’s accession to the WTO. The next stage began in 2000 by nationwide liberalization and opening up previously closed sectors. The share of foreign affiliates' exports in total Chinese exports increased from 0.27% in the early 1980s to 20% in 1992, and then 41% in 1997. In 2004, the value of exports by foreign-funded enterprises constituted almost half of China's total exports (SSB, 2005). Thus, both FDI and exports are important factors of Chinese economic growth. This leads to the questions: What is the relationship between FDI and exports, and has it changed over time? Are FDI inflows one of the reasons why Chinese exports are drastically growing during last decades, especially after China’s accession to WTO?

There is considerable number of studies analyzing the effects of FDI on productivity, labour forces, economic growth and domestic capital formation. However, systematical empirical analysis of the FDI linkage with export performance in China seems to be limited. This paper investigates the effects of inward FDI on Chinese exports using Fixed Effects estimation method and panel data for 29 provinces in the period of 1986-2009. The dependent variable, total export value, is collected from various issues of the China Statistical Yearbook (1986-2009). The yearbooks also serve as the source for independent variables, which are utilized foreign direct investments, domestic investments, GDP and GDP per capita values.

The remainder of the thesis proceeds as follows: section 2 presents theoretical discussion of channels through which FDI has an influence on exports. Sections 3 provides stylized facts of the export and FDI patterns in China, including the development of policies on FDI in China, a historical background and briefly discuss consequences of WTO accession. In Section 4, the previous researches on the FDI export linkage are discussed in order to provide groundwork for the empirical analysis and formulate hypothesis. Section 5 focuses on the methodology, description of data and variables used in the analysis. Various models for regression analysis are also presented. Section 6 presents the results and robustness checks, and Section 7 concludes the thesis.

2. Theoretical Background

Foreign direct investment is usually defined as the process of acquiring ownership of assets and other activities of a firm in another country (the host country) in order to control the production and distribution (Moosa, 2002). The United Nations defines FDI as “an investment involving long-term relationship and reflecting a lasting interest and control of a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor”. It is important to highlight “long-term relationship” as it helps to distinguish foreign direct investments from portfolio investments, which are usually characterized as “short-term”.

From the host country point of view, FDI can be grouped into three categories: government initiated, import substituting or export-increasing. To the first category belongs FDI that was attracted to host country by different government incentives, such as for example tax exemptions and reductions and special export proceeding zones. Export-increasing FDI is related with the search of raw materials and intermediate parts, while import-substituting FDI streams into production of goods that were previously imported to the host country. FDI can affect economy of the host country in different ways. A voluminous body of literature focuses on the relationship between FDI and economic growth, exports and imports, capital formation and employment. In the particular interest for this paper are studies related to the linkage between FDI and exports performance.

Kojima (1978) defines FDI as transfers of technical knowledge, managerial know-how, capital and management resources to the host countries. Thus, FDI increases exports through the improvement of labour productivity, transfer of advanced technologies and entrepreneurial knowledge. Moreover, FDI may increase exports from domestic companies through industrial linkage effects. When foreign enterprises purchase raw materials and different inputs at the local market they improve domestic company's outputs and possible exports (UNCTAD, 2001 and 2002). Additionally, Markusen and Venables (1999) showed that foreign enterprises with strong demand on the local inputs can strengthen the local supply industries. Sun (1996) points out that inward FDI dominates in China in industries where such linkage effects are strong and foreign enterprises use noticeable proportion of Chinese parts and materials.

Multinational enterprises are usually considered as the main source of FDI flows. According to the UNCTAD (2004) estimates MNEs generate around two-thirds of world exports. The theory of multinational enterprise (MNE) tries to predict effects of inward FDI on host country's exports. The theory points out that MNEs can expand host country's exports by bringing advantages such as knowledge of global market, well established marketing and distribution networks. It is common to divide FDI effects into

two broad categories: direct and indirect. Direct effects occur from the MNEs activities, while indirect are referred to domestic firms performance (Caves, 1996; Helleiner, 1989). In industries that require advanced technologies or any other special skills, MNE might have a great advantage over domestic companies and be the exclusive producer and exporter of the goods. Same logic applies when domestic companies lack business contacts abroad and established global marketing networks. However, due to different spillovers effects which occur over some time, MNEs can transfer their knowledge to domestic companies and by this domestic companies can lower their sunk cost and find affordable ways to start or increase their exports (Kneller and Pisu, 2007). Moreover, domestic companies can increase their exports by learning and copying MNEs activities. In addition, domestic firms can start using infrastructure of transports, communications and financial services that were developed or established with MNEs assistance (Haddad & Harrison, 1993). Another channel through which MNEs can increase overall host country's exports is by providing information and possible access about new markets. As it was mentioned in World Investment Report (UNCTAD, 1999) MNEs can lobby for the favorable treatment of exports from the host country.

However, FDI is not always positively affecting exports. First, MNEs might be successful in spillovers prevention, during some time they can exclusively enjoy their privileges of advanced technology, management skill and other advantages. Second, MNEs are strong competitors for domestic firms and thus they can force domestic companies to leave the market and eliminate their future exports activities (Kneller and Pisu, 2007). In addition, Greenaway et al. (2004), Ruane and Sutherland (2004) on the example of Ireland point out that positive effects are less likely to occur if a country is used as an export platform. They link it to limitation of the competition on the local market.

Despite the fact, that many studies are focused on the positive FDI, there is enough evidence to assume negative effects also. In the case of China, FDI inflows during late 80's and early 90's can be related to seeking benefits from cheap labour and tax reductions. Thus, China was widely used as the export platform only. However, later MNEs started to consider enormous domestic market and could greatly benefit local partners, increasing exports both from international and domestic companies.

3. Foreign Direct Investments and Export in China

3.1 The Development of a Policy on FDI in China

Among the most important aspects contributing to China's financial reforms are the presence of investment from foreign interests. Beginning in the late 20th century, China has slowly been developing its ties with foreign investors. While this process continues today, China has developed a new attitude, and a number of laws, concerning its relationships with foreign investors.

In the late 70s and early 80s Chinese government adopted policies that allowed to open joint venture enterprises using foreign capital in the Special Economic Zones (SEZs). In July 1979 on the 5th National People's Congress "The Law of the People's Republic of China on joint ventures using Chinese and Foreign Investment" was adopted. Guangdong and Fujian provinces gained autonomy in foreign trade policies and were allowed to set up four SEZs in Zhuhai, Shantou, Xiamen and Shenzhen in 1980. Further liberalization of the "Law of the People's Republic of China on Joint Ventures using Chinese and Foreign Investment" came in 1983.

Later in 1984 experimental SEZs have showed good results and it was decided to extend experiment to another fourteen cities and Hainan island. Moreover, in order to provoke the technology transfer twelve cities were established as Technology Promotion Zones (Zhang, 1995).

In the end of 1986 the State Council proclaimed the 'Provisions of the State Council of the People's Republic of China for the Encouragement of Foreign Investment'. These provisions were aimed to encourage foreign investments rather than just permitted them. The 1986 provisions provided incentives for foreign joint ventures in the form of special tax treatment, barriers from bureaucratic interference and rights to freely import parts and materials. Some extra tax benefits were offered to export oriented and high-tech enterprises. Furthermore, on the 6th National People's Congress the documents covering

operations of wholly foreign owned enterprises were issued. Wholly foreign owned companies were required to use advanced technologies or to be export oriented. These laws were greatly extended in 1990 with extra Amendments to the Joint Venture Law. Foreigners gained opportunity to be the Chairman of the Board of Directors and eliminated upper limit for the proportion of foreign capital in the enterprise (Chen et al. 1995).

In the 1990's, China was focused on using foreign capital to fund its own domestic businesses, while at the same time keeping perfect conditions for foreign businesses in China. A law passed in April of 1994 suggested redistributing the funds gained from foreign investments into valuable Chinese industries: especially farming, alternative energy sources, mining and technology. This goal was successfully achieved through changes in foreign taxing procedures and well-planned monetary support. This initiative was supported by two major economic administrations in China calling for better strongholds on foreign businesses operating in China, as well as more rational inquiry into those wishing to begin operations. The effects of both the law and the paper were widespread, and not only implemented new standards for the approval and registration of foreign businesses, but also determined the fines to be laid against those businesses in the case of wrong-doing (Fung et al. 2004).

The government and economic institutions of China placed key interest in funding specific ventures dealing with the development of farming and farming techniques, as well as technological ventures designed to save output and increase efficacy. It was also important to fund businesses to produce goods that were under-supplied in the global market, and those businesses hoping to increase export levels in China. Also of interest were ventures dealing with innovative technology, and companies dedicated to green business practices and the use of renewable energy.

These new standards for controlling foreign investments also spoke against the funding of some older business projects. Ventures that planned to use every-day or out-of-date technologies were not supported, and those ventures involving production of goods whose demand had already been saturated were also avoided. Other ventures that were

not supported included businesses looking to capitalize on resources on short term, and businesses already controlled by the state.

The ideological shift in Chinese foreign economic policy banned a number of industries from being supported in China, as well. Any project that posed a threat to the security of the state was not to be funded. The same was true of projects that caused harm to human beings or the environment, and projects that misused or poorly allocated resources or land. The Chinese economic standards also did not grant permission to ventures attempting to utilize technology exclusively available in China.

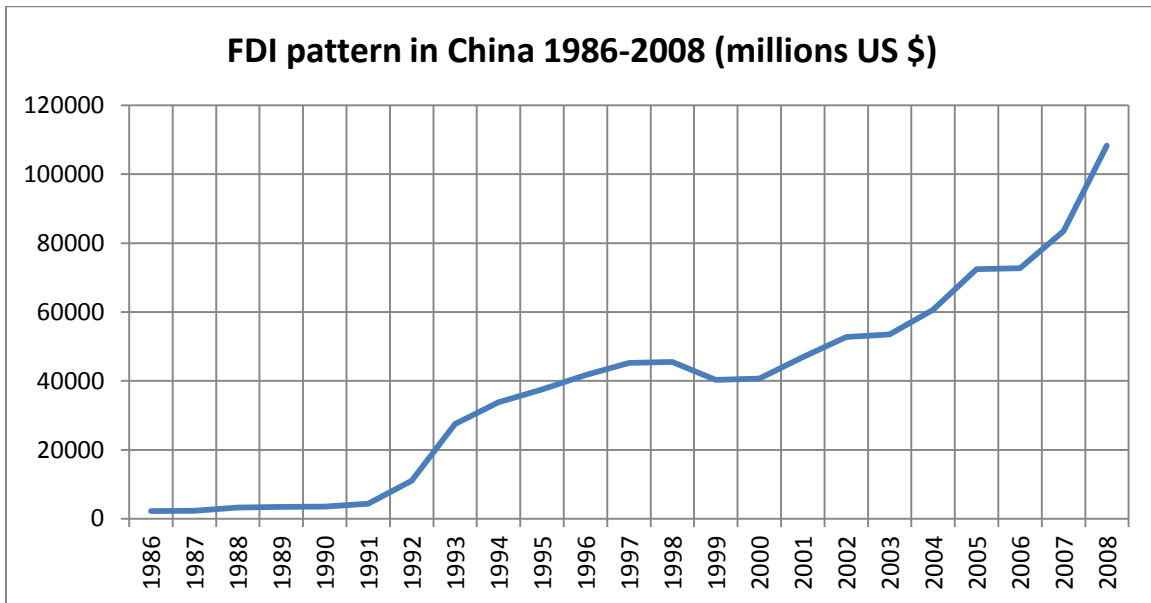
For the most part, the policies established toward foreign investment in Chinese industry can be understood as a three-stage process. Initially, the Chinese attitude toward foreign investment was both wary and highly limited. Afterward, both the government and active economic institutions showed preference toward some businesses, but not all. In the third phase, those enterprises that also supported the domestic economy were shown high levels of support (OECD, 2002).

3.2 Foreign Direct Investment to China – A Historical Background

3.2.1 FDI pattern

Foreign direct investments (FDI) grew during the mid-to-late 1980's. This happened largely because of a number of initiatives started in order to regulate investments in China. During the 1990's, the FDI grew even higher, and actually were about a third of the total foreign capital brought into China. After 1992, this situation developed, causing the FDI to be China's most important source of foreign capital. Now, China is one of the largest recipients for FDI income worldwide, and takes the lead amongst other developing nations. From the years 1991-1998, the amount of foreign direct investment in China grew by nearly 40 billion US dollars (SSB, 2000). Figure 1 shows inward FDI in China during 1986-2008.

Figure 1.



Source: UNCTADstat data

While the total amount of foreign direct investments may have exponentially increased, the actual number of FDI contracts has actually exhibited a different model of behavior. This is true beginning with the second phase of FDI treatment in China. Upon examination, it becomes clear that the actual number of contracts related to FDI drastically increased in at the beginning of the 1990's, reaching their highest level around 1993. In terms of the total FDI, though, this sharp increase is not present. In actuality, it has grown rather slowly.

Beginning in the late 70's and continuing into 2000, the level of actually used Foreign direct investment increased, aside from a small decrease in the early 1990's. This number must be contrasted against the total amount of contractual FDI reported, though. There is in fact a sharp discrepancy between these numbers. This situation, though, is fairly common. For example, prior to the mid 80's only a fourth of contractual FDI was legitimately obtained. Before 1985, between a quarter and a half of contracted FDI was actually realized (SSB, 2000).

This situation happened because of a number of factors, including the wariness felt by investors toward international business policy in China during the 90's. In the 1980's this

situation appeared to have improved because of the positive changes which affected Chinese business culture at the time. The decrease in foreign investment noticed in the 90's is in part an effect of the global political turbulence at that time, but also a result of the Chinese government's changing attitude toward international business. An economy on the verge of recession, and its effect on the credit industry, also negatively affected this situation. These reasons, while thoroughly understandable, may not be the only source of discrepancy between contractual and actual FDI rates during the 90's. It is also widely believed that a large number of businesses funded at that time may have been illegitimate. Tax packages were immensely beneficial for both foreign and domestic parties, increasing the incentive for, and likelihood of fraud. All of these factors may have contributed to the sharply different numbers reported between contracted and used FDI. This problem peaked around 1992, but seems to have largely resolved itself sometime during the mid-to-late 90's (Fung et al. 2004).

3.2.2 Sources of FDI

Emigration-flow of Chinese citizens to other South-East Asian countries was keenly attributed for in the strategies established during the third phase of China's policy toward foreign direct investment. In order to appeal to these citizens abroad, China established four special economic zones in both Guangdong and Fujian province. These southeastern provinces are home to a number of cities bordering metropolitan communities like Macao and Hong Kong. Cantonese-speaking citizens have long populated these two cities, and hold strong ties with other communities in Guangdong province. Special economic zones in Fujian border Taiwan, also populated by a large group of Chinese-born citizens.

The amount of investment produced by Chinese citizens abroad can be seen as a direct effect of the government's emphasis on these special economic zones. In fact, Chinese citizens living abroad accounted for the largest part of China's accumulation of foreign direct investment. This was particularly true during the late 80's and early 90's. If one consults the data, it becomes apparent that Hong Kong was actually the strongest source of foreign direct investments for China, with Taiwan, Singapore, and Macao not far behind (Zhang, 2005). Hong Kong alone was responsible for nearly 170 billion dollars

worth of FDI between the years of 1983 and 2000, constituting about half of the total FDI used during this time. These investments from bordering cities were also popular due to the abundance of mutual ventures, and currency exchange issues. However, bordering economies were not the only source of Foreign direct investment in China. During this same time period, the US invested around 30 billion, Japan invested 28 billion, and Taiwan invested 25 billion, making these countries the second, third, and fourth largest contributors to China's FDI , and responsible for about a fourth of the total FDI coming into the country. Singapore, Macao, and Korea are also major investors in the Chinese economy (UNCTADstat).

Despite the strong trend of investments from throughout Southeast Asia in the 90's, a large number of investors from Western Europe and North America began to take notice of the opportunities in China, as well. This situation has only continued to grow. Investors from Europe and the US are becoming a major source of investment for China. While Hong Kong is still the largest and most significant source of China's FDI, it's share in the flow of FDI into China has decreased from 68% of FDI to 48%, and a similar pattern can be seen amongst Taiwan, Singapore, and Malaysia. In the past few years, the total amount of foreign direct investment from Southeast Asia has significantly dwindled. From 1992 to 2000, The US jumped from the fourth largest provider of China's FDI to the second largest, and now contributes about 10% of China's total FDI. The complete share of FDI from countries like the UK, Canada, Germany, France, and the Netherlands has also significantly increased, from about 2% in the early 90's to 10% in 2000. Industrialized western nations are now responsible for more than 30% of the foreign direct investment coming into China today (Almance of China's External Economies and Trade, various issues).

3.3 China and the World Trade Organization

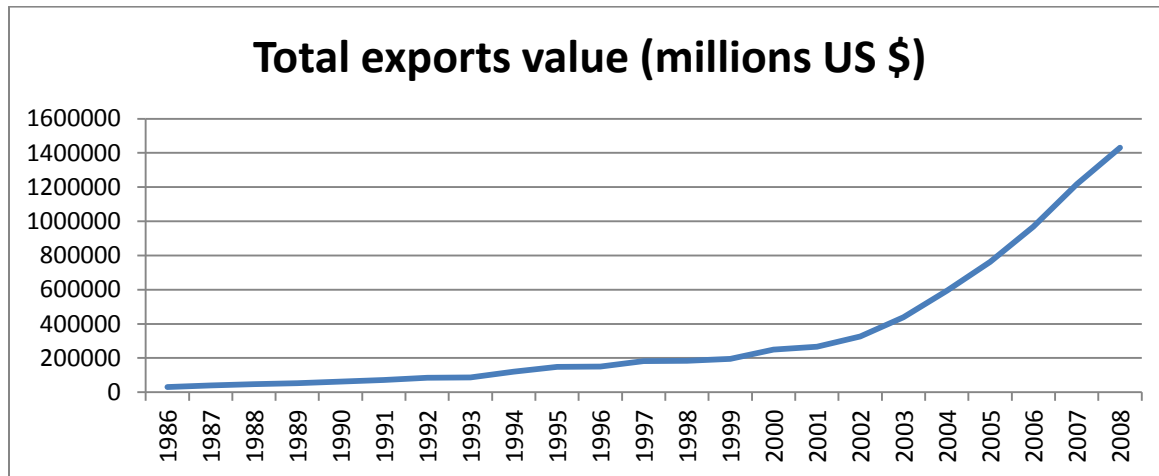
China's negotiation with the World Trade Organization is a broad and extensive field for discussion. However it is important to summarize the information about consequences of WTO accession for Chinese foreign trade and FDI policies.

At the 18th Working Party meeting held at Doha, the Chinese government accepted a protocol on the entry to the World Trade Organization on 11 November 2001. The concept of WTO framework is based on the three basic principles concerning the trade administration system: transparency, uniformity and judicial reviewability (World Trade Organization, 2001).

In the case of China, this means that China must ensure that laws and regulations affecting foreign trade fully available to other members, individuals and enterprises. Moreover, the WTO Agreements are applied uniformly through its entire country, including all sub-national level (He et al., 2001). At last, China has agreed to establish independent tribunals, contact points and procedures for the prompt review of all administrative actions with respect to trade-related laws and regulations.

Importantly, China has agreed to eliminate “any export performance, trade balancing, foreign exchange balancing, and prior experience requirements, such as importing and exporting, as criteria for obtaining or maintaining the rights to import and export” (World Trade Organization, 2001). This means that foreign-invested enterprises are now allowed to export and import most types of products and technologies. The gradual reduction or elimination of tariff and non-tariff barriers had a positive impact on the foreign trade performance and FDI attraction. Foreign investors gained possibility to enjoy more fair and transparent business environment in China. This served as an encouragement for foreign investment of all types and increased exports. Figure 2 illustrates the drastic increase of Chinese exports after WTO accession.

Figure 2.



Sources: Statistical Yearbook (various years)

WTO membership offers China a more stable international trading environment because it ensures that Chinese products have greater access to the world market. At the same time, other WTO member countries are guaranteed access to the growing Chinese market. As a new member of the WTO, China has become even more attractive to international investors as its investment barriers are removed.

3.4 Previous Studies

This section summarized previous studies on the impact of FDI on the export performance in developed and developing countries, including China. The available empirical evidence of the FDI role is mixed.

Greenway et al. (2004), Kneller and Pisu (2007) argue that export oriented Multinational Corporations are most likely to increase exports of domestic companies through positive export spillovers. Aitken et al. (1997) used an example of a Korean Multinational Corporation, which entered the Bangladesh market, to show positive external effect of FDI. The existence of the Korean company provoked tremendous rise of domestic companies, which later created the largest export industry in Bangladesh. Prasanna (2010) in the recent research of the impact of FDI on export performance in India examines the data for the period between 1991-92 and 2006-07 and finds out that overall

FDI impact on exports in India had positive and significant effects. Interesting, that manufacturing value added is used as a proxy for domestic efforts, instead of domestic investments.

Kutan and Vukšić (2007) estimated the effects of FDI on exports in 12 Central and Eastern European countries between years 1996 and 2004. For the whole sample it was possible to find evidence that FDI was extending exports by increasing the country's domestic supply capacity. Some other studies also indicated that FDI has positive effects on export performance of host countries (Cabral, 1995; Blake and Pain, 1994). Moreover, few studies showed positive effect from FDI at the national level, affecting productive efficiency, job creation and economic growth (Kueh, 1992; Cheng et al., 1995).

It is pertinent to point out that many studies were unable to find positive impact of FDI. For example, Goldberg and Klein (2000) got mixed results in their analysis of some Latin American countries and the United States. The results were different between different sectors and host countries. Thus, the authors could not clearly identify relationship between inwards FDI and country's export performance. Further, Sharma (2000) does not see any statistically significant impact of FDI on Indian exports. Several cross-country studies found support for the hypothesis of a negative relationship between FDI and export (Jeon 1992).

The papers from Sun (1998, 2001) and from Zhang and Song (2000) are in particular interest for this study. Sun (1998) analysis ten coastal provinces during period from 1983 to 1995 and concludes that FDI has greatly contributed to China's economic growth, exports and employment. However, he also points out possible and occurred side effects of intense FDI inflow, such as increasing inter-regional economic disparity, environmental problems caused by transferring of heavy pollution industries to China, possible income loss for the domestic companies and the government. The next research Sun (2001) extends by using panel data that includes 3 macro-regions with a total of 29 provinces during period 1984 to 1997. Once again it was possible to establish positive relationship between FDI and export performance in China. However, latter is true only for 2 out of 3 macro-regions. The strongest effect was observed in the coastal region, what is explained by Guangdong province as the main destination of FDI during that time

period. Moreover, by excluding Guangdong province from the regression, the FDI coefficient decreases to half. For the western region it was not possible to confirm positive effects of FDI. Zhang and Song (2000) investigate the same research question but at the provincial level. Using panel data for 24 provinces during a period from 1986 to 1997, they calculate a correlation coefficient using a simple regression model and conclude that higher levels of FDI are consistent with higher provincial exports.

Summarizing the overview of previous research, it can be argued that earlier studies were able to come to the same conclusion about the impact of FDI on the exports performance, particularly in China. Accordingly, this study tries to provide a further and more detailed research, using more suitable econometric model and a well-defined dataset, which covers a longer period. In addition, this study contributes empirical research of the relationship between FDI and exports in China after its accession to World Trade Organization. Most of the previous research on this topic is usually limited by theoretical debates and expectations.

4. Hypothesis

The aim of this study is to examine the inward FDI inflows impact on China's international trade performance. Given the results of previous empirical studies and appropriate theoretical background a testable hypothesis can be formulate:

Hypothesis 1: Inward FDI has a positive effect on exports in China.

A second testable hypothesis is formulated on a more strict time period. China's accession to WTO was closely connected with different policies that could affect FDI and exports. Thus, it is essential to examine particular linkage between FDI and exports in this time period.

Hypothesis 2: Inward FDI has effect on the exports performance in China and that effect is stronger after WTO accession.

5. Data and Methodology

5.1 Empirical Strategy

In order to examine the impact of FDI on the export performance in China, panel data on the provincial level is used. In general, the methodology and framework used for this study are in line with previous studies. Importantly, many factors can affect exports and these factors may vary from one province to another. The levels of export can depend on domestic investments and overall province conditions¹. In order to measure the elasticity of changes in exports regarding changes in the independent variables, it is essential to use the logarithmic form of these variables.

To remove the influence of domestic investments on exports performance, it is necessary to include this variable in the right side of the equation. Some previous studies have shown that domestic investments can notably affect export levels (Erickson and Hayward 1992, Leichenko and Erikson, 1997). As a matter of fact, effects from FDI and domestic investments are more likely to take place with some delay, and thus the variables are used at time $t-1$. Year dummies are supposed to capture most of the business cycles effects, including different financial and economic crises occurred in Asia. Well-known from the gravity literature is that GDP is highly connected with country's exports and therefore GDP and GDP per capita variables are included in the estimations.

In order to estimate the relationship between exports and FDI, panel data consisting of 29 provinces from 1986 to 2009 is used and provides more efficient estimators than independent cross-sections models. Due to some limitations in the data availability the panel is unbalanced. There are a number of different estimation techniques available to work with the panel data. The most straight-forward approach is to estimate OLS including dummy variables for years and provinces. In total, this would require the addition of 29 provinces and 23 year dummies to the estimation model. Instead, by using a proper within-transformation it is possible to estimate Fixed Effects (FE) model which

¹ The gravity literature suggests that trade cost is an important factor in trade flows. However, this study does not operate with bilateral data and unable to include trade costs to the model.

should provide more accurate and efficient results by reducing the number of variables. Another possible estimation method is Random Effects (RE) model. To determine which of the models is more appropriate to use, Hausman test was performed². The baseline model fitting Fixed Effects requirements can be presented as:

$$\ln EXP_{i,t} = \beta_0 + \beta_1 \ln FDI_{i,t-1} + \beta_2 \ln DI_{i,t-1} + \beta_3 \ln GDP_{i,t} + \beta_4 \ln GDP-PC_{i,t} + \beta_{5-28} Year + \varepsilon_{i,t} \quad (1)$$

Where $EXP_{i,t}$ is total exports value in province i at time t , $FDI_{i,t-1}$ is of utilized FDI in province i at time $t-1$, $DI_{i,t-1}$ is domestic investments in province i at time $t-1$, $GDP_{i,t}$ and $GDP_PC_{i,t}$ are Gross domestic product and gross domestic product per capita in province i at time t . The GDP and GDP per capita values indicate the overall economic performance of a province and exports performance as well. Year are dummy variables, and $\varepsilon_{i,t}$ is error term. Province dummies are not estimated in the FE model, but are taken into the account by proper transformation to fit Fixed Effects. Therefore, this captures all province-specific heterogeneity that does not change over time, such as location, difference in infrastructure, access to the sea ports and so on.

Moreover, in order to check results for robustness, additional three models will be estimated. Therefore, model (1a) is extended with one additional lag of FDI variable. Model (1b) has additional lag of FDI and DI variables, and finally model (1c) has GDP per capita variable excluded, in order to eliminate possible correlation with GDP variable.

In this framework, the main variable of concern is FDI and corresponding to it coefficient β_1 . Following the hypothesis introduced earlier, the FDI coefficient is expected to be positive and significant. Likewise, GDP or GDP per capita variables are also expected to be positive.

One of the contributions of this study to the previous research of FDI impact on the export performance in China is the possibility to work with the data after China's

² The test has the null hypothesis that the preferred model is random effects vs. the alternative the Fixed Effects (Greene, 2011). Hausman test reports χ^2 value of 97.55 and the p-value equal to 0.00, thus Fixed Effects estimator is more appropriate (Cameron and Trivedi, 2009).

accession to WTO in 2001. It is important to note that the comparatively short time period necessitates the use of the first-order lag structure. Thus, the baseline model (2) has no lagged variables:

$$\ln EXP_{i,t} = \beta_0 + \beta_1 \ln FDI_{i,t} + \beta_2 \ln DI_{i,t} + \beta_3 \ln GDP_{i,t} + \beta_4 \ln GDP-PC_{i,t} + \beta_{5-14} Year + \varepsilon_{i,t} \quad (2)$$

The comparatively short time period necessitates the use of the first-order lag structure only. The baseline model (2) has no lagged variables, what leaves it to work with total of 219 observations. Specifications (2a) and (2b) include the first-order lag of FDI and domestic investments, what leaves only 201 observations. The model (2b) has GDP per capita variable excluded from the regression in order to check for the robustness of the results.

Important to note is that panel data usually suffers from two problems: heteroskedasticity and autocorrelation. Even if the error terms for each panel are homoskedastic, there is a possibility that error terms between panels are not homoskedastic. Moreover, error terms might be correlated with each other. Both these problems cause coefficient estimates to be inefficient. In order to eliminate possible problems with estimations, White's robust standard errors will be used instead of normal standard errors.

5.2 Data

The primary source of data is China Statistical Yearbooks, available as in printed version and through the online database. The period covered is from 1986 to 2009. There are 29 provinces included in the dataset. One of the strengths of the dataset is utilizing the most comprehensive data available to date.

Table 1 shows the summary statistics of the variables that are used in the full-sample estimation. Exports in millions US dollars are total province export values, including domestic and foreign enterprises. Minimum value is 0.005 and maximum is 2532.29, in total there is 695 observations. FDI utilized has minimum of 0.17 million dollars US and maximum of 2126.57 in total of 633 observations. Domestic investments are measured in

100 million yuan and within 694 observations have minimum of 16 and maximum of 19034. GDP is also measured in 100 million yuan and has minimum of 34.52 and maximum of 39482. At last, GDP per capita is measured in yuan per person with total of 687 observations, minimum of 467 and maximum of 78989.

Table 1

Descriptive statistics for full sample 1986-2009				
Variable	Number of observations	Mean	Min	Max
Exports (millions US dollars)	695	167.43	0.005	2532.29
FDI utilized (millions US dollars)	633	188.16	0.17	2126.57
Domestic Investments (100 million yuan)	694	1620.1	16	19034.53
GDP (100 million yuan)	694	3741.59	34.54	39482.56
GDP per capita (yuan per person)	687	9423.13	467	78989

In addition to this, table 2 shows the correlation between the main variables used in the regression. For brevity, table presents the full sample only, as the sub-sample shows relatively close digits. It is easy to see a strong positive correlation between the used variables.

Table 2

Correlation between variables					
	Exports	FDI utilized	Domestic Inv.	GDP	GDP per capita
Exports	1				
FDI utilized	0.845	1			
Domestic Inv.	0.814	0.81	1		
GDP	0.762	0.78	0.875	1	
GDP per capita	0.839	0.817	0.977	0.815	1

6. Empirical results

6.1 Full Sample

Table 3 shows results for the baseline model (1) and three other models that were discussed previously. As a first step, the results of baseline model estimations are discussed. According to the results, there is no relationship between FDI and exports in the model (1), as the first order lag of FDI variable is insignificant. This is a surprising finding, which will be further tested for robustness. However, GDP variable coefficient is 2.339 implying strongly positive and significant effect what corresponds with the economic rationale, that initial conditions might affect province's exports and overall performance. Due to high correlation between variables, there is possibility that GDP variable has absorbed some effects of FDI. Domestic investments and GDP per capita variables have negative coefficients, but they are not significant. The baseline model R^2 value, as a measurement of fitness, is equal to 0.91, meaning that 91% of variation in the dependent variable explained by the chosen independent variables.

To explore whether the unexpected finding that FDI does not have any effect on exports is the result of some peculiarity with the baseline model, it is essential to subject the results to a number of robustness checks. For clarity, the results are also presented in table 3. After extending model (1) with the second-order lag of FDI, FDI variable becomes significant at the 5% level with the coefficient equal to -0.057. The coefficient of GDP variable is positive and significant at 1% level and equal to 2.3. Other two variables stay not statistically significant.

Table 3

Full sample estimation results				
Variable	Baseline model	Model (3a)	Model (3b)	Model (3c)
FDI utilized				
L1.FDI ³	-0.040 0.031	-0.003 0.023	0.000 0.024	-0.002 0.025
L2.FDI		-0.057 0.023	-0.058 0.022	-0.064 0.025
Domestic Inv.				
L1. Domestic Inv.	-0.141 0.152	-0.174 0.155	-0.301 0.248	-0.396 0.285
L2. Domestic Inv.			0.150 0.227	0.155 0.227
GDP	2.339 0.625	2.303 0.639	2.281 0.629	1.871 0.403
GDP per capita	-0.699 0.601	-0.594 0.592	-0.591 0.591	
Number of obs	618	586	586	586
R-sq	0.9103	0.9041	0.9043	0.9034

Note: Robust standard errors in parentheses.

****, ** and * indicate that coefficient is significant at 1%, 5% and 10% levels respectively.*

Model (1b) has second-order lags of FDI and Domestic Investments variables included in the regression. The results are comparable with previous model. The coefficient of second-order lag FDI variable decreases to -0.058 and the coefficient of GDP variable decreases to 2.28. However, Domestic Investments and GDP per capita variables stay insignificant. The final model that tests for robustness is (1c), which has both second-order lags of FDI and Domestic Investments included, while GDP per capita variable is excluded. The coefficient of second-order lag FDI variable decreases further to -0.064.

³ L1 – is the first-order lag of the variable.

L2 – is the second-order lag of the variable.

Likewise, the coefficient of GDP variable decreases to 1.87 and two other variables stay insignificant.

Interesting that in all models the coefficient of the second lag of FDI variable has a negative sign, opposite to what is expected. Therefore, the FDI coefficient is in the range from -0.057 to -0.064, meaning that 1% increase of FDI is causing 0.057-0.064% decrease of exports. The coefficient of GDP variable is positive and significant at 1% level and is in range from 1.87 to 2.3. Thus, it is reasonable to assume that province's initial and overall economic conditions effects exports potential.

Unfortunately, it is hard to explain why the results are opposite to what was expected. The advantage of the Fixed Effects model is that it captures sufficient disproportionate distribution of FDI across different provinces. Moreover, it also takes into account the nature and type of FDI, which can vary among different provinces. Possibly, the negative sign of FDI variable can be explained by different trends of FDI over time. Due to high correlation between GDP and FDI variables, there is also a chance that some of the positive FDI effects were absorbed by GDP variable. According to the results, the hypothesis 1 has to be rejected.

Sun (2001) in his research of FDI and regional performance, argues that Guangdong province has a significant impact on the robustness of results, as it is one of the largest exporters and FDI recipient provinces. Thus, as a further robustness test, table 4 presents results from the estimation of the same models as above with Guangdong province excluded.

Table 4

Full sample estimation results excluding Guangdong province				
Variable	Baseline model	Model (3a)	Model (3b)	Model (3c)
FDI				
L1.FDI	-0.040 0.031	-0.003 0.023	0.000 0.024	-0.002 0.025
L2.FDI		-0.057 0.023	-0.058 0.022	-0.064 0.025
Domestic Inv.				
L1. Domestic Inv.	-0.141 0.152	-0.174 0.155	-0.301 0.248	-0.396 0.285
L2. Domestic Inv.			0.150 0.227	0.155 0.227
GDP	2.339 0.625	2.303 0.639	2.281 0.629	1.871 0.403
GDP per capita	-0.699 0.601	-0.594 0.592	-0.591 0.591	
Number of obs	618	586	586	586
R-sq	0.9103	0.9041	0.9043	0.9034

Note: Robust standard errors in parentheses.

****, ** and * indicate that coefficient is significant at 1%, 5% and 10% levels respectively.*

By excluding Guangdong province, the coefficient of FDI variable became slightly more negative and lies within the interval from -0.059 to -0.068. This result is inline with Sun (2001) findings. According to his estimation results, the FDI coefficient decreases nearly twice with Guangdong province exclusion, confirming significance of the province as one of the largest FDI recipient. Additionally, in comparison to the first estimation, the coefficient of GDP variable has fractionally increased with a maximum of 2.61 and a minimum of 1.99. Thus, it is clear that Guangdong province to some extent effects results.

To summarize, the baseline model did not show any significant effects from inward FDI on exports. Extending the model by the second-order lag made the coefficient significant, but surprisingly with the opposite sign from what was expected. Therefore, the hypothesis 1 is not upheld.

6.2 Sub-Sample 2001-2009

Table 5 presents estimation results of the baseline and two additional models for the period from 2001 to 2009.

Table 5

Sub-sample estimation results			
Variable	Baseline model	Model (3a)	Model (3b)
FDI	0.136 0.050		
L1.FDI		0.091 0.051	0.091 0.051
Domestic Inv.	-0.225 0.142		
L1. Domestic Inv.		-0.114 0.179	-0.106 0.155
GDP	0.198 0.847	-0.443 1.367	-0.349 0.459
GDP per capita	-0.425 0.513	0.101 1.160	
Number of obs	219	201	201
R-sq	0.9042	0.8885	0.8885

Note: Robust standard errors in parentheses.

****, ** and * indicate that coefficient is significant at 1%, 5% and 10% levels respectively.*

As table 5 shows, in the baseline model FDI variable has a positive coefficient 0.136 at the 5% significance level. Therefore, the 1% increase of FDI is associated with 0.13% increase of exports value. It is possible to assume that such contrast results to the full

sample are consequences of the gradual increase of FDI inflows and drastic increase of Chinese export sector. As it is shown in figure 2 the exports value increased more than 5 times and FDI more than doubled during the period 2001-2009. In addition, during this period FDI greatly increased in the mainland regions and became distributed more evenly, comparing to previous domination in the coastal area. In comparison with full sample, GDP variable has lost its significance. Moreover, none of other variables are statistically significant in the model (2). The baseline model R^2 value is 0.904 meaning that 90% of variation in the dependent variable explained by the chosen independent variables.

In case of the models (2a) and (2b) the coefficient of the first-order lag of FDI variable is equal to 0.091 and significant at the 10% level. This implies that a positive relationship between inward FDI inflows and exports is robust to the selection of independent variables for the sub-sample. For brevity, estimations for sub-sample with Guangdong province excluded are not presented, as they are approximately identical to the results above. Additionally, the R-square value for the model (2) is the highest and equal to 0.904 comparing to 0.888 for models (2a) and (2b). Most likely, more explanatory power of the baseline model (2) can be explained by the comparatively short time period covered and inclusion of the first-order lags in two other models.

The obtained results indicate that inward FDI had positive effects on Chinese export performance after the WTO accession. This can be supported by previously mentioned increased incentives for MNEs, such as more standardized and transparent policies, trade barriers and tariffs reduction. The findings are in line with the theoretical background as well as with the previous empirical research. Thus, inward FDI has positive effects on the exports performance in China during period 2001-2009 and hypothesis 2 is accepted.

7. Conclusion

Since the beginning of the market-oriented reforms in China 1978 there has been a big increase in the country's FDI. Initially the reforms started with allowing foreign companies to invest in China but as time progressed the Chinese government emphasized the importance of FDI. By establishing special economic zones and promoting joint ventures between domestic firms and foreign firms, the government created more favorable conditions for FDI. These changes acted as incentives for more FDI and today China is one of the world's largest economies and recipients of FDI. As previously mentioned, prior research has shown that FDI can possibly improve labor productivity, technology transfer and knowledge, as a result it is an important factor for a country's industry. In addition, some prior research has also confirmed that FDI has had a positive impact on exports in China. However, unlike prior research regarding FDI in China, this thesis is providing a more detailed research with a better defined data-set and econometrical model. Moreover, this thesis has a focus on FDI and exports in China after the entry to WTO. Therefore the aim of this thesis is:

To investigate the inwards inflows impact on China's international trade performance

Using panel data at the provincial level in the period of 1986-2009, this paper provided empirical evidence on the role of inward FDI and export performance. The results for the full sample are surprising and contradicting to the widely held belief that increase of FDI positively affects export values, as FDI variable has a negative sign and it stays consistent after robustness tests. Therefore, hypothesis 1 has been rejected. This can be due to different FDI trends over time or high correlation with GDP variable. In contrast to pooled OLS estimator commonly used in previous research, this study uses Fixed Effects estimator as it appeals to be more appropriate for provincial data.

However, hypothesis 2 has been supported. Results from estimation sub-sample reveal positive and significant effects of FDI on exports. Obtained results are also robust to changes in variables. This is showing that WTO accession had affirmative impact on FDI and exports in China. This finding implies that China's gradual liberalization of

investment policies, which promoted FDI, had greatly contributed to the outstanding export performance.

For the future research, it is interesting to use bilateral data and apply gravity model specifications. This could help to evaluate impact of FDI from different countries. It is also possible to investigate the impact of WTO accession on different regions in China, as previous researches utilize data until year 2000.

8. References

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