AN ANALYSIS OF CHINA'S FOREIGN TRADE WITH AUGMENTED GRAVITY PANEL DATA MODEL

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ABSTRACT

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AUGMENTED GRAVITY PANEL DATA MODEL

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The rapid transition of China from a closed agricultural society to an industrial powerhouse has been associated mainly with a rapid increase in the share of China in the world trade. The basic objective of this study is to analyse the foreign trade of China with its trading partners via Extended Gravity Panel Data Model to assess whether some main economic indicators have any effect over its bilateral trade relations. These economic indicators are gross domestic product of China and its trading partners, gross domestic product per capita and free trade agreements made between China and its trading partners to increase bilateral trade. These factors are believed to have explanatory power for China's foreign trade. They are analyzed within the framework of augmented gravity model. In addition the the bilateral trade relations' success depens on social relations such as the existence of common language. Further, the existence of a common border and the distance between the countries are also included within the model. As a result of the analysis, the main economic indicators are found to have a high importance in increasing the bilateral trade of China.On the other hand, the absence of a common language, common border and a long distance between the trading partners are found to reduce the bilateral trade between China and its trading partners.

Keywords: China's Foreign Trade, Gravity Model, Panel Data Analysis

ÖZ

GENİŞLETİLMİŞ ÇEKİM PANEL VERİ MODELİ İLE ÇİN'İN DIŞ TİCARETİNİN ANALİZİ

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Çin'in kapalı bir tarım toplumundan bir sanayi devine hızlı geçişi özellikle dünya ticaretinden aldığı paydaki artışa bağlı olarak gerçekleşmiştir. Bu çalışmanın temel amacı, bazı temel ekonomik göstergelerin Çin'in ikili ticari ilişkileri üzerinde etkisini değerlendirmek için Genişletilmiş Yerçekimi Panel Veri Modeli aracılığıyla Çin'in ticaret ortakları ile arasındaki ticareti analiz etmektir. Çin'in ve ticari ortaklarının gayri safi yurtiçi hasıla değeri, kişi başına gayri safi yurtiçi hasıla ve Çin ile ülkeler arasında ticareti artırmaya dönük imzalanan serbest ticaret anlaşmaları gibi Çin'in ticari ilişkilerini açıklama gücüne sahip ekonomik göstergeler genişletilmiş çekim modeli çerçevesinde analiz edilmektedir. Bunun yanısıra, ikili ticari ilişkilerin başarısının sosyal ilişkilere bağlı olduğu değerlendirmesi çerçevesinde, ortak dil, ortak sınır ve ülkeler arasındaki uzaklık modele dahil edilmiştir. Çalışmanın sonucunda, temel ekonomik göstergelerin ve serbest ticaret anlaşmalarının ikili ticaretin artırılması için yüksek öneme sahip olduğu, ortak bir dil ve ortak sınırın olmamasının ve iki ülke arasındaki mesafenin artmasının ikili ticareti azalttığı değerlendirmesine ulaşılmıştır.

Anahtar Kelimeler: Çin'in Dış Ticareti, Genişletilmiş Çekim Modeli, Panel Veri Analizi

To Me and My Parents

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CHAPTER I

INTRODUCTION

Over the past three decades, China's two historic transformations, from a rural, agricultural society to an urban, industrial one, and from a command economy to a market-based one, have combined to yield spectacular results. Since the institution of its reforms and Open Door policy in 1978, China's gross domestic product (GDP) has been growing at an average annual rate of more than 9 percent. In 2010, it is poised to surpass that of Japan and become the world's second-largest economy (OECD, 2011). After the 2008 global crisis, in 2011 China's gross domestic product (GDP) growth outpaced the rest of the world at 9.2 per cent and China was the second biggest merchandise exporters in 2011 with 1.90 trillion $ or 10.4% share of the world exports. It was also the second leading importer after United States with 1.74 trillion $ or 9.5% share in world import volume (WTO, 2012).

Trade policy in China, a 'socialist market economy' underwent a major change during the 1979-1980 period, when the central government decided to establish four Special Economic Zones (SEZs) due to Open-Door Policy to attract foreign direct investment (FDI) and new technologies. Domestic and foreign trade sectors were opened to FDI which increased dramatically in the late 1990s. Especially foreign enterprises, which include enterprises with investment from Chinese Hong Kong, Macao and Taiwan, played more and more important roles in the manufacturing sector of China Altough the type of trade policy was the mix of both import-substitution and export-orientation during a long period of the reform era, the trade policy gradually shifted towards the East Asian growth model of export-oriented growth with high import tariffs (Wang, 2004). The integration of China,3rd country in World good trade in 2006, to world trade system and expansion of its trade within international context after its membership to World Trade

Organization (WTO) provides China with a big development in the economic performance. Altough China continues the gradual liberalization of its international trade and investment regime like other WTO Members, China resisted a protectionist response to the effects of the global economic recession. Especially the response to the effects of the global economic recession have been expansionary fiscal and monetary policies to offset the sharp decline in external demand, putting more emphasis on domestic demand to drive GDP growth. But, since the strong increase in domestic demand stemming from the stimulus has drawn in imports and exports have been weak and may not recover to pre-crisis rates, the current account surplus is set to fall sharply to %5½ of GDP by 2010 before rising somewhat in 2011, as domestic demand growth eases (OECD, 2011).

In fact, China, depended on export-led growth with high import-intensity of its manufactured exports was left vulnerable to the effects of the global economic recession. Its economy's heavy reliance on manufacturing has resulted in over-investment and hence excess capacity in certain industries, which became obvious when external demand declined. In order to rely less on manufacturing, the crisis has reinforced China to relax FDI restrictions on some services sectors and promote the expansion of agriculture by providing production subsidies and phase out agricultural taxes. On the other hand long-term structural reforms that are needed to strengthen its social safety net, reduce precautionary saving by households, diversify its economic structure, and to improve its underdeveloped capital market, which has contributed to high enterprise saving are undertaken (Gang, Qiang and Peng, 2010). China is increasingly becoming part of the global production chain, importing parts and components from its Asian neighbors and exporting processed goods to the USA and EU15 (Yujie, 2010). In addition China with increase in merchandise trade volume and output of products with increasingly high domestic content, as well as an increase in services trade, China has become the world's leading exporter of information and communications equipment and its firms are moving beyond simple assembly of imported parts into processes requiring higher skilled labour and greater technology inputs (OECD, 2010).

Although China still has the intention of further liberalizing its import and export policies to its reinforce its role in WTO Members, China's average applied MFN tariff was 9.5% in 2009, and it still uses various non-tariff border measures, such as import and export licensing or state trading to "guide" the allocation of resources. It still uses various export restrictions, including prohibitions, licensing, quotas, taxes, and less-than-full VAT rebates, to manage certain exports on grounds of natural resource and energy conservation. In addition, significant restrictions are still imposed on FDI in services (Razmi, 2010).

Many signs point to a growth slowdown in China to near 8.5 % in 2011-15 and to around 5% in 2026-30 due to some important developments especially within China. One reason of this is the tendency of the growth effect of shifting resources from agriculture to industry to decline, the rising capital-labor ratio. Another reason is the decrease in total factor productivity (TFP) growth, and technological progress. Moreover, the old age dependency ratio will double in the next two decades as a wrenching demographic change, and the size of China's labor force is projected to start shrinking as soon as 2015 (World Bank, 2012). All these factors mean a higher share of services and consumption in the economy, a lower share of exports, savings, investment and a decline in the trade surplus. China's current pattern of development, which has placed considerable stress on the environment—land, air, and water— has imposed increased pressure on the availability of natural resources (World Bank, 2010). China’s role as an important stakeholder in the world economy with its effective integration into global supply chains across many industries and the world trading system should not be overlooked.

In this context the aim of the study is to consider factors such as gross domestic product of China and its trading partners, gross domestic product per capita and free trade agreements made between China and its trading partners to increase bilateral trade. These factors are analyzed within the framework of augmented gravity model. In addition, social relations, such as the effect of the existence of common language, common border participation and the distance between the countries are also included within the model an analyzed.

In the first part of the study, literature related to the use of augmented gravity model will be presented. In the second part, an examination of economic and trade structure of China and the characteristics of China playing important role in its achieving the role it has today in the world trade will be discussed. In the third part, augmented gravity model will be explained. Further, the empirical model with the variables to be used will be presented. In the fifth part, panel data estimation technique namely the Fixed Effect Estimation will be explained. In the following part, the empirical results will be provided. Finally, the summary and concluding remarks of the thesis will be given.

CHAPTER II

LITERATURE ON GRAVITY MODEL APPLICATION

Applications of the gravity model are especially used to explain and predict the effects of regional trade agreements on the creation and diversion of trade, trade policy developments, and other factors that affect trade, such as natural border effects, foreign direct investments, transportation costs, GDP, democracy effects, regulatory quality, export performance and north versus south effects (Kepaptsoglou, Karlaftis and Tsamboulas, 2010).

Miranda *et al.* model the international trade of U.S., Brazil and China during the period of 1995 through 2003 by considering traditional variables such as, GDP, distance between two countries, relative price index used in gravity models, and some additional variables to capture the political and factors that stimulate or restrict trade between pairs of countries. Since they believe that cultural and political aspects such as language, political structure and the presence of government controls on trade which make China different from other traditional Western countries as a trade partner. They found temporal variables with expected sign and proper magnitudes, but the distance variable and the political effects had a poor performance (Miranda., Ozaki, Fonseca and Mortatti, 2007).

According to a recent study on trade relations of Bangladesh with its eight major trading partner countries- India, China, Singapore, Japan, Hong Kong, South Korea, USA and Malaysia-, the gravity theory is consistent with the imports of Bangladesh. That is, the geographical distance between Bangladesh and its partner countries has significant impacts on its imports, but a mixed relationship exists between the GDP and imports of Bangladesh. Moreover, the population of Bangladesh has a significant impact on imports, so does the transportation cost adversely influence Bangladesh's trade. It also shows that partner countries' GDP has significant positive impacts, and partner countries' population has mixed impact on imports of Bangladesh. The findings of the study show that Bangladesh's trade is positively influenced by the size of the economies, per capita GNP differential of the countries involved and openness of the trading countries. The major determinants of Bangladesh's exports are as follows: the exchange rate, partner countries' total import demand and openness of the Bangladesh economy. More liberalization of trade restrictions, especially in Bangladesh, is of utmost importance. Per capita GNP differential, which supports the H - O effect, is found to be a common determinant of trade both in the trade model and the import model (Rahman, 2006).

Another study (Hermawan, 2011) examines the determinant factors of export in Indonesia textile products, especially in yarns, fibres and fabrics, using the standard and augmented gravity model. It concludes that the geographical distance and size of partner countries' economy, which is reflected in its GDP, per capita income and population, significantly affects the pattern of textile product export growth. Another major result is that Indonesia tends to export to partner countries with similar level of per capita income, and as expected, the trading partners' GDP positively influences the export value, whereas geographical distance has negative impact. The present study utilizes the gravity model to calculate the potential trade value and compare it to the actual trade data within the period of analysis, which is referred as undertrade or overtrade circumstances between Indonesia and its trading partner.

In their study "Determinants of U.S. Exports to China" study, Bosworth and Collins show that the commodity composition of U.S. exports to China is similar to that to the world. The study focuses on the estimation of a set of "gravity equations", exploring the role of market size and distance from the United States, and it concludes that the asymmetry of the U.S. trade with China, small exports but large imports, is due to United States' low level of exports to all countries. In other words, while U.S. exports to China are smaller than those of the EU-15 and Japan, they are not small as to U.S. exports to other countries. Again U.S. exports to China have been increasing rapidly since 2002 (Bosworth and Collins, 2008).

Another study assessing whether aggregate and sectoral cross-border trade between Ireland and Northern Ireland is at, above or below the expected level by using gravity model for manufactured goods concludes that there is a gap between the actual and expected level of trade and there are unexploited gains from trade. In addition, parameters for these variables are found to be correctly signed and highly significant. In other words, a higher GDP increases trade while a longer distance inhibits trade; the common border and common language significantly increase trade, and a trade agreement between two trading partners also has a significant positive impact as one would expect (Intertradelreland, 2009).

Bussiere and Schnatz (2006) used results from a gravity model to examine whether China's external trade with all trading partners is consistent with the economic fundamentals included in a gravity equation for the period 1980-2003. The paper includes a gravity model of bilateral trade flow across 61 countries, most of which are large trading nations. According to the estimation results, the distance term reflecting the aerial distance between the capitals of the two countries is strongly negative, implying that trade between the two countries is important. Similarly, having a common border and speaking the same language might lead to the trade between the two countries, which is three times higher than otherwise, and free trade arrangements enter significantly and with the right sign. Moreover, comparing the trade intensity of China across countries and using the overall trade intensity of these countries, the study concludes that China is overall already very well integrated in the world markets (Bussiere and Schnatz, 2006).

The results of another study which examines Poland's aggregated bilateral trade flows with its major trade partners by means of the gravity model in a panel data framework are not surprising since the coefficients for the traditional gravity determinants such as real GDP per capita of trade partners and distance are economically sensible, and their impact on the dependent variable is statistically significant. In addition, the quality of institutions of the trade partner, as proxied by rule of law or political stability, has a positive and statistically significant impact, and foreign exchange rate volatility has a negative impact on the trade flows (Brodzicki, 2008).

The results of a gravity equation model used to estimate the potential trade between Mainland China and Taiwan in case of the removal of trade restriction show that, given their sizes, the stages of their economic development, bilateral distance as well as other characteristics, Taiwan's imports from Mainland China should be more than double that of the current value if Taiwan can import freely from Mainland China, as other East Asian economies do. The variables within the model are GDP and GDP per capita, including greater circle distance, dummy variable of common free trade areas or common market, income, population, distance, geographical, cultural and historical information (Xu and Yu, 2009).

Zhang et all’s work called "Chinese Bilateral Intra-Industry Trade: A Panel Data Study for 50 Countries in the 1992-2001 Period" intends to detect what country- specific factors influence bilateral intra-industry trade in the transition period for China and its trading partners by exploring a rich panel data set. The study includes three groups of 15 explanatory variables: (a) difference in GDP per capita and cultural distance variables to measure differences in demand (or consumer pattern) between China and its trade partners; (b) difference in electric power consumption per capita, the difference in public education expenditures variables to examine difference in endowments between China and its trade partners;(c) GDP of the trade partners in PPP prices and population size of the trade partners to measure economic size. Authors assumed that the *similarity* between China and its trade partners can explain horizontal intra-industry trade, whereas the *difference* between China and its trade partners can explain the vertical one. As seen in the results part, as the vertical intra industry trade is dominant in Chinese bilateral intra-industry trade, comparative advantage can explain not only the inter-industry trade, but also most of China's intra-industry trade (Zhang, Witteloostuijn and Zhou, 2005).

Another paper proposing a simple measure of the World's Economic Center of Gravity (WECG) based on national GDP figures and the geographical location of the world's most important cities finds that throughout the 1975-2004 period, the WECG shifted towards Asia, and the location of economic activity spread even more. In the measurement part, "mass" is replaced in our case by "real production" (Grether and Mathys, 2008).

The paper investigates whether the trade flows of each Gulf Cooperation Council countries with their partners have sustained or have developed new relations mainly after the 2003 Customs Union agreement of the GCC. The research approach is different from other gravity model studies due to the application of simultaneous estimation method used for gravity models including highly correlated (multicollinearity) proximities, such as distance, population and dummies. The results of the estimated models for the periods 1997-2002 and 2003-2007 revealed that distance variable, the key determinant of the gravity model, is insignificant for all, while incomes and time invariant variables are the important determinants of trade flows in this analysis (Insel and Tekce, 2010).

Results of another study, modeling the international trade of U.S., Brazil and China during the 1995-2003 period by using traditional variables used in gravity models, such as GDP, distance between two countries and relative price index to capture the political factors, which foster or restrict trade between pairs of countries, show that distance among these countries and their large territories, consumer market, cultural and political aspects such as language, political structure and the presence of government controls on trade have an important role. In fact, especially

GDP coefficients presented the expected sign and proper magnitudes, and the trade barriers presented statistically significant and negative effects on the bilateral countries trade, particularly Brazilian exports (Miranda, Ozaki, Fonseca and Mortatti, 2007).

Yu (2009) investigates the two-way causality between exchange rates and bilateral trade through data from China, Japan, and the United States during the 2002-2007 period. The empirical results of the study show that the revaluation of the Chinese Yuan against the dollar significantly reduced China's exports to the United States, but it had no significant effects on China's exports to Japan. In other words, this findings reveal a policy implication that revaluation of the JAMB was helpful in reducing the bilateral Sino-U.S. trade imbalance.

Wang et al.'s work called "Determinants of Bilateral Trade Flows in OECD Countries: Evidence from Gravity Panel Data Models" attempts to analyse the main causes of trade and FDI flows for OECD countries in an augmented gravity equation by incorporating such important variables as R&D and FDI. Among these, geographical distance (negatively related to trade flows), total domestic R&D stock, R&D similarity, inward FDI similarity, total inward FDI stock, level of GDP, GDP similarity and factor endowment similarity are statistically significant and remain to be important determinants of trade flows. Especially, it is found that encouragement of domestic R&D, inward FDI, and improvement in economic performance promotes international trade (Wang, Wei and Liu, 2010).

Drottz and Lantz conducted a study to estimate Sweden's export potential towards South-Korea from 1997 to 2005 by using basic gravity model, including GDP, distance in kilometer. The results of the study indicate that GDP had a weak and the dummy variable of being landlocked (i.e. when a country does not have access to open water) has a very strong relationship to the observed export data.

Nevertheless, no firm conclusions can be drawn concerning the trade potential from Sweden to South Korea (Drottz and Lantz, 2008).

Paper by Bhattacharya and Bhattacharyay (2006) which analyzes the likely impact of preferential and free trade agreement between China (PRC) and India using Gravity Model shows that the trade cooperation will improve the quality of life of common people in both countries, but since tariffs in India are very high, Chinese exporting firms have more to gain from the duty free access to India while Indian exporting firms will gain much less from duty free access to the PRC because of the latter's very low tariffs. To balance this situation in favor of India, the paper suggests that PRC should open up its service sectors so that India can also enjoy the advantage

De(2010) estimates the trade potential for India in the pre- and post- global economic and financial crisis period, using an augmented Gravity model and then attempts to determine the importance of trade remedies. It is found that India's trade potential is at its maximum in the Asia-Pacific region, followed by Africa and Latin America, and the potential for expansion of trade in the post-crisis period is highest with countries such as China. In particular the paper suggests that tariff liberalization and trade facilitation together can help build export momentum in the post-crisis period.

The results of a study investigating the trading patterns in China’s textile sector reveal a positive correlation between the sector's import/export volume, and China and its trading partners' GDP, and a negative correlation between its import/export volume and the distance separating its trading partners. The significant negative correlation between import/export volume and distance reflects the close trading relations between China and the other countries of East Asia. Moreover, it is mentioned that the ongoing process of market opening in China boosts both textile imports and exports, whereas Trading partners' openness to trade has not had a positive impact on China's downstream textile exports (Wu, Chen and Chen, 2012).

In another study conducted to assess the actual trade between China and EU within Gravity model, although the results of the gravity model explain well the trade flows between China and EU countries, the importance of coefficients such as per capita GDP difference to test Linder Hypothesis is unclear. However, according to Linder hypothesis using the gravity model, countries with similar levels of income have been shown to trade more, and these countries are trading in different goods because of their similarities (Jian, 2011).

In the empirical literature, the main reason for the studies to use augmented gravity model as an analysis tool is that trade data fits the gravity model well. In our study, trade flows of China with its 58 trade partners over the period 1992-2010 with yearly observations are analyzed. This study contributes significantly to literature since it focuses on the main role of China in world trade system with a particular emphasis on the 1992-2010 period by taking into account 73 per cent in the total trade volume of China in 2010, 78 and 70 per cent of Chinese imports and exports.

CHAPTER III

THE SCOPE OF THE ANALYSIS

3.1. Introduction

Although not stable, after being separated from central planning in 1978, China's GDP has grown at an average annual rate of 10.8% between 2004 and 2008. Population grew by 0.5%, GDP by 10.8%, foreign investments by 3% and domestic demand by 9.2%. The rate of inflation was 3.6% during the same period ın this context, consumption trend, prices, foreign investments and per capita income in China are increasing. In fact, with its growth performance in the last 10 years, China has been the world's second largest economy after the United States. It is important to note that in the European crisis time China grew by 9% in 2011, 7.8% in 2012. According to IMF estimates, by 2016 China is expected to be the world's number one economy by increasing its economic size from $11.2 trillion in 2011 to $19 trillion in 2016. China is one of the main destinations for direct foreign investment. It accepts the national treatment rule for investments. China has reached its saturation in term of foreign investment.

3.2. Trade Structure of China and Place of Chinese Trade in the World Economy

According to the 2011 estimates, the composition of China's GDP is 10%, agriculture 46.6% industry and 43.3% services. In 2011, the distribution of labor force in these sectors was as follows: 36.7% agriculture, 28.7% industry, and 34.6% services. The dollar values of China's agricultural and industrial output each exceed those of the US; China is the second after the US in the value of services it produces. The most important agricultural products are rice, wheat, potatoes, corn, peanuts, tea, millet, barley, apples, cotton, oilseed; pork, and fish. With an 12.3 % industrial production growth rate, China is a world leader in gross value of industrial output, which is as varied as mining and ore processing, iron, steel, aluminum, and other metals, coal, machine building, armaments, textiles and apparel, petroleum, cement, chemicals, fertilizers, consumer products like footwear, toys, and electronics, food processing, transportation equipment, including automobiles, rail cars and locomotives, ships, and aircraft, telecommunications equipment, commercial space launch vehicles, and satellites (CIA, 2012).

As indicated table below, China's nominal GDP reached 8.231 billion $ in 2012 with a 9.3% real GDP growth. According to EIU estimation, this growth trend is expected to continue. Main determinants of China's GDP such as government and private consumption have increased by about 10 percent in 2012 compared to 2011. Export of goods and services continue to increase by about 6 percent altough it declines in 2009 after European Crisis. For 2012 although the origin of GDP is dominated by industry, for the coming years 2013 and 14, it is expected that the services trade will gain more importance and share in the origin of GDP. For the population side, although it increases and has reached 1.3 billion by the year of 2013, GDP per head also increases.

Table 1: Main Economic Indicators of China

GDP	**2008[a]**	**2009[a]**	**2010[a]**	**2011[a]**	**2012"**	**2013c**	**2014[c]**
Nominal GDP (US$ bn)	4,547	5,105	5,950	7,212	8,231	9,442	10,628
Nominal GDP (Rmb bn)	31,598	34,877	40,282	46,600	51,913	58,887	66,286
Real GDP growth (%)	9.6	9.2	10.4	9.3	7.8[a]	8.5	7.8
Expenditure on GDP (% real change)							
Private consumption	8.5[b]	9.8[b]	8.5"	10.2[b]	9.9	9.7	9.5
Government consumption	8.8[b]	8.5"	11.2[b]	12.1[b]	11	8.9	9.1
Gross fixed investment	9.8[b]	22.6[b]	11.5"	8.7[b]	7.4	8.6	7.7
Exports of goods &services	4.8[b]	-4.1"	19.0[b]	7.3"	6.2	8.3	7.7
Imports of goods services	3.9[b]	4.5"	20.7[b]	9.4[b]	5.6	9.7	9.3
Origin of GDP (% real change)							
Agriculture	5.4	4.2	4.3	4.3	4.5[a]	3.6	3.2
Industry	9.9	9.9	12.3	10.3	8.1[a]	8.8	8

Table 1 (cont'd)							
Services	10.4	9.3	9.8	9.4	8.1[a]	9.2	8.5
Population and income							
Population (m)	1,297[b]	1,305[b]	1,313[b]	1,321[b]	1,329	1,336	1,343
GDP per head (US$)	6,418[b]	7,028[b]	7,816[b]	8,672[b]	9,465	10,431	11,411

Source: ***[a] Actual [b] Economist Intelligence Unit estimates. [c]Economist Intelligence Unit forecasts, March 2013 China Country Report, (10/12/2012)***

China's economy has reached competence in a variety of industries and some of these areas are modern metallurgy, mining, aircraft construction, automobile manufacturing, large machine parts, castings, aerospace, large power circuits, electronics, communications equipment, measurement tools. China mostly bases its operations on its own technical facilities currently in mining, power plant, metallurgy, petroleum, chemicals, automotive and shipbuilding fields.

With respect to natural sources, China is rich in mines and minerals, and a global leader especially with 17 mines and minerals species including iron, iron alloy metal ores, steel, cement, aluminum, phosphate, tungsten, molybdenum and titanium. It is a manufacturer and exporter of some rare metals used in the field of space technology and electronics.

China is in the first place in the World with 22.4% of the world's wind power capacity. In fact, China produces 48.2% of the global coal production, 60% of iron ore imports of the world, uses 40% of the worldwide copper. The quality of the coal produced is low, China is the first in the world in terms of coal reserves and hydroelectric power potential. It obtains 70% of the total energy from coal. China has become the second most oil-consuming country after the United States. The energy bottlenecks encountered are the most important obstacles to the economic development of the country with rapid industrialization. Also, China ranks the first within the world carbon dioxide emission and child deaths. Rapid industrialization, population growth, and lax environmental oversight have caused many environmental issues and large-scale pollution in China.

The greatest lack of infrastructure is assessed in the transport and telecommunications sectors. There are which has 502 active airports. World's second largest airport is the Beijing International Airport, which handled 77.4 million passengers in 2011. There are 2,000 ports, 130 of which are open to international access. Also, although by the year 2011, China had the world's busiest 8 ports and the largest high-speed rail network, the current transportation infrastructure meets only 60% of demand (Ministry of Economy, 2012)

In China, families are encouraged to have only one child since 1990s. The population of the country, which is 1,32 billion according to 2011 estimates. The population is growing at a decreasing rate. Although large population remains as one of the biggest problems for China, it is still a major source of economic power. About seventy million people's participation in labor force in the next ten years is envisaged. On the other hand, with the acceleration of the urbanization process in China, the middle-income population, expected to be a the major force causing political, economic and cultural developments. The middle income population increases more rapidly than planned. It is assumed that the pressure of this increasing middle-income population will necessitate higher growth rates in the coming periods.

One of the biggest obstacles to China's development and to its meeting the needs of this population is the lack of infrastructure. Intensive investments in infrastructure are made in order to rectify this. In addition, regional development disparities and rural-urban migration are the fundamental problems of China. In this context, especially due to the more favorable conditions of accessing to the east, the western regions would not reach the expected level of development due to the inadequacy of the foreign investment.

Since the workers' wages have bettered, although slightly, and export demand from developed countries declines, the foreign direct investment in China is predicted to fall. Thus, preventive measures such as increasing the effective role of domestic demand are planned to be taken as indicated by the government's 12th Five-Year Plan, adopted in March 2011 with the aim of decreasing economic dependence on exports (CIA, 2012). Within this development plan, foreign investment in sectors such as alternative energy, biotechnology, information technology and high-tech manufacturing equipment would be supported by at least as much as domestic investments In fact, high-tech manufacturing equipment sales is expected to approach $ 1 trillion level in 2015. In 2006-11 period, the average annual growth rate of direct foreign investments in the manufacturing sector was 5.5% (Ministry of Economy, 2012) According to the 12th Five-Year Plan, global factors such as sluggish post-crisis growth, surging global liquidity, rising commodity prices, and mounting protectionist risks lead China to evaluate internal demand - especially private consumption - as the antidote to the instability of external demand. This transition of Chinese economy - from export-and investment-led growth to consumers-led growth depends on three factors: boosting employment, raising wages, and shifting allocation of the resulting increment in labor income away from saving toward spending. In order to raising the incomes of the less well-off, redistributive tax reforms could be enacted. The household registration (hukou) system, preventing migrant workers from accessing state welfare services in localities other than their place of birth, can also be softened, which could support economic growth by encouraging urbanisation (EIU, 2013). It is important to note that China is shifting its incremental support away from the traditional low value added export-oriented manufacturing sector. It has played such a prominent role over the past 30 years. The new plan especially targets at a major move up the manufacturing value chain. It focuses on the expansion of seven strategic emerging industries (SEIs): New-generation information technology, high-end equipment manufacturing, advanced materials, alternative-fuel cars, energy conservation and environmental protection, alternative energy, and biotechnology. It is important to stress that China is concentrating on resource-saving and more environmentally friendly, large-scale, labor- and transactions-intensive services, rather than more knowledge-intensive industries. Obviously, these are ideal sources of employment that more easily absorb the rural-urban migration wave. Nonetheless, cultivation of innovative and high-technology industries as well as a competitive services sector as part of policy priority in 2013-17 would probably be resisted by the restructuring of state-owned enterprises and banks in the sectors that they monopolise (EIU, 2013).

For all these targets, it is important to take into account that although boosting wage income is a necessary step on the road to a consumer-led growth dynamic, it cannot guarantee a shift toward internal private consumption and expand the social safety net, key to reducing precautionary saving required for reduction in China's outsize saving propensity. In addition, wage increases, an essential part of China's consumer-led growth agenda would cause inflation to get out of control, a worrisome possibility of a wage-price spiral (Morgan Stanley, 2011). Although China's working age population is expected to peak in 2013 according to EIU estimates, and the country's urban workforce will continue to grow and become much better educated, China's urbanisation rate will never reach that of Germany and Japan, where the process of massive rural-to-urban migration has already matured. In addition, diminishing China's rural population does not have much adverse impact on agricultural output due to the overpopulated countryside, where China has managed to boost agricultural output by investing in agriculture, machinery and technology.

According to the 2010 census, males account for 51.27% of China's 1.34 billion people, while females made up 48.73% of the total. The sex ratio (the number of males for each female in a population) at birth was 118.06% in 2010, higher than the 116.86% of 2000, but 0.53 points lower than the ratio of 118.59% in 2005. In most western countries the sex ratio at birth is around 105 boys to 100 girls (51.22%). Within the results of 2010 census it is found that the literacy rate of population over age 15 is 95.92% (Ministry Of Economy, 2012). On the other hand, the surge in school enrolment implies that as China's youth becomes better educated, the coming decade will witness the emergence of a two-tiered workforce. One tier will consist of graduates looking for office jobs. The other will remain the country's "traditional" source of labour that is relatively low-skilled rural migrants seeking work in factories and construction yards (EIU, 2013).

3.3. Foreign Trade of China

China has been the world's number one supplier and exporter in recent years, having an increasing share of the world trade. China's foreign trade volume in 2011 exceeded US$ 3.6 trillion, and thus the US$ 243 billion trade surplus of 2011, although it was lower than the previous year by 4.2% .

According Table-2 figures, for 2008-2014 period the trade balance of China is expected to be positive while its trade volume increases by 67,2% for the period 2008-2012. While goods export of China increases by 57,4%, import of goods increases by 80,3% for the same period. Services trade balance of China is evaluated to be negative for 2008-2012 period and it is also estimated to be negative until 2014.

Table 2: Foreign Trade of China

(US$ bn)	2008[a]	2009[a]	2010[a]	2011[a]	2012[b]	2013[c]	2014[c]
Trade balance	360.6	249.5	254.2	243.5	316.9	321.1	280.6
Trade volume	2,508.80	2,158.10	2,908.60	3,564.10	3,776.10	4,194.10	4,653.80
Goods: exports	1,434.70	1,203.80	1,581.40	1,903.80	2,046.50	2,257.60	2,467.20
Goods: imports	1,074.10	954.3	1,327.20	1,660.30	1,729.60	1,936.50	2,186.60
Services balance	-11.8	-29.4	-31.2	-55.2	-85.9	-115.9	-138.4
Current A.Balance	420.6	261.1	237.8	201.7	233.6	184.5	99.9

[a]Actual [b] Economist Intelligence Unit estimates. [c]Economist Intelligence Unit forecasts. Source: March 2013 China Country Report, (10/12/2012)

As shown in Table-3, the main export items of China are automatic data processing machines (8%), electric app for line telephony, including current line system (7%), with which China has the biggest shares within world export. On the other hand although the current transfers surplus falls, the number of foreigners remitting earnings from China will increase significantly in 2013-17. China's exports of services will also grow drastically, indicating the fact that Chinese companies working on infrastructure projects abroad provides labor with rising earnings (Ministry of Economy, 2012).

Table 3: Main Exports of China, 2011

GTIP Codes		Value million $	Annual growth 2007-2011, %	Share in world exports %, 2011	Share in China's Export %, 2011
8471	*Automatic data processing machines*	152.029	13	46,5	8,0
8517	*Electric app for line telephony,incl curr line system*	133.414	13	34,6	7,0
8901	*Cruise ship, cargo ship, barges*	37.100	38	29,4	2,0
8541	*Diodes/transistors&sim semiconductor devices*	35.428	37	27,7	1,9
8542	*Electronic integrated circuits and microassemblies*	32.900	9	7,9	1,7
9013	*Liquid crystal devices; lasers; other optical appl*	31.682	11	32,6	1,7
8473	*Parts&acces of computers & office machines*	30.642	-2	23,2	1,6
8528	*Television receivers (incl video*	30.291	-5	26,9	1,6
8443	*Printing machinery; machines for printing*	25.124	8	21,5	1,3
4202	*Trunks,suit-cases, camera cases,handbags e*	23.941	20	45,2	1,3
8504	*Electric transformer,static*	22.307	12	24,1	1,2
9403	*Other furniture and parts thereof*	20.915	15	28,3	1,1
2710	*Petroleum oils, not crude*	20.766	20	2,2	1,1
8708	*Parts & access of motor vehicles*	20.353	12	6	1,1
6110	*Jerseys, pullovers, cardigans, etc, knitted*	20.139	5	39,4	1,1
6104	*Women's suits,dresses,skirt etc&short, knit/croch*	19.175	16	57	1,0
6402	*Footwear and uppers of rubber or plastics*	17.603	17	59,1	0,9
9401	*Seat (o/t dentists' & barbers' chairs, etc)*	17.017	12	28,6	0,9
6204	*Women's suits, jackets,dresses skirts etc&shorts*	16.221	5	30	0,9
TOTAL	*All products*	1.898.388	10	10,6	

Source: ***TradeMap, International Trade Statistics***
This table is calculated by author.

Products that are assembled locally before being shipped overseas constitute a significant proportion of China's imports, and imports and exports, therefore, tend to expand at similar rates. However, a growing proportion of imports are used to make goods for local consumption, which is partially responsible for merchandise import growth. Between the main imported items of China, goods such as crude petroleum oils, microassemblies, iron ores and liquid crystal devices are on top of the main imported items list of China. The biggest percentage incrase in the demand of Chian for main imported items occurred especially for coal; briquettes, ovoids & similar solid fuels, cars (incl station wagon), iron ores and machines used for the manufacture of semicon.(Table-4)

Table 4: Main Imports of China, 2011

		Value 2011 Million $	Ann. Growth 2007-2011 %	Share In World Imports %	Share In China's Import %
2709	***Crude petroleum oils***	196.770,6	20	11,8	11,3
8542	***Electr. Integr. Circ.& microassemblies***	171.142,2	8	33,2	9,8
2601	***Iron ores***	112.408,9	31	61,2	6,4
9013	***Liquid crystal devices; lasers; other optical***	53.140,4	4	66	3,0
9999	***Commodities not elsewhere specified***	49.498,4	110	11,3	2,8
8703	***Cars (incl station wagon)***	40.965,1	43	6,5	2,3
2710	***Petroleum oils, not crude***	32.776,2	11	3,6	1,9
8517	***Electric appfor line teleph., incl curr line sys.***	30.862,1	12	7,3	1,8
1201	***Soya beans, whether or not broken***	29.726,1	23	57,8	1,7
8471	***Auto. data process. Mach.***	29.351,0	10	8,7	1,7
7403	***Refined copper and copper alloys***	25.193,7	28	34,7	1,4
8541	***Biodes/transistors&sim semiconductor devices;***	24.384,3	13	19,1	1,4
8708	***Parts & access of motor vehicles***	21.163,6	20		1,2
2701	***Coal; briquettes, ovoids & similar solid fuels***	20.883,9	80	13,7	1,2
8473	***Parts&acces of comp. & office machines***	17.451,3	2	13,4	1,0
8486	***Machines used for the manufacture of semicon***	17.382,8	33	27,3	1,0
7404	***Copper waste and scrap***	16.337,9	30	45,4	0,9
2603	***Copper ores and concentrates***	15.339,0	15	28,9	0,9
2902	***Cyclic hydrocarbons***	14.905,0	12	27,8	0,9
TOTAL	***All products***	1.743.394,9	15	9,6	

Source: ***TradeMap, International Trade Statistics***
This table is calculated by author.

As indicated below in Table 5, the largest market for U.S. exports where exports to U.S.A was 417.3 $ billion. Hongkong, Japan and South Korea are main destinations and increasingly important trade partners of China. Germany, England, France and Canada are within China's major trading partners among EU countries. China's export to Turkey is 21.693 million $ for 2011 which constitutes 0.85 of China's exports. The trade balance of China with Turkey is 19.226 million $.On the other hand, main importing partners of China are Hongkong, Japan, Korea and U.S.A. This in fact shows that China's main importing and exporing partners are generally same. Especially neighbouring Asian economies, USA and some EU countries such as Germany are the main partners.

Table 5: Main Exporting Partners of China (2011)

	Value 2011 (Million $)	Trade Balance 2011 (Million $)	Share in China's Exports (%)	Growth Between 2007-2011 (%)	Ranking of Partner Countries In World Imports 2011	Share of Partner Countries in World Imports (%) 2011
USA	417.303	313.424	19,8	5	2	12,5
Hong Kong	220.582	-26.000	10,4	6	10	2,8
Japan	183.882	21.847	8,7	8	5	4,7
China	122.614	122.614	5,8	9	3	9,6
Germany	112.184	21.687	5,3	10	4	6,9
Korea	86.431	-47.754	4,1	6	9	2,9
England	56.785	42.722	2,7	5	7	3,5
France	56.189	37.473	2,7	9	6	3,9
India	55.483	38.765	2,6	21	13	2,5
Mexico	52.248	46.283	2,5	15	17	1,9
Canada	48.654	31.669	2,3	7	14	2,5
Russia	48.226	13.519	2,3	16	18	1,6
Taipei	43.551	-40.041	2,1	11	19	1,6
Australia	43.457	-24.132	2,1	14	21	1,3
Netherlands	42.497	33.406	2	4	11	2,7
Italy	40.754	26.887	1,9	8	8	3,1
Singapore	37.995	-4.687	1,8	4	16	2
Brazil	32.788	-11.526	1,6	24	23	1,2
Thailand	30.581	3.179	1,4	15	22	1,3
Turkey	21.693	19.226	1	11	20	1,3
Spain	21.626	16.905	1	-2	15	2,1
Belgium	20.152	9.932	1	1	12	2,6

Source: ***TradeMap, International Trade Statistics, This table is calculated by author.***

According to Table 6, the main Asian importing partners of China are Hongkong (%18,2), Japan (%11,9), Korea (%9,9), Korea (%7,7), Taipei(%6,2), Singapore(%3,1) and Thailand (%2). Besides these countries, USA and Germany which are main exporting partners are also importing partners of China for 2011.

Table 6: Main Importing Partners of China, 2011

	Value 2011 (Million $)	Trade Balance 2011 (Million $)	Shr. in China's Imports	Growth Between 2007-2011	Ranking of Partner Cntr. in World Exp. 2011	Shr. of Partner Cntr. in World Exp. 2011
Hong Kong	246.582	-26.000	18,2	10	12	2,6
Japan	162.035	21.847	11,9	10	4	4,6
Korea	134.185	-47.754	9,9	13	6	3,1
USA	103.878	313.424	7,7	13	3	8,3
Germany	90.497	21.687	6,7	21	2	8,3
Taipei	83.592	-40.041	6,2	8	18	1,7
Australia	67.589	-24.132	5	37	21	1,4
Brazil	44.315	-11.526	3,3	41	20	1,4
Singapore	42.682	-4.687	3,1			
Russia	34.708	13.519	2,6	18	9	2,7
Malaysia	29.821	-5.456111		17	24	1,3
Thailand	27.402	3.179	2	16	23	1,3
Indonesia	22.941	3.271	1,7	22	25	1,1
France	18.716	37.473	1,4	10	5	3,3
Chile	18.601	-5.905	1,4			
Canada	16.985	31.669	1,3	17	13	2,5
India	16.718	38.765	1,2	18	19	1,7
Oman	14.246	-13.151	1	-15	57	0,3
United Kingdom	14.063	42.722	1	16	11	2,6
Turkey	2.467	19.226	0,2	24	32	0,8

Source: ***TradeMap, China International Trade Statistics. This table is calculated by author.***

3.4. China's Trade Policy Reforms and WTO Membership

With the global crisis, Asian economies experienced considerable declines in trade throughout 2009, and imports generally dropped more proportionally than exports in these economies, due to both oil price fluctuations and the impacts of the financial crisis on the real economies. As many other countries, as part of protectionist policy, China focused on products that have significant impacts on trade flows. Like Asia, on both the export and import sides, there was a solid rebound in 2010. Consequently, China survived the recent financial and economic crisis relatively healthier than many OECD economies due to good macroeconomic fundamentals and tight regulations. These provided the financial system a sound buffer, and many of the negative spillovers were avoided due to less globalised and relatively smaller financial sectors, lower levels of financial intermediation and less exposure to high risk assets. Furthermore, the Government's large fiscal and credit stimulus package led to significant investments, a rebalancing of demand in China's economy and a kick- started growth (OECD, 2010a).

Although the main problem is supposed to be the lack of US savings rather than a glut of Chinese savings, Washington pressured China to revalue the yuan to decrease US's trade deficit. Since 2005, while state has sold renminbi, leading to a large and sustained increase in foreign reserves to unprecedented levels, large current account surplus and rising capital inflows, particularly foreign direct investment, haave posed a pressure on the renminbi to appreciation. The major cost of China's exchange rate regime is the constraint it imposes on its ability to tailor monetary policy to domestic objectives because resisting currency appreciation and sterilising the foreign reserve inflow prevents the domestic interest rate from falling, which attracts more inflows, necessitating more sterilisation (OECD, 2010c).

The reforms that have started in agriculture with the household responsibility system and township and village enterprises, and initial steps to open up the economy to foreign trade and investment move the country economy away from the economic plans. These state-owned enterprise (SOE) reform gained momentum in the mid-1990s, and financial sector reforms were initiated in 1979. The main policy of China, 'Feeling the stones in crossing the river', is China's mode of economic reform, which entails implementing partial reforms in an experimental manner, often in pilot regions, and expanding them upon proven success. The reform system involves administrative and fiscal decentralization, distributing the benefits of reforms to a fairly large part of the population as well as to local government and party officials. On the administrative side, investment approval and detailed implementation of central policies were left largely to local governments and on the fiscal side, the tax contracting system gave a large share of the marginal revenues to local governments.

As a result of agricultural policies, the first stage in the reform process implemented in the major policy areas, China managed to increase agricultural production significantly through more efficient agricultural policies and pricing. The rapid productivity increase in agriculture was achieved owing to the incentive system brought about by the HRS, higher fertiliser use and rapid mechanisation, which resulted from the sprawling rural industry that emerged after the reforms. In reaction to the fact that ,by the early 2000s, WTO entry had reduced many of the tariffs that protected agricultural goods, a grain production subsidies programme started and for rural incomes, the agricultural tax and many rural fees for government services were abolished in 2004/05 (Hofman, Zhao and Ishihara, 2007). After 2003, since the reallocation of resources away from agriculture has contributed markedly to sustaining economic growth, the total number of people whose principal activity is agriculture started to decline, and the marginal product of an additional worker in agriculture gets lower than in the rest of the economy (OECD, 2010b). In 2011, while the unemployment ratio is %6.5, the share of labor in agriculture is %34, industry is 29.5% and services is %35.7. The GDP composition by sector is dominated by industry with %45.3, services with %44.6 and agriculture with %10.1 (CIA, 2012).

China was a closed economy, with very limited trade and financial interaction with the rest of the world until 1978. Later, the proclaimed policy goal started the reforms allowing for very limited interaction with the international economy, which would ultimately turn China into open economy in the course of reforms. Following the negotiations for WTO membership, China applied the necessary domestic reforms such as gradual liberalisation of the trade planning system, gradual reforms in the foreign exchange and payments system, opening up to FDI and especially in the run-up to its WTO accession, though, China implemented a major reduction in tariffs and other trade barriers, with average tariffs falling from over 40% to 15% by the time of entry in 2001, and to 10% by end-2005 (OECD, 2010c).

The fact that China's trade pattern mirrors the trade structure of Asian countries such as Hongkong, Singapur, Republic of Korea and Taiwan, which experienced a significant shift from traditional inter-industry trade to intra-industry trade in finished goods, and more recently, to intra-industry trade in parts and components, in particular in "machinery and transport equipment. In fact China engages intensively in intra-industry trade in parts and components with economies in the Asian region while exporting finished goods to markets in the developed West. In addition, because the share of parts and components in imports has been falling, the share of parts and components in exports has been rising, and the share of final goods in exports has been rising, China's regional role as an assembler and a corresponding strengthening of its role as a consumer is weakening, and China's successful integration into the world economy is increasing (Park and Shin, 2010).

Monetary Policy Framework Of China

China's monetary policy framework has evolved considerably since the mid-1980s and has gradually moved away from a planned administrative system resting on credit rationing to a more market-based regime with money growth as the main intermediate target. As part of this transition, interest rates have been liberalised, making them more responsive to market signals, and the tools of monetary policy have been modernised (OECD, 2010c). At the early stage of economic development while China adopted to introduce massive foreign investment and leverage foreign investment to boost domestic development, with foreign investment focusing on producing export goods due to weak domestic purchasing power, Gradual reform for opening up the foreign exchange system occurred. The financial reforms of China entail gradual increase in the type and number of banks, combined with a gradual relaxation of restrictions on lending. Although, before the reforms, foreign exchange was allocated according to the Plan, and all foreign exchange had to be handed over to the central bank, and Bank of China was the only bank that was allowed to conduct business in foreign currency, foreign banks were allowed to set up branches in Special Economic Zones.

In addition, these established Zones enjoyed tax exemptions and reductions as well as better infra structure and often better government services to attract foreign investors and thus, became an instant success in generating trade. Entry of national joint-stock banks, urban cooperatives, city commercial banks and rural credit cooperatives gradually eroded the state-owned commercial banks' (SOCBs) market share and with the relaxing credit plan, banks were, in principle, free to lend to whomever they wanted. By 1998, the financial sector reform began to take shape. SOCBs embarked on major financial and operational restructuring, closing branches, centralising lending authority to provincial and head offices, and shifting NPLs to newly created asset management companies (AMCs) (Hofman, Zhao and Ishihara, 2007). Especially the cleaning-up of the stock of non-performing loans is largely completed and considerable progress has been made in improving commercial banks' corporate governance structures and risk management systems. Efforts have also been made to improve credit access to underserved segments, notably small and medium-sized enterprises and rural China (Xu and Yu, 2009). Still continuing financial market opening, Chinese Financial institutions have broadened the scope of their activities, housing and consumer credit have expanded rapidly, and new financial instruments and facilities have been introduced (OECD, 2010c). China's high saving rates, even in the early stage of economic reform, intermediated predominantly through the banking system have not been intermediated to productive investment (Li and Zhang, 2008).

Importance of Manufacturing Sector

The sectoral composition of China attaches the greatest importance to manufacturing as it is like the engine of economic growth with a high potential of labour productivity and spillover effects, requiring intermediary products, capital goods, infrastructure and services for its expansion. It contributes to growth much more than agricultural or service sectors by providing high productivity gains owing to large scale production of standardized goods and facilitating the diversification of export industries and its adaptation to world demand (Lemoine and Kesenci, 2007). The Chinese manufacturing sector is highly integrated into world markets; around one third of its valueadded is exported and much of the remainder is highly substitutable with foreign goods, but China especially has become the world's largest steel producer and consumer (OECD, 2010b). China has become a world manufacturing platform of electronic goods and is now a world leading exporter, accounting for approximately 15-20 percent of world exports (Lemoine and Kesenci, 2007).

The automobile industry emerged as an important economic driver, and during 2009, China became the world's largest car market (Euromonitor, 2010). Later, the service sector develops as the country reached industrial maturity, and growth of manufacturing started to slow down. In the traditional trade, the theory context where comparative advantage follows from countries' relative endowments, it is emphasized that developed countries would not face a serious competition with China and India, who manufacture and export labor-intensive goods as against developed countries' skill- and capital-intensive products (Gang, Qiang and Peng, 2010). In addition, since, MNCs create a growing number of R&D centers in China by the help of the boosting innovation capacity of China, China is now the second largest world exporter of high-technology products, just behind the USA. However, since Chinese exports are concentrated in less sophisticated varieties, China's high-technology exports are located at the bottom of the price/quality ladder (Lemoine and Kesenci, 2007).

Internal Migration

The household registration system (hukou registration system) introduced in the 1950s as a part of centrally-planned labour allocation, aimed at keeping as many people as possible in farming, maximise food production necessary for the towns, and make movement from rural areas to towns impossible. If a person did move despite these barriers, he or she would be unable to obtain a local ration card to buy food. Actually, the hukou system is still very much in force, acting as a major constraint on migration and hence on urbanisation. Especially, rigidities in labour markets have created huge pools of unemployed in some parts of the country as a result of the country's (known as hukou), which limits migrants workers' access to healthcare, housing and pensions when they move to cities. Despite the remaining restrictions and barriers to movement to cities, China has been urbanising quickly. The right of migrants to have temporary registration in cities led to a marked acceleration in the urbanization pace in the decade ending in 2008, with urbanisation rising from 32% to nearly 46% (OECD, 2010c).

Sources of Chinese Growth

Although it is assumed that one of the main drivers of Chinese growth is low wages, wages in India, Indonesia, and many parts of Africa are probably much lower than in China today. Instead, in case of Chinese growth, the lower transaction costs, the real cost of doing business, having to supply chain management technology, information technology (IT) revolution and the active role of multinational corporations explain foreign trade competitiveness of the economy of China (Xiao, 2008). Moreover, the Chinese economy is a fake 'guerilla capitalism' due to its flexibility and responsiveness to market conditions and the mutual sharing of resources and information. And due to international demand for internationally-traded peed-intensive goods -(1) apparel, shoes and handbags, (2) consumer (and later business) electronics and (3) miscellaneous manufactures, mainly toys and cheap plastic goods-, Chinese economy is accepted to be comparative (Olds, 2009).

Despite rapid privatization, the extent of state control in the Chinese economy is still higher than in any OECD country, particularly in a range of sectors described as "basic or pillar industries" such as defence, electrical power and distribution, oil and chemicals, telecommunications, coal, civil aviation and shipping to maintain absolute control through sole ownership or an absolute controlling stake in SOEs operating in these sectors. Outside of the industrial sector, SOEs continue to dominate banking, telecommunications, and the media (OECD, 2010c).

Through outsourcing and offshoring, inflows of Foreign Direct Investment (FDI) are made by firms that are from advanced economies and attracted to cheap, unskilled labour especially after China's entry into the World Trade Organization (WTO) in 2001, and they continue to rise during the first quarter of 2010 as investors remain confident about China's economic prospects (Lemoine and Kesenci, 2007). FDI played a pivotal role in the development of China's manufacturing, and FDI has provided local entrepreneurs with financing means, together with new technology and export markets (Li and Zhang 2008). Although until the mid-2000s, FDI was heavily concentrated in manufacturing and services, it attracted far less foreign investment than in other developing countries more recently, driven in part by policy changes enacted as part of China's entry into the WTO in 2001, the service-sector share of FDI rose markedly. These increases in inflow occurs especially in the real estate and financial sectors (OECD, 2010c).

Although China started to introduce liberal economic policies in the area of foreign trade and investment after 1980s, the barriers including a plethora of tariff and nontariff measures of the China's trade maintained at levels similar to those in highly protectionist developing countries (Zhang, Witteloostuijn and Zhou, 2005). The main types of FDI barriers foreign service providers face are generally restrictions on the form of ownership and ceilings on the maximum equity stake they may hold in domestic firms, restrictions on the geographic scope and lines of business, and other requirements, such as minimum capital requirements that are not imposed on domestic competitors or imposed to a lesser degree. Although, before China's entry to WTO, trade-related investment measures (TREVIs) such as domestic component, export performance, and foreign exchange balance requirements taken to protect the national trade balance were removed upon China's WTO accession in 2001. For instance, the banking and insurance, and telecommunication sectors, which were not opened to FDI before, were opened. In addition, non-tariff barriers, e.g., import licensing and requirement for special import approvals, were reduced in the 1990s and entirely eliminated in the early 2000s due to the government's commitment to the WTO accession (Hofman, Zhao and Ishihara, 2007).

3.5. Properties of Chinese Growth

Special economic zones (SEZs), or as they are called as free trade zones, export-processing zones, industrial parks, free ports, enterprise zones or industrial clusters, come to front as a key driver of growth. SEZs, generally defined as a geographic concentration of interconnected firms in a particular field with links to related institutions, operate in more technology- and capital-intensive formal sectors and enjoy greater government support, more foreign direct investment (FDI), and stronger links to the global market. Among the contributions of SEZz are High-tech industrial development, increase in exporting potential and employment (WorldBank, 2010). Another important tool, total factor productivity, makes considerable contribution to per capita GDP growth. This, in turn, increases especially opening up to trade and competition, changes in the ownership structure of the economy, and urbanisation, labour productivity growth due to increased human capital, increased physical capital per worker, and growth in total factor productivity (Hofman, Zhao and Ishihara, 2007).

High savings proportion of China is frequently attributed to cultural factors, unique to East Asia in general and China in particular, but it is known that Chinese household consumption grew at an impressive average annual rate of 7 percent between 1999 and 2007.The increasing saving rate is ascribed to the high rate of GDP savings by the government and enterprises, which channel retained earnings into fixed investments at high rates (Gang, Qiang and Peng, 2010). Another reason is regarded as China's investment- and export-led growth mode's rapid incorporation into vertically integrated global production networks to become the global assembling/processing powerhouse, with estimates placing its processed exports at 45-55 % of its total exports.

The production structure of China has placed a particular emphasis on moving resources from the rural agricultural sector to tradable sectors which are assumed to be agricultural and manufacturing sectors, whereas services are seen as the nontradable sector. China has been the largest developing country destination for FDI since 1993, attracting US$92.4 billion of inflows in 2008, which amounts to about one fifth of such inflows to all developing countries. These flows from East Asian economies come especially to sectors including labor-intensive manufacturing sectors such as textiles, garments, footwear, and electronics especially due to low labor costs and the huge pool of available labor, increasing the productivity of tradables. Inflow of FDI, opened up in the early 1980s, was gradually liberalized to include domestically oriented manufacturing and service sectors investment in the early 1990s. In fact, since particularly manufactures, tend to be more investment intensive than nontradables, the undervaluation of real exchange rate of China brings a growth-RER relationship. On the other hand, productivity growth is achieved by holding wage growth at a rate slower than the growth rate of labor productivity and unit labor costs at low level so as to boost the competitiveness of domestically produced tradables (Razmi,2010).

3.6. Imbalances and Constraints Endangering Sustainability

One of China's main challenges today is the growing intersectoral gaps between agriculture, industry and services. As a result of rapid industrialisation and even faster urbanization, the contribution of agriculture to GDP in China has been declining; the service sector has become the only source of employment, and industry has entered into a period of 'jobless growth'. Obviously, smoothly functioning financial, planning, and regulatory systems that can employ the remaining rural surplus labor and surplus capital are needed (Li and Zhang, 2008). China will have to improve social conditions, especially raise education rates, develop a national pension system and provide people with wider coverage of health care, while modernisation increases the welfare of the rural population, which is an important factor for the expansion of domestic demand for services and industrial goods and majority of Chinese population (Xiao, 2008).

Another threat for Chinese growth is the fact that eastern seaboard of China benefits from China's robust growth, and unsurprisingly, these provinces are also where most of China's industry and foreign direct investment is concentrated, while majority of the western and interior parts of China remain poor and underdeveloped (Business Monitor International Ltd, 2010). In fact, China's coastal development strategy increased inter-provincial inequalities.As a matter of fact, the household registration system hampered rural citizens' ability to compete for higher-paid formal sector jobs, and agricultural incomes significantly lagged behind average income per capita. Also, unevenness across households, between the incomes of the richest households growing much faster than those at the bottom of the income distribution, dramatically increased (Hofman, Zhao and Ishihara, 2007). Income disparities across provinces have tended to decline slightly in recent years, partly as a result of migration, which boosts incomes in the poorer areas via remittances and thus, raises the wages of the remaining workers (OECD, 2010c). Nevertheless, although the household registration system (hukou) allows temporary mobility, it causes considerable barriers hindering internal migration by linking most social and educational benefits to the area where the person is registered, rather than where he or she is living (OECD, 2010b).

Owing to low fertility, rising life expectancy and one-child policy (adopted in 1980) with a general bias in favour of sons, China's population is ageing fast, and the old-age dependency ratio, which was 0.11 in 2010, is projected to reach 0.24 in 2030, and by 2050, the dependency ratio is estimated to exceed 0.43, which leads to especially gender imbalance (Business Monitor International Ltd, 2010). Especially these demographic imbalances necessitate a more developed pension system owing to the country's dramatic increase in elderly population and fundamental economic and social character (Euromonitor, 2010).

On the other hand, China's rapid economic growth takes place at the cost of environmental degradation. China's cities are notoriously polluted as a result of coal power plants. Also, China , whose economic growth relies on its carbon emissions, is one of the world's largest emitter of carbon dioxide (CO), and while the developed world is becoming ever more reliant on importing goods from China, it is becoming more reliant on 'exporting' carbon to China to achieve carbon reduction targets (Wang and Watson, 2008). What is more, China's growth is believed to be constrained in the future with a widening gap between water demand and limited supplies, the deteriorating water quality caused by widespread pollution and especially its inefficient water allocation system (World Bank, 2009).

China's foreign trade, generally with low added value and thin profit margins, needs to increase its export of electromechanical products as well as new and high technology products and strive to cultivate the exportation of brand-name products besides promoting the transformation and upgrading of processing trade from such low-end work as assembling and manufacturing to medium- and high-end work such as R&D, design, core parts manufacturing and logistics. In other words, developing trade in services and service outsourcing in sectors such as transportation, traveling, and construction, and vigorously supporting new-types of trade in services, including telecommunication, insurance, finance, logistics, software, and information services is important for China (Hou, 2010). Moreover, because the tradable sector in industrialized countries shrinks and international markets for developing country exports tend to be more competitive, Chinese tradable sector will have to rely more on domestic demand, and the real exchange rate is likely to grow less effective as a distributional tool. Oil prices shock acting adversely on both the input cost and sales price ends likely to act as a major exogenous shock to the Chinese economy, which vertically integrated international production networks (Razmi, 2010).

3.7. Conclusion

China, closed economy turns into an economic giant with its economic reforms and being a member of WTO although it stil uses non tariff trade barriers heavily and a world leader in gross value of industrial output is expected to have a trade which depends mostly on service trade. While China’s economy has reached competence in variety of some industries such as modern metallurgy, mining and automobile manufacturing, energy bottleneceks are evalauted for its groiwng competence in these industries although it is rich in minerals and mines and is in the first place in world in terms of coal reserves. In fact since the quality of these coal reserves, which are used heavily for energy need of China, are low, China’s increasing enviromental pollution and carbon dioxide emissions exist as important challenges for China.

China stil encourages the only one child policy where labor power stil remains a comparative tool for economic performance. Although according to unbalanced investment policy regional develeopment disparirites and rural-urban migration continue, new 12th Five Year Plan of China aims to make a transition of Chinese economy from export and investment led growth to consumers-led growth.This program is considered as a necessity within the global demand context where external dmand may fall due to crisis.This programme will necessitate for China to increase the wages without leadin an inflation problem, relaxing hukou system and provide people with more social rights to decrease precautionary savings. It is important to stress that New-generation information technology, high-end equipment manufacturing, advanced materials, alternative-fuel cars, energy conservation and environmental protection, alternative energy, and biotechnology will be seven strategic sectors for China in the following years.

China whose main exporting and importing partrners are USA, Japan and East Asian countries continues its assembler role as a factory of Asia and engaging intensively in intra-industry trade in parts in Asian region. Within the important sources of economic growth China, the lower transaction costs, the real cost of doing business, having to supply chain management technology, information technology (IT) revolution and the active role of multinational corporations are some properties of China which differentiate China from other Asian others. The basic pillar industries especially controlled and protecetd by government, support of government for pivotal role of FDI in manufacturing sector, tariff and nontariff measuers applied to protect China's economy, special economic zones with greater government support, more FDI and stronger links to global market, governments and enterprises' high savings and particular emphasis of govenrment to move resources from rural agricultural sector to tradable ones are evaluated as important features of Chinese economy for its outstanding growth. Also monetary policy of China evolves from planned administrative system to a more market-based regime where China's high saving rates which were predominantly controlled by government are used via new financial instruments and facilities..

This economic growth’s sustainability is assumed be constrained by China’s growing intersectoral gaps and the existence of the role of services sector as an only source of employment, the household registration system hich hampers the dynamics of labor market, low fertility, rising life expectancy an done-child policy with a fast aging population, rapid economic growth with high enviromental degradation.

CHAPTER IV

THE MODEL

In this chapter, different theoretical foundations of gravity model will be explained by emphasizing gravity applications from the literature.

4.1. Augmented Gravity Model

4.1.1. Theoretical Considerations

Since the introduction of the gravity models, they have been widely applied and proved effective in explaining a significant proportion of bilateral trade flows although. Following the classical and neo-classical theories in international trade marked by the Ricardian theory of comparative advantage and Heckscher-Ohlin model of factor endowment, Tinbergen (1962) and Poyhonen (1963) tried to apply the gravity model to study international trade flows. In the Newtonian physics notion model, postulating that the force between two objects is determined by their body mass and the distance between them, trade flow represents the gravitational force; the economic scale and wealth of two countries correspond to body mass of each subject, and the geographical distance is exactly the denotation of physical distance. After the mid-1980,s the gravity model's theoretical foundations were considered within the international trade theory based on imperfect substitutes, increasing return to scale and product differentiation at firm-level.

Following Linneman's (1966) approach, which is the partial equilibrium model of export supply and import demand, to justify the gravity equation, Jeffrey Bergstrand tried to develop the theoretical foundation of gravity model from partial equilibrium model. He opines that a gravity model is the reduced form equation of a general equilibrium of demand and supply systems where for each country the model of trade demand is derived by maximizing a constant elasticity of substitution (CES) utility function subject to income constraints in importing countries. On the other hand, the model of trade supply is derived from the firm's profit maximization procedure in the exporting country, with resource allocation determined by the constant elasticity of transformation. The gravity model of trade flows, proxied by value, is then obtained under market equilibrium conditions, where demand for trade flows equals supply of the flows. Under his assumptions, such as small (relative) market of aggregate trade flow, identical utility and production function, perfect goods substitutability, perfect commodity arbitrage, zero tariffs and zero transport costs, equilibrium of export supply and import demand leads to original gravity equation (before loglinear transformation). In this study, he employs monopolistic competition model of Dixit and Stiglitz (1977) based on the assumption of differentiated goods among firms that use labor and capital as factors of production and produce differentiated products under increasing returns to scale rather than countries.

Following his work was Linder's model developed to capture income differentials effect. Since this model was criticized to leave some parameters unidentified and exclude the price variable, he treats income and certain price terms as exogenous and solves the general equilibrium system retaining these variables as explanatory variables, which leads to the resulting model of "generalized" gravity equation. In this manner, gravity equation differentiates from standard Heckscher-Ohlin (H-O) setting where price and exchange rate variables can be omitted when products are perfect substitutes for one another in consumer preferences and when they can be transported without cost between markets. The import demand equation for a specific commodity can be derived by maximizing the constant elasticity of substitution (CES) utility function (U_{ij}) subject to income constraint:

$$U_{ij} = \left(\sum_{i=1}^{N} X_{ij}{}^{\theta}{}_{j}\right)^{1/\theta}{}_{j} \qquad \textbf{(1)}$$

Where:

X_{ij} = the quantity of the commodity imported from country i. The commodity can be differentiated by country of origin, the exponent $\theta_j = (\sigma_j - 1)/\sigma_j$, where σ_j, is the CES among imports. Consumption expenditures are limited by the income constraints (Y_j) of importing country j.

$$Y_j = \sum_{i=1}^{N} P_{ij} X_{ij} \text{ ; Where } P_{ij} = P_{ij} T_{ij} C_{ij} / E_{ij} \quad \textbf{(2)}$$

P_{ij} = the unit price of country i's commodity sold in country j's market;

$T_{ij} = 1 + t_{ij}$ where t_{ij} is import tariff rates on j's imports;

C_{ij} = transport cost of shipping commodity to country j; and

E_{ij} = spot exchange rate of country j's currency in terms of i's currency. By using the Lagrangian function to maximize utility (equation 1) subject to income constraint (equation 2), the procedure generates the desired import demand as follows:

$$X_{dij} = Y_j P_{ij}^{-\sigma j} T_{ij}^{-\sigma j} C_{ij}^{-\sigma j} E_{ij}^{-\sigma j} (\sum P_{ij}^{1-\sigma j})^{-1} \quad \textbf{(3)}$$

X_{dij} = the quantity of i's commodity sold in country j; and all variables are as previously defined. The supply equation is also derived from the firm's profit maximization procedure in exporting countries. The total profit function of the producing firms is given as follows:

$$\prod_i = \sum_{j=1}^{N} P_{ij} X_{ij} - W_i R_i \quad \textbf{(4)}$$

Where:

P_{ij} = the export price of i's commodity paid by importing country j;

X_{ij} = the amount of i's commodity imported by country j;

W_i = country i's currency value of a unit of R_i;

R_i = the single resource input used in the production of the commodity in country i. The resource in the country is allocated according to the constant elasticity of transformation (CET) during the production process and is defined as:

$$R_i = [(\sum_{i=1}^{N} X_{ij}^{\delta i})^{1/\delta i}]^{1/\delta i} \qquad \textbf{(5)}$$

where $\delta_i = (1 + \gamma_i)\gamma_i$ and γ_i is the CET among exporters. Since $Y_i = W_i R_i$, where Y_i is the allocated income. Substituting equation 5 into equation 4 and maximizing the resulting profit function yields the desired export supply equation as follows:

$$X_{ij}^{s} = Y_i P_{ij}^{\gamma i} (\sum_{i=1}^{N} P_{ij}^{1+\gamma i}) -1 \qquad \textbf{(6)}$$

General equilibrium conditions require demand to equal supply. Therefore:

$$X_{ij}^{d} = X_{ij}^{s} = X_i \qquad \textbf{(7)}$$

Anderson (1979), also, one of several researchers attempting to derive the gravity model from international trade theory, under complete specialization, no tariff, no transportation costs and homothetic preference assumption, found that gravity equation can be rearranged from simple/pure and trade-share expenditure system. Using this system, Anderson (1979) also derives the gravity model, which postulates identical Cobb-Douglas or constant elasticity of substitution (CES) preference functions for all countries and weakly separable utility functions between traded and non-traded goods. Under the assumption of monopolistic competition, each country is assumed to specialize in different products and to have identical homothetic preferences. Zero balance of trade is also assumed to hold in each period. Then the equilibrium trade volume from country i to j (X_{ij}*) at any time period t can be expressed as

$$X_{ij}^* = \theta_i Y_j \quad \text{or} \quad \theta_i = X_{ij}^*/Y_j \qquad \textbf{(8)}$$

Where θ_i denotes the fraction of income spent on country i's products (the fraction is identical across importers) and Y_j denotes real GDP in importing country

j. Since production in country i must be equal to the sum of exports and domestic consumption of goods, country i's GDP is expressed as follows:

$$Y_i = \sum_{j=1}^{N} X_{ij}^* = \sum_{j=1}^{N} \theta_i Y_j = \theta_i \left(\sum_{j=1}^{N} Y_j\right) \quad \text{or} \quad \theta_i = Y_i / \left(\sum_{j=1}^{N} Y_j\right) = Y_i / Y_w, \qquad \textbf{(9)}$$

where $Y_w = \sum_{j=1}^{N} Y_j$ is world real GDP, which is constant across country pairs.

Rearranging this equation yields,

$$X_{ij}^* = Y_i Y_j / \left(\sum_{j=1}^{N} Y_j\right) = Y_i Y_j / Y_w \qquad \textbf{(10)}$$

Therefore, this simple gravity equation relies only upon the adding-up constraints of a Cobb-Douglas expenditure system with identical homothetic preferences and the specialization of each country in one good. The basic empirical gravity equation is obtained by taking a natural logarithm of both sides of (10) as follows:

$$\log X_{ij}^* = \alpha + \beta \log Y_i + \gamma \log Y_j + \text{Ø} Z_{ij} \qquad \textbf{(11)}$$

where $\alpha = (-\log)Y_w$, and Z_{ij} is a vector of time-invariant variables such as distance and border effects. Because, in reality, countries do not have exactly identical and homothetic taste, the coefficients should not be unity, but are not significantly different from unity in aggregate level trade (Anderson 1979).

In recent years the traditional theories are supplemented by the new trade theories, based on the assumption of product differentiation and economies of scale. Among the contributors of these new theories, another most cited theoretical research on gravity model is the study of Alan Deardorff (1997), who derived the gravity equation from the rudiment international trade theory of Heckscher-Ohlin (HO) model, especially, in two extreme cases: the frictionless trade and the existing of trade impediment without the assumption of product differentiation. In other words, Deardroff proves that, if trade is impeded and each good is produced by only one country, the H-0 framework will result in the same bilateral trade pattern as the model with differentiated products. If there are transaction costs of trade, distance should also be included in the gravity equation. As a result, he is different from other scholars since he proves that the gravity equation can simply be derived from the standard H-O model, either in homothetic or arbitrary preference assumption.

In the latter case, he demonstrates, that from standard HO model with transport costs, he can obtain original gravity equation, both in Cobb-Douglas and Constant Elasticity of Substitution (CES) preference. In fact, since Heschker-Ohlin theory assumes the larger the differences in the factor endowments between two countries are, the larger the trade contradicts with empirical facts of trade in real world will be. It may, for example, apply to intra-industry trade and 'North-North' trade. Here, we see that Linder (1961) hypothesis explains the 'North-North' trade pattern. The hypothesis suggests that the increasing return in production causes the location of production of each good in either of the countries and demand structure will be similar when per capita income is similar.

Evenett and Keller (1998) also derived the standard gravity equation from the Heschker-Ohlin model with both perfect and imperfect product specialization while they also argued that the increasing returns to scale model (imperfect product specialization) rather than the perfect specialization version of the H-0 model is more effective in explaining the success of the gravity equation. Their three types of models, differing in the way specialisation is obtained in equilibrium as follows: (i) technology differences across countries in the Ricardian model, (ii) variations in terms of countries' different factor endowments in the H-0 model, (iii) increasing returns at the firm level in the Increasing Returns to Scale (IRS) model. According to Evenett and Keller, the gravity model is different from and more successful than the normal trade theories in terms of explaining trade. It, actually, enables more factors to be taken into account to explain the extent of trade as an aspect of international trade flows. On the other hand, Hummels and Levinsohn's (1993) results of the tests for the relevance of monopolistic competition in international trade by using intra-industry trade data show that much of intra-industry trade is specific to country pairings.

Basic variables in the most basic form of gravity model, which relates bilateral trade to distance between countries and GDP, are especially mass or economic size of the countries proxied by GDP (the gravitational force) expected to have a positive sign and distance as a proxy for transport and other transactions costs that is expected to have a negative coefficient (InterTradelreland, 2009) It is assumed that the larger the country is in terms of its GDP/GNP, for instance, the larger the varieties of goods offered and the more similar the countries are in terms of GDP/ GNP, and the larger the volume of this bilateral trade is. Taking GNP per capita as a separate independent variable, indicating the level of development, is meaningful with respect of Linder hypothesis because it assumes that the more similar the development level of countries, the more they trade each other. Studied based on the general equilibrium approach concluded that incomes of trading partners and the distances between them were statistically significant and had expected positive and negative signs, respectively. Three kinds of costs are associated with doing business at a distance: (i) physical shipping costs, (ii) time-related costs and (iii) costs of (cultural) unfamiliarity. In addition, it is important to explain bilateral trade wherein the population sizes of the trading countries have a negative and statistically significant effect on trade flows (Rahman, 2006).

In addition to the gravity variable GDP of the destination country and the friction variable distance, a range of dummy variables or other variables, which are thought to explain the potential trade between country pairs such as dummy variables of geographic factors (common border), dummy variables for cultural factors (common language) and dummy variables for economic factors such as the existence of a trade agreement between the two countries or the membership in a currency union (free, preferential trade agreement) are used in the gavity models. The coefficients for all these dummy variables are expected to be positive since neighboring countries tend to trade more with each other, for a common language makes trade easier and membership of a trade block is expected to facilitate trade. Although in some papers dependent variable is specified as total trade, that is imports plus exports, this practice is found problematic, and disaggregation of data into sectors by considering import and export is advised from a theoretical and econometric point of view (Evenett and Keller, 2002).

4.1.2. The Gravity Model and the Variables Used in Model

The concept of Gravity model based on Newtonian physics, is popular for analysis of trade reation between partners wherein trade between two partners is affected by their sizes and proximity has been the most popular econometric approach for modeling trade flows owing to its robust performance and limited need for parameter assumptions despite the lack of theoretical background and poor reputation among economists (Head, 2003). The common features of Gravity models used in the literature are the equations' bilateral trade structure, derivation of gravity model from various theoretical trade models and use of gravity equation to estimate trade potential or determinants of the volume or determinants of the nature of trade flows (Kepaptsoglou, Karlaftis and Tsamboulas, 2010).

The simplest form of the equation postulates that bilateral trade between two countries is directly proportional to economic size of the trading partners and inversely proportional to the distance between them (D), thus resembling the famous Newton's gravity law. In other words, the gravity model implies that the larger, the more prosperous and the closer to each other two countries are, the more they are likely to trade. Distance term is a proxy for considering the impact of transport costs and other transaction costs. In mathematical notation the simple gravity equation has the following structure:

$TT_{ij} = A*(Y_i^{\alpha} Y_j^{\beta})/D_{ij}$ **(12)**

where, TT_{ij} - total trade flows between country i and country j, Y_i, Y_j - market size of countries i and j, for instance given by their real income, D - distance between counties i and j, A – some constant gravity parameter. Log-linearising form of the equation is as following:

$\log Tt_{ij} = \log A + \alpha \log Y_i + \beta \log Y_j - Ø \log D_{ij}$ **(13)**

Gravity equation is frequently extended to incorporate other factors affecting (stimulating or hindering) bilateral trade flows such as income per capita of trade partners to measure the economic development level/purchasing power/capital-labor ratio/ relative prosperity of trade partners of the country, coefficient of population (as a proxy for market size) of the exporters with negative or positive sign depending on whether the country exports less when it is big (absorption capacity) or whether a big country exports more than a small country (economies of scale). Moreover, in order to capture the impact of other qualitative aspects, some dummy variables denoting the existence of shared common border, common language, being a member of free/preferential trade agreement, variables as proxies of quality of institutions and foreign exchange rate volatility are used within gravity models. (Kepaptsoglou, Karlaftis and Tsamboulas, 2010)

In fact, apart from the impact of distance and GDP, researchers augment model with variables denoting spatial exogenous barriers severely affecting transport cost for instance. and in the models, the removal of non-spatial barriers (trade liberalization) is commonly proxied by dummies for regional or bilateral trade agreements. In addition, the models are supplemented with time effects dummies to capture common shocks and country pair dummies to capture country pair specific effects depending on specification.

4.2. Empirical Model

A gravity model is implemented to identify the magnitude of the effect of factors that have an important impact on the pattern of China's trade with trade partners. The analysis is carried out at the aggregated level - we do not differentiate between exports and imports. The dependant variable in the model is a volume of bilateral trade between China and its trade partner i in the year t.

$\log (TT_{ijt}) = \alpha_0 + \alpha_1 \log (GNP_{it} * GNP_{jt}) + \alpha_2 \log (PCGNP_{it} * PCGNP_{jt}) + \alpha_3 \log (Distance_{ij}) + \alpha_8 (Border_{ij}) + \alpha_9 lang + \alpha_{10} (j\text{-}FTA) + U_{ijt}$ where,

TT_{ij} = Total trade between China (country i) and country j,
$GDPM_{ij}$ = Product of Gross National Product of country i (j),
$GDPPCM_{ij}$ = Product of Per capita GNP of Country i (j),
$Distance_{ij}$ = Distance between country i and country j,
$Border_{ij}$ = Land border between country i and j (dummy variable),
Lang= Existence of common language between country i and j (dummy variable),
j –FTA= Country j is member of FTA(dummy variable),
U_{ij} = error term; t = time period, αs = parameters.

The model is estimated with data covering 58 trade partners of China over the period 1992-2010 with yearly observations. The countries included in the sample had a share of 73 per cent in the total trade volume of China in 2010, 78 and 70 per cent of Chinese imports and exports, respectively. Fundamental explanatory variables are the ones giving the size of the market of trade partners as proxied by real GDP and geographical distance. Distance is measured as a great circle distances in kilometers between Beijing and capital cities of individual trade partners of China. In accordance with the theory, we expect distance to have statistically significant and negative impact on total trade while real GDPs, total population as well as higher per capita incomes to have a positive effect.

The signs of the coefficient of variables which will be used in the model are expected to be compatible with the theoritical foundations of traditional gravity model. Since GDPs of trading countries are proxied as gravitational force between countries, their signs are expected to be positive. Likewise GDP, GDP per capita, as an indicator for computing how much countries' preferences resemble each other, is another variable which is expected to have positive sign. Distance and not having common border, which act as barriers for trade between countries are expected to have negative sign. Free trade agreements between China and its partners, which are signed to increase trade volume between countries by decraeasing tariff and non tariff barriers between countries must have postive sign in this model. Using same language as an indicator for cultural similarity, which is evaluated to have positive effect on trade relations, is expected to have positive sign in the model.

All these variables in regression are in natural logarithms. The product of GDP and the product of per capita GDP have been used as independent variables due to the fact that the bilateral trade (sum of exports and imports) is dependent variable in the gravity model between the pairs of countries. The product of GNPs is considered as the size of the economy (Urata and Okabe, 2007). As it is bigger, there will be more trade between the two countries, so we expect a positive sign for the coefficient of GNPs.

The log of real per capita income measures the wealth or life standard of a country, such that if the income coefficient is significantly positive and greater than one, then an increase in the wealth of the host or the partner country raises the country's propensity to trade further. In addition, the potential impact of regional and bilateral trade liberalization agreements are entered into the regression by constructing a set of dummy variables for liberalization of trade within the Association of Southeast Asian Nations (ASEAN) (entered into force in 2005), as well as bilateral free trade agreements with Chile (2005), Hong Kong, China (2003), Macao, China (2003), Taipei, China (2010) and New Zealand (2008), Pakistan (2007), Singapore (1999) and Peru(2010) variable FTA for bilateral agreements.

Data Sources

Data of the variables of gravity model for the years between 1992 and 2010 are from different resources. Bilateral trade data pertaining to China is from trade dataset, collected by the United Nations in form of the COMTRADE database. Bilateral trade flows in current US$ at this database contains detailed product/country level. GDP per capita and population size are from the World Development Indicators (World Bank) and bilateral distances between countries were compiled using the Google Earth software. The data of the existence of common border between countries and the bilateral distances between the capital cities of the countries analyzed within the model of this thesis are taken from CEPII (Centre d'Etudes Prospectives et d'Informations Internationales), France's leading institute for research on the international economy. In addition, data of the common language variable is also provided from this database. The data of the fact that whether free trade agreements between China and its trading partners exist, is taken from World Trade Organization Regional Trade Agreements Information System.

CHAPTER V

ECONOMETRIC METHODOLOGY

5.1. Panel Data Models

Since cross-section data is collected over several time periods in panel data methodology, it provides us with more useful information on the effects and trade relationships in a particular time period, so classical gravity models panel data methodology is more widely than cross-section data alone (Alam, Uddin and Taufique, 2009). Panel data could be explained as the pooling of horizontal (sectoral) and vertical (time) observations belonging to countries, firms, households or individuals, which would provide people with an opportunity to evaluate relations by taking into account data series with cross section and time dimensions (Baltagi, 2005). Although the availability of this method for various sectors has increased, the unique advantages and disadvantages of this method are debated. Baltagi (2005), and Hsiao (1985,1986), Klevmarken (1989), and Solon (1989) make the following main points are as follows;

- Panel methodology is different from cross-sectional analysis in that it takes into account differences between countries, firms, households and individuals which are not homogeneous and provides a modelling tool to assess these differences by horizontal or vertical cross-sectional analysis feature.
- Panel data method has two main strengths as it combines cross-sectional and time-series observations; first, the higher number of observations enables the researcher to obtain richer information. Second, it gives higher degrees of freedom allowing for more consistent predictions and monitoring of unobservable trading-partner-pairs' individual effects.

- Since panel data contains data which are more informative and varied, and since the degree of freedom of the estimated models is high, the problems of multicollinearity between the variables are less common and are more efficient.

The gravity model has traditionally been estimated using cross-sectional data. However, this has been shown to generate biased results since heterogeneity among the countries is typically not controlled for in an appropriate way. To mitigate this problem, researchers have turned towards panel data, which have the advantage that they permit more general types of heterogeneity. For example, consider estimating the impact of currency unions on trade while controlling for country-pair propensity to trade. For a single cross-section, these controls can only depend on observed country-pair attributes such as common language, and estimates can thus be biased if there is additionally an unobserved component to the country-pair propensity to trade. With panel data, such heterogeneity can be readily controlled for by means of a country-pair fixed effect.

The panel data study has the above-mentioned advantages, yet it poses a number of challenges. Some of the main disadvantages of using panel data are difficulty of compiling the values of different units for the same variable and for the same time period. In addition, in the presence of short time-series dimension, if the time dimension is shorter than horizontal size, the explanatory power of fixed effects model weakens (Yilmaz, 2008).

We used panel data methodology for our empirical gravity model of trade. A series of panel data includes the differences between horizontal cross sectional units and the main changes occurring for these sectors within the time period of panel data. Therefore, the panel data model series have one indice indicating time and cross sectional units together differently from only cross section or time series (§ukriioglu, 2008). i=l,...N, in the equation represents households, individuals, companies and countries, while t=l,...T represents time (Baltagi, 2005). The model of the argument which is dependent Y is described by k variables in the panel data model with the following number of arguments:

$Y_{it} = \alpha_{it} + \beta_{2it}X_{2it} + B_{kit}X_{kit} + u_{it}$ **(15)**

Three main panel data models are applied for gravity model:

- Ordinary Least Squares (OLS)
- Fixed Effects Model
- Random Effects Model

The main difference between the above-mentioned methods is the constant term which is common for pooled regression. In the fixed effect model, there is a separate constant term for all cross sections. For random effect model, the constant term is assessed as a random element. The differences between these three methods are covered within the framework of some models (Hübler,2005; Arısoy, 2005; Greene, 2003; Roy, 2002; Baltagi, 2005; Pazarlıoğlu, 2001).

1. Ordinary Least Squares (OLS)

In this model, all observations are pooled without any dummy variables reflecting the specific effects of each country, and classical OLS regression equation mentioned below shows the effects of independent variables over the dependent variable. It is criticized that pooled OLS estimator is likely to be subject to substantial misspecification problems which would make the estimates biased and inefficient.

$Y_{it} = \alpha_{it} + \beta_i X_{it} + e_{it} \quad t= 1,2,\ldots T \quad i= 1,2,\ldots N$ **(16)**

Y_{it}: dependent variable

α : constant term

β : slope coefficient

X_{it} : Set of explanatory variables

e_{it} : independent and normally distributed error term for i^{th} variable for time t

2. **Fixed Effects Model - Least Square Dummy Variable (LSDV)**

Fixed models are the ones where slope coefficients do not change according to time or cross section but constant term changes according to only cross sections (Fixed Effects Model with Cross Section Specific Dummy), constant term changes within time period but independently from cross section data (Fixed Effects Model with Time Dummy) and finally constant term changes within time period and with respect to cross section Two-Factor Fixed Effects Model (Least Square Dummy Variable). Below is the general model for these three kinds of fixed effects and the differences in the constant term of the model according to cross section/time as expressed in terms of dummy variables to be included in the model:

General model:

$Y_{it} = \alpha_{it} + \beta_2 X_{2it} + \ldots + \beta_k X_{kit} + u_{it}$ where, **(17)**

$\alpha_{it} = \alpha_i$ for all t

$\beta_{kit} = \beta_k$ for all i and t (k=2,3,…K)

Fixed Effects Model with Cross Section Spesific Dummy /One Way Fixed Effects Model

$Y_{it} = \alpha_1 + \alpha_2 D_1 + \alpha_3 D_2 + ... + \alpha_N D_N + \beta_2 X_{2it} + \beta_3 X_{3it} + \ldots + \beta_k X_{kit} + e_{it}$ **(18)**

Fixed Effects Model with Time Dummy

$Y_{it} = \delta_1 + \delta_2 Year_2 + \delta_3 Year_3 + \ldots + \delta_t Year_t + \beta_2 X_{2it} + \beta_3 X_{3it} + ... + \beta_k X_{kit} + e_{it}$ **(19)**

Two-Way Fixed Effects Model - Least Square Dummy Variable

$Y_{it} = \alpha_1 + \alpha_2 D_1 + \alpha_3 D_2 + \ldots + \alpha_N D_N + \delta_1 + \delta_2 Year_2 + \delta_3 Year_3 + \ldots + \delta_t Year_t + \beta_2 X_{2it} + \beta_3 X_{3it} + ... + \beta_k X_{kit} + e_{it}$ **(20)**

On the other hand, the performance of Dummy variable coefficients is tested via F-statistic, whose null hypothesis (H_0) and the alternative hypothesis (H_1) are as follows:

H_0: $\alpha_1 = \alpha_2 = ... = \alpha_n$

H_1: $\alpha_1 \neq \alpha_2 \neq ... \neq \alpha_n$

It is required to assess whether the computed F-statistic is higher than the one on the F table to make a decision about the use of dummy variables. If it is less than one on the F table value, coefficients of the dummy variables are not different from each other, and OLS method would be used. However, if it is higher than F table value, we have three different panel data models to estimate the gravity equation. On the other hand, for joint significance of these dummies $H_0=\alpha_2=\alpha_3=\cdot\cdot\cdot=\alpha_n=0$, by performing an F-test. Under H_0, the model becomes the pooled regression.

$y_{it} = \alpha + X_{0it}\beta + \acute{\varepsilon}_{it}$ **(21)**

Denote the sum of squares residuals from the pooled regression as SSR_{pooled} .

$F = ((SSR_{pooled} - SSR_{LSDV})/(n - 1))/(SSRLSDV /(nT - n - k))$ compared to $F_{n-1,n(T-1)-k}$

3. Random Effects Model

In the random effect models changes according to cross sections and/or are added as components of the error term Random effects models are useful when cross-sectional units are selected randomly. In fixed effect models, although all sections have constant parameters different from each other, in random effects models all constant parameters are the same for all cross sections. Thus, in random effects model, a;= a + u; where, a is the common constant, u;is independent of time and the cross section-specific random deviations from the average value of the constant a. Random effects model is called "Error Components Model" due to the fact that time and cross section specific coefficients do not exist. However, these effects are stated as error components. Just like the fixed effects model, if it takes into account only the differences with respect to cross sections, it is called One Way Random Effect Model, but if it takes into account the differences both with respect to cross section and time, it is called Two Way Random Effects Model.

One-Way Random Effects Model is shown as follows:

$$Y_{it} = \alpha_{it} + \beta_{1it}X_{1it} + \beta_{2it} X_{2it} + ... + B_{kit} X_{kit} + (v_{it} + \mu_i) \quad \textbf{(22)}$$

Two-Way Random Effects Model is shown as follows:

$$Y_{it} = \alpha_{it} + \beta_{1it}X_{1it} + \beta_{2it}X_{2it} + ... + B_{kit}X_{kit} + (v_{it} + \mu_i + \lambda_t) \quad \textbf{(23)}$$

In addition to the μ_i representing the cross section effect, $\lambda_{t,}$ used for the estimation of differences within time is included an error component term in the model. Here v_{it} is not correlated with μ_i and $\lambda_{t,}$ but total error term may be correlated with independent variables. For random effects models, Generalized Least Squares and Maximum Likelihood methods are recommended.

In this study, since our model examined changes in cross-section-specific effects, the partners of the dependent country are not randomly selected, and trade volume of these partners covers about 80% of the total, we used Two Way Fixed Effect / Least Square Dummy Variable method (Neyaptı, Taşkın, ve Üngör, (2003); Yiğit ve Kutan, (2004); Baltagi, (2005); Grene, (2003)).

Table 7: Fixed Effect Model vs Random Effect Model – Hausman test

hausman fe re		**Coefficients**		
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	**re**	**Difference**	**S.E.**
gdpm |	4.47747	4.571954	-.0944837	.6783175
gdppcm |	.0003618	.0238644	-.0235026	.0388286
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)				
= 0.77				
Prob>chi2 = 0.6816				

In addition to the results mentioned below, Hausman test used for the selection between fixed effect and random effect, fixed effect model is better compared to random effect model for our variables. Here in this test, Ho: random effects would be consistent and efficient, and alternative hypothesis Hi: random effects would be inconsistent, and fixed effects would certainly be consistent. Since chi2 value is higher than probability value, we reject the null hypothesis and consider that random effect model method is inconsistent for this study.

5.2. Panel Unit Root Tests

Since panel data analysis is made by bringing together cross-sectional and time series, problems in time series are encountered widely. Therefore, just as time series, whether variables contain a unit root or not, whether a cointegration exists between the variables with the same degree of unit root must be evaluated. In fact, if the variance and co-variance and mean do not change over time, that time series is stationary where many macroeconomic variables are non stationary, many of these are difference stationary I(1), variables (Gujarati, 1999). If the variables are not stationary, regression estimates of these variables would be misleading (spurious) and show a "genuine long run relationship". Especially the unit root testing technique is used to identify variables which have stable long-run relationships with one another as opposed to spurious regression. In a typically spurious regression, any linear combination of 1(1) variables shows a long-run relationship, in which case the variables in question are said to be cointegrated, errors have tendency to disappear and return to zero i.e. are 1(0). When it occurs, panel unit root tests and panel cointegration tests have to be made.

One of the most common unit root test ADF (Augmented Dickey Fuller) implemented for stationary basically depends on son testing; whether p = 0 while t representing time or general tendency variable, p = 0 means y has a unit root and not stationary. Here the commonly known t test developed by Dickey-Fuller is used to test this hypothesis.

$$\Delta y_t = \beta_1 + \beta_2 t + \rho y_{t-1} + u_t \quad \textbf{(24)}$$

If u_t is autoregressive equation is changed to be

$$\Delta y_t = \beta_1 + \beta_2 t + \rho y_{t-1} + \sum \alpha_i \Delta y_{t-i} + \acute{\varepsilon}_t \quad \textbf{(25)}$$

where p shows maximum lags and Augmented Dickey Fuller test is used. (Enders, 2004)

Levin-Lin and Chu (LLC), Breitung, Im-Pesaran and Shin (IPS), Fisher ADF, PP, and Hadri Fisher unit root tests are 1st generation unit root tests, where the p goes to 0. It means that the series is stationary, although it is vice versa when it goes to 1. However, to obtain reliable and consistent results, the application of CADF and SURADF are 2nd generation unit root tests taking into account cross section dependency and would be used to determine whether all cross sections are stationary separately. Recently, the CADF and CIPS tests have been used to test unit roots in panel data, which has a major advantage over the so called first generation tests. It allows for cross section correlations. As argued by O'Connell (1998), cross section correlations among series can lead these tests to overreject the null hypothesis of a unit root (Pesaran, 2007).

Covariate Augmented Dickey-Fuller (CADF) and Im, Pesaran, Shin (CIPS)

In Im, Pesaran and Shin approach, as in the equation below, the error term has two parts: f_t which isis common for all cross sections and stationary, and Si,t which is specific for all sections and freely distributed. The cross sectional dependency is due to existence of f_t and Pesaran indicated that when the mean is different from 0 and $N \rightarrow \infty$, f_t Δy_{it} would be computed by inserting lagged values of $\overline{y}_t$ and $\Delta \overline{y}_t$ ($\Delta \overline{y}_{t-1}, \Delta \overline{y}_{t-2} \ldots$) to take into account autocorrelation problem.

$u_{i,t} = \lambda_i f_t + \varepsilon_{i,t}$ **(26)**

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + \sum_{j=1}^{p_i} c_{ij} \Delta y_{i,t-j} + d_{it} + h_i \bar{y}_{t-1} + \sum_{j=0}^{p_i} \eta_{ij} \Delta \bar{y}_{i,t-j} + \varepsilon_{i,t} \quad \textbf{(27)}$$

$H_0 : b_i = 0$ $H_i = b_i < 0$ $i=(1,2,\ldots.N)$

In CADF which is applicable when N>T and T>N, t values of b_i is found from Pesaran(2006). In addition normal average of CADF values is stated as CIPS.

$$CIPS = (\sum_{i}^{N} CADF_i) / N$$ Güloğlu B., İspir S. (2009) **(28)**

5.3. Test of Cross Sectional Dependency

Cross sectional independence stating that error terms are not cross-correlated and zero error covariance is a very important issue in panel unit root and cointegration tests. If this assumption is relaxed, the derived distributions of panel unit root and cointegration tests are no longer valid and depend in a very complicated way upon various nuisance parameters leading to correlations across individual units, Chang (2002). As noted in Cerrato (2001), cross sectional dependence can be caused by different factors. For example, in the case of purchasing power parity, cross sectional dependence can be caused by assuming the same numeraire currency, by omitted variables and by exogenous common shocks. This means that cross sectional dependence can be caused by model mis-pecification or by common shocks. Failure to take into consideration cross-sectional dependence between the series may cause significantly biased results (Breusch and Pagan, 1980; Pesaran, 2004).

This issue is also important in choosing the methods to test the existence of unit root for variables and cointegration between them. The presence of cross-sectional dependence would be best tested by CDLM1 Berusch Pagan (1980) when the size of the cross-section is too large; when the time is close or equal to the size of the cross-section CDLM2 test Pesaran (2004), when the time period is smaller than the size of the cross-section, CDLM Pesaran (2004) is considered better. Test statistic shows asymptotic standard normal distribution and the null hypothesis of the test is the fact that there is no dependence on the horizontal cross-section.

$$CDLM\,2 = \sqrt{\frac{1}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} T\hat{\rho}_{ij} - 1\right) \qquad N\,(0,1) \qquad \textbf{(29)}$$

If the probability value to be obtained as a result of test is less than 0.05 at the 5% significance level, the hypothesis Ho is rejected this means that there exits a cross-sectional dependence. (Pesaran, 2004).

5.4. Panel Cointegration

Panel data regression models (FE and RE) depend on the assumption of independence between horizontal cross-sectional units. The horizontal cross-sectional dependency on panel data studies makes the FE and RE estimates consistent but ineffective and standard errors biased.

Therefore, the existence of horizontal cross-sectional dependency is needed for estimation testing. Pedroni (1999) cointegration test would be used for testing whether panel data is cointegrated under the assumption that cross-section dependency does not exist. In Pedron's studies, the residuals of co-integration regression stated below must be computed where M represents the number of variables of the regression, P's are the cointegration coefficients. Yit ve Xn are assumed to be 1(1) and under the acceptance of null hypothesis e, it is 1(1) and variables are cointegrated.

$Y = \gamma it + \beta_i X_{it} + \beta_{Mi}\, X_{Mit} + eit$, i=1,…,N, t=1,…,T, m=1,…,M **(30)**

Hypothesis of the test is as follows:

H_0: no cointegration exists

H_1: cointegration exists

Among seven differet Pedroni residual-based panel cointegration statistics, four tests depend on pooling within-dimension and are called as panel cointegration statistics. Three of them depend on pooling inter-dimensional called as group mean cointegration statistics. On the other hand, if cross-sectional dependence is identified, the existence of panel cointegration is tested via Westerlund's (2008) Durbin Wu Hausman Test, which works even when independent variables are 1(1) or 1(0) when dependent variable is 1(1). In rejection of the null hypothesis, the null says that cointegration relationship exists between variables.

Consider the model,

$Y_1 = Z_1\beta_1 + Y_2\beta_2 + \acute{\varepsilon}_1 \qquad E(z\acute{\varepsilon}_1) = 0,$

where Z is the set of exogenous variables, Zi is a strict subset of Z, and Y_2 is a potentially endogenous regressor and P = (Pi,P2)- The test is with a null hypothesis that the error terms are uncorrelated with all the regressors against the alternative that they are correlated with one of the regressors.

In the following chapter for the analysis of gravity model within panel data method, the tests which will be used are as follows;

- Firstly, for making a decision whether fixed effect model and pooled OLS method is suitable for this gravity model F-test results will be used.
- Results of Hausmann test will be used for making a comparison between the effectiveness of the fixed and random effect models which would be used for the configuration of panel data model.
- To check whether the variables have unit root and are stationary, CADF and CIPS statistics which allows cross section correlations will be applied.

- For cross sectional dependency, CDLM2 test which is applicable when time period of the panel data model is small compared to the size of the cross-section, will be used.
- Westerlund Durbin Wu Hausmann test is used for testing panel cointegration under the assumption that cross section dependency exist.
- Least Square Dummy Variable Model / Two Way Fixed Effect Model will be used for the estimation of the coefficients of the variables in the gravity model.

CHAPTER VI

ESTIMATION RESULTS

6.1. Results

To decide between pooled OLS and fixed effects model, we applied an F-test comparison where the pooled OLS is the restricted model, and if we reject Ho fixed effects would be used.

Table 8: Pooled OLS vs Two Way Fixed Effect Model - F Test

Test Of Absence Of Time And Individual Effect Restricted Model Pooled Ols Unrestricted Model Two Way Fixed Effects						
regress logtotaltrade loggdppcm loggdpm //only change variables						
Source	**SS**	**df**	**MS**	**Nrofobs=1102**	**F(2,1099) = 291.05**	
Model	1317.32659	2	658.663295	Prob>F= 0.0000		
Residual	2487.112	1099	2.26306825	R-squared= 0.3463		
	Adj R-squared= 0.3451 i			RootMSE = 1.5043		
Total	3804.43859	1101	3.45543922			
logtotaltrade	**Coef.**	**Std.**	**t**	**P>t**	**[95% Conf. Interval]**	
loggdppcm	.2327075	.0513655	4.53	0.000	.131922	.3334931
loggdpm	.4628914	.0364417	12.70	0.000	.3913883	.5343945
_cons	5.204337	.6295974	8.27	0.000	3.968988	6.439685
. xtreg logtotaltrade loggdppcm loggdpm year2- year19, fe						
Fixed-effects (within) regression			Number of obs = 1102 Number			
Group variable: ident			of groups =58			
F(20,1024) = 430.39			Prob. > F = 0,0000			
lntotaltrade	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
loggdppcm	.3023702	.1538708	1.97	0.050	.0004321	.6043083
loggdpm	.0726447	.0408913	1.78	0.076	-.0075956	.1528849
year2	.3470656	.080236	4.33	0.000	.1896199	.5045113
year3	.576894	.0911125	6.33	0.000	.3981054	.7556826
year4	.620217	.1056943	5.87	0.000	.4128149	.8276191
year5	.5807231	.1219167	4.76	0.000	.341488	.8199581
year6	.6958491	.139422	4.99	0.000	.4222637	.9694345
year7	.7332056	.1508348	4.86	0.000	.4372249	1.029186
year8	.8290127	.1649604	5.03	0.000	.5053136	1.152712
year9	1.083257	.185548	5.84	0.000	.7191596	1.447355

Table 8 (cont'd)						
yearl0	1.149618	.2035635	5.65	0.000	.750169	1.549068
year11	1.304223	.2217807	5.88	0.000	.8690264	1.739419
yearl2	1.59981	.2442955	6.55	0.000	1.120433	2.079187
yearl3	1.853324	.2714716	6.83	0.000	1.32062	2.386028
yearl4	2.019053	.2988596	6.76	0.000	1.432605	2.6055
yearl5	2.209151	.3306611	6.68	0.000	1.5603	2.858001
yearl6	2.414407	.3637927	6.64	0.000	1.700543	3.128272
yearl7	2.561614	.3863758	6.63	0.000	1.803435	3.319793
yearl8	2.3801	.3975393	5.99	0.000	1.600015	3.160185
yearl9	2.616052	.4199107	6.23	0.000	1.792069	3.440036
_cons	7.552807	2.365842	3.19 0	0.000	2.910354	12.19526
F(57,1024)= 202.46 Prob > F= = 0.0000						
LSDV						
regress logaspcar lincomep lrpmg lcarpcap dum2-duml8 year2-yearl9 scalar urss 1 = e(rss) //unrestricted scalar payH_0=(rrss-urss 1)/(n+t-2) scalar paydaH_0 = urss l/((n-1)*(t-1)-k) scalar FH_0 = pay$H_0$1/paydaH_0 **FH_0=765.36986** display "prob FH_0=" l-F((n+t-2),((n-l)*(t-l)-k),FH0) prob FH_0=0						

As indicated in the table where the results of the comparison between Pooled OLS and Two Way Fixed Effects are shown, computed F value 765.36 is bigger than table value of F (2,1099)=291.05. In this case Two Way Fixed Effects model is the panel data model that we use for our main gravity model. As explained in the previous chapter, by using F test, we compared Fixed Effect One Way and Fixed Effect Two Way models in terms of suitability. The computed F value, which is bigger than F(20,1081), shows us that Fixed Effect Two Way (Least Square Dummy Variable) model has more explanatory power for our model.

In this study, the presence of cross sectional dependence is tested by CDLM1, CDLM2 and CDLM tests by using Gaussian codes. CDLM2 is used for testing the existence of the cross sectional dependcy. Since, panel data Pesaran (2004) CDLM test is suitable for the models where time period of the variables is smaller compared to size of the cross sections, CDLM results will be evaluated for our analysis where 58 countries and 19 years are involved.

Table 9: CDLM Test for Cross Sectional Dependence

CD Tests	Stat	prob
cd Lm1 (Breusch,Pagan 1980)	5176.193	0.000
cd LM2 (Pesaran 2004 CDlm)	61.275	0.000
cd LM (Pesaran 2004 CD)	57.286	0.000
Bias-adjusted CD test	238.464	0.000
P_value of Bias Adjusted CD test for cointegration equation	0.000	

According to the results stated above in Table-9, the probability values are less than 0.05. This shows that a horizontal cross-sectional dependence exists between cross sectional units. This indicates that a shock affecting a country also affects others. Therefore, for panel unit root and panel co-integration tests, we have to choose methods taking into account cross-sectional dependence. Stationarity of the series is tested by means of the second generation unit root tests, CADF and CIPS methods which were developed by Pesaran (2006). For the application of CADF and CIPS, better than 1st generation tests, which don't take into account the existence of cross-sectional dependence, we use Gauss and Stata codes.

Table 10: CADF and CIPS Panel Unit Root Test

Country	**CADF Statistics**	***p**		**CADF Statistics**	**p**
Algeria	0.8280	4	Morocco	-14.691	4
Argentina	0.4155	4	Netherlands	-0.2528	4
Australia	-0.9232	4	New Zealand	51.636	3
Bangladesh	-0.5890	2	Nigeria	0.5434	2
Belgium	-0.3994	4	Norway	-0.1808	2
Brazil	42.581	4	Pakistan	-17.933	4
Canada	-12.806	4	Panama	-0.1937	4
Chile	-10.394	4	Peru	12.886	4
Hong Kong SAR	-26.605	4	Philippines	-42.912	4
Taiwan	-0.0095	4	Poland	0.3224	4
Colombia	0.3455	4	Portugal	-10.649	4
Czech Republic	-0.4425	4	Korea	-0.9065	1
Denmark	-38.380	4	Romania	0.8484	4
Egypt	0.2374	4	Russia	-42.686	4
Finland	-0.3058	4	Saudi Arabia	-21.930	4
France	-0.5402	4	Singapore	-0.1854	4

Table 10 (cont'd)					
Greece	-16.020	4	Spain	-10.787	4
Hungary	-36.552	4	Sweden	0.3606	4
India	-0.4839	4	Switzerland	-0.4001	4
Indonesia	0.9331	4	Syria	14.792	3
Iran	-23.465	4	Thailand	-97.587	4
Israel	-0.2517	4	Turkey	-19.157	4
Italy	0.8177	3	Ukraine	-17.529	4
Japan	0.5920	4	United Arab Emirates	29.246	4
Kazakhstan	-22.364	4	United Kingdom	-22.041	4
Kyrgyz Republic	-17.014	1	United States	-118.099	4
Malaysia	-0.4635	4	Venezuela	-86.326	2
Mexico	-0.4225	4	Viet Nam	0.9016	4
CIPS statistics for all countries=-1.0779					

Crtical value is taken from Pesaran (2006) page 46 in Table 1c %1 level of significance and it is – 2.25
***p : Optimum lag distance.**

CIPS statistics obtained is smaller than critical value; null hypothesis is accepted, and it means that unit root exists for panel data series. This means that the effects of shocks to the countries do not disappear over time. As regards this, the existence of a co-integration relationship between series needs to be checked.

Thus, Durbin-Wu-Hausman method developed by Westerlund (2008) which takes into account cross-sectional dependence will be used to see whether a panel cointegration exits. Here since, null hypothesis which indicates that error terms of the models are not correlated with all regressors, rejection of null hypothesis means a panel cointegration. The application of this test will be made by Gauss codes.

Table 11: Westerlund (2008) Durbin-H Test Results

Durbin-H Group statistics	32.641
Durbin-H Panel statistics	3.497

Critical values: 10%=1.28—5%=1.645—1%=2.333

According to the results of the Westerlund (2008) Durbin-H Test indicated above in Table-11, since group statistics (32.6) and panel statistics (3.5) obtained from tests are higher than the critical value of 1.28 under %10 level of significance, 1.645 under 5% Ho hypothesis is rejected. This means that there is a co-integration relationship between cross sections which are trading partners of China for the period 1992-2010.

Table 12: Two Way Fixed Effect-LSDV Results

Linear regression, correlated panels corrected standard errors (PCSEs)					
xtpcse logtotaltrade loggdppcm loggdpm brdr fta lang distance dum2-dum58 year2-year19					
Time variable: year		Number of groups = 58			
Panels:correlated (balanced)		Obs per group: min = 19			
Autocorrelation: no autocorrelation					
Estimated covariances = 1711		**R-squared = 0.9548**			
Estimated autocorrelations = 0		Wald chi2(20) = 71099.21			
Estimated coefficients = 78		**Prob > chi2 = 0.0000**			
		Panel-Corrected			
logtotaltrade	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**
loggdppcm	0.3023702	0.143619	2.11	0.035	.020882 .5838583
loggdpm	0.0726447	0.0368906	1.97	0.049	.0003404 .1449489
brdr	-6.253938	0.295374	-21.17	0.000	-6.832861 -5.675016
fta	2.215709	0.0967466	22.90	0.000	2.026089 2.405329
lang	2.782871	0.1979787	14.06	0.000	2.394839 3.170902
distance	-0.0000577	0.0000133	-4.33	0.000	-.0000838 -.0000316

According to Least Square Dummy Variables Method, the strength of trade relationships between China and countries in selected regions are generally explained by the cultural, economic, and geographic characteristics of the trading economies within gravity model.

Overall, according to the R^2 value of the model, the model estimates perform well and explains about 95% of the variation in trade between country pairs. In addition, nearly all of the variables expected to influence trade under the gravity model are significant (at 95% level) and have the expected signs. The gross domestic product (GDP) of countries, proxied as gravitational force between countries, has the expected positive sign. Alike GDP, gross domestic product per capita, proxied as the preference of countries, has the expected positive sign. This states the fact that countries having similar economic structure and preference with China, has a higher trade volume with China. Altough the existence of common border is not found to affect the trade volume between China and trading partners, landlocked countries trade more than those with access to sea, while island economies tend to trade less according to the models. For distance variable, higher distances mean a distortion for trade volume as assumed within traditional gavity model. On the other hand free trade agreements of China with its trading partners have the expected positive sign. Language variable which is placed in the model as an approximation of cultural similarity and proximity of social relations between China and its trading partner has the expected positive sign.

According the resuls of the model, estimates point at an exports increase in trading partners' GDP (1% increase in GDP product, 0.07% increase in total trade volume) and decrease as the distance (1% increase brings a 0.0% decrease in total trade volume) between trading economies increases. The GDP per capita (1% increase in GDP per capita product leads to 0.3% increase in total trade volume) and area variables are statistically significant with positive signs as expected. Countries sharing a common language (same language means a 2.7% increase in trade volume) is found to trade more with each other Trade volume of countries within free trade agreements with China brings an increase to the trade volume by 2,22%. The trade volume of trading partners of China, where the spoken language is the same as China, increases by 2,78%.

Table 13: LSDV Results For Countries

	Coef.	Std.Err.	Z	P>|z|	[95% Confidence Interval	
Argentina	1.94	0.147244	13.19	0.000	1.654007	2.231192
Australia	3.06	0.481685	6.36	0.000	2.117533	4.005704
Bangladesh	1.28	0.263527	4.84	0.000	0.759758	1.792763
Belgium	1.85	0.308009	6	0.000	1.244987	2.452361
Brazil	2.78	0.142188	19.53	0.000	2.498379	3.055744
Canada	2.44	0.290683	8.39	0.000	1.869112	3.008567
Taiwan	1.11	0.146372	7.55	0.000	0.818904	1.392673
Colombia	1.62	0.155423	10.45	0.000	1.320062	1.929307
Czech R.	0.50	0.252742	1.99	0.046	0.008648	0.999378
Denmark	1.10	0.307431	3.58	0.000	0.497248	1.702354
Egypt	3.16	0.193714	16.33	0.000	2.784106	3.54345
Finland	3.58	0.320582	11.18	0.000	2.955545	4.212204
France	-0.18	0.264737	-0.68	0.496	-0.69895	0.338799
Germany	4.42	0.361878	12.21	0.000	3.707881	5.126415
Greece	0.28	0.276573	1.01	0.312	-0.26246	0.82169
Hungary	2.14	0.172807	12.39	0.000	1.803044	2.480435
India	9.11	0.527918	17.26	0.000	8.076284	10.14568
Indonesia	-0.27	0.080357	-3.34	0.001	-0.42609	-0.11109
Iran	0.57	0.156738	3.63	0.000	0.261125	0.875526
Iraq	2.62	0.3085	8.49	0.000	2.015932	3.225229
Israel	4.74	0.32386	14.64	0.000	4.108016	5.377523
Italy	0.39	0.323316	1.21	0.226	-0.24215	1.025224
Japan	10.59	0.408953	25.89	0.000	9.788262	11.39133
Malaysia	0.46	0.151705	3.05	0.002	0.166042	0.760713
Mexico	2.53	0.297466	8.52	0.000	1.951663	3.117707
Morocco	-1.36	0.229838	-5.9	0.000	-1.8073	-0.90636
Myanmar	1.31	0.223813	5.84	0.000	0.867629	1.744957
Netherlands	0.30	0.3611	0.84	0.400	-0.40375	1.011733
New Zealand	5.60	0.419264	13.36	0.000	4.77926	6.422745
Nigeria	1.62	0.169641	9.57	0.000	1.291619	1.956599
Norway	-0.68	0.10298	-6.65	0.000	-0.88631	-0.48264
Panama	0.92	0.202156	4.54	0.000	0.520695	1.313133
Philippines	-0.39	0.352731	-1.1	0.270	-1.0806	0.302076
Portugal	8.21	0.329955	24.87	0.000	7.558563	8.851964
Korea	2.98	0.283582	10.5	0.000	2.422214	3.533836
Russia	2.33	0.147003	15.86	0.000	2.043708	2.619949
S.Arabia	1.46	0.297342	4.92	0.000	0.880818	2.046378
Singapore	1.26	0.32781	3.83	0.000	0.614589	1.899582
South Africa	-0.74	0.302691	-2.44	0.015	-1.33282	-0.1463
Spain	4.50	0.172139	26.12	0.000	4.159334	4.834108
Sweden	0.36	0.123921	2.94	0.003	0.121482	0.607244
Switzerland	1.08	0.164882	6.52	0.000	0.752549	1.398876
Thailand	1.08	0.178407	6.08	0.000	0.734604	1.433947

Table 13 (cont'd)						
Turkey	1.40	0.350458	3.99	0.000	0.710572	2.084342
Ukraine	2.57	0.297169	8.64	0.000	1.984706	3.149587
U. Arab Em.	4.61	0.31200	14.79	0.000	4.002814	5.225862
England	0.48	0 .063418	7. 55	0 .000	0 .354438	0.603031
USA	6.05	0 .354011	17 .08	0 .000	5 .351214	6.738913
Constant	6.29	1 .950653	3. 22	0 .001	2 .465863	10.11228

According to the results of Least Square Dummy variables test, the main economic indicators, GDP, GDP per capita, existence of free trade agreements, common border, language and shorter distance between countries have high explanatory powers for bilateral trade relation and value of China for 1992-2010 time period. However, among the 59 countries, these variables don't have explanatory power for Czech R., France, Italy, Greece, Netherlands and Philippines countries' trade volume with China.

According to the individual coefficients of the countries in the analysis, main Asian countries whose trading volume with China would be explianed beter compared to the mean of panel group are Japan and India. USA, United Arab Emirates and some European countries such as Spain, Germany and Finland are within the top ten countires, whose trade volume with China fits the model. The trading pattern of China with countries such as Australia, Korea, Brazil, Russia, who are within the main importing or exporting partners list of China are also explained successfully with this model.

The findings of our study are in coincidence with the results of the Miranda et all (2007) and Bussiere and Schnatz's (2006) analysis of Brazil and China's international trade in gravity model which reveals that cultural aspects such as language are important for trade relationship of China. In fact, the other gravity variables are also found with expected sign.

Like our study, Bussiere and Schnatz's (2006) study of China's external trade with a gravity model which concludes that aerial distance betweeen the capitals of the countries has a negative impact one trading capacity and the existence of common border, langauage and free trade agreement might lead more trade between countries assessed the gravity model as a model which has an explanatory power for Chinese trade.

The similarity between China and its trading partners which is proxied by GDP and population size of the countries in Zang et all's work which specifically deals with bilateral intra industry trade of China for 1992-2001 time period, is evaluated also as an important determinant for trade relations of China with the same expected positive sign. These findings are paralel with the results of Miranda et al. (2007) study, whose topic is international trade of US, Brazil and China for 1995-2003 period.

As indicated within the findings of our study, The Bhattacharya and Bhattacharyay's paper which assesses the importance of the existence of free trade agreement between China and India for trade volume also found the fact that with respect to gravity model, trade cooperations like free trade agreements are important determinants.

CHAPTER VII

CONCLUDING REMARKS

In the present study, main economic indicators which are gross domestic product value of China and trading countries, gross domestic product per capita and free trade agreements made between China and its trading partners to increase bilateral trade are analyzed within the framework of augmented gravity model. Besides, based on the fact that bilateral trade relations' success depends on social relations, the evaluation includes the effect of the existence of a common language, common border and the distance between the countries within the model.

The results demonstrate that variables in the augmented gravity model estimation fit the data well and explain nearly 95 % of the variation in bilateral trade across China and its trading partners. This implies that as countries converged in income levels, the volume of trade in relation to GDP increased and took the form of intra-industry trade for China. This is in coincidence with the fact that China has increased its prominence in the global trade network not only by substantially raising its share in the total world exports and imports, but also in terms of interconnectedness. China's exports have high content of value added that is from Asian countries such as Japan, Taiwan, India and South Korea where processing trade accounts for a significant share of exports from China that largely uses imported intermediates to assemble final goods and serves as a downstream hub in the Asian supply chain. Besides, it is obviously known that like many other Asian countries, China increasingly plays a dual role in the global supply chain for high technology products, as an assembly country and exporter of intermediate inputs to other countries' high technology exports. In addition, corresponding convergence in export structures of China and advanced countries reflect higher complementarity where a growing proportion of advanced countries' machinery exports are now assembled, and in turn, higher exports from China to the United States, which is one of the main exporting partners of China.

Moreover, several factors such as distance between markets influence transportation costs, and thus the cost of imports and exports and personal contact and communication, which may influence trade. Although the effect of distance between China and its trading partners seems smaller over time due to modern transportation and communication, it still has a high explanatory power for its trade value. Besides, borders causing time-consuming formalities and perhaps monetary costs like tariffs are evaluated for their behaviors creating implicit and explicit costs reducing trade. Again these borders may also indicate the existence of different languages or different currencies, either of which may impede trade. For China case, having a common border is meaningful for exporting value of China for countries such as Taiwan, India and Russia. It is also worth stressing that common language meaning cultural affinity, which is expected to reduce transaction costs as speaking the same language helps facilitate trade is another important variable in determining China's trade volume. The rapid growth of the East Asian economies is due to physical and human capital accumulation and improvement of the quality of both education and training besides the productivity growth That is why, the importance of the existence of common language for China with high literacy rate is not surprising.

On the other hand, it is an undeniable fact that the managerial decision-making, leadership style and human resource management practices of firms are heavily influenced by the culture. The societal culture may also be seen as part of a firm's resources, leading to a competitive advantage. Thus, oriental cultural affinity of China with its trading partners creates a common ground for trade.

Free trade agreements between countries are intended to reduce the formalities and tariffs needed to cross borders, and therefore to increase trade. For the China case, where China actively promotes the regional economic integration of East Asia, which depends heavily on external neighboring economies, FTAs are found to increase bilateral trade flows of China with its trading partners. China uses FTAs as new platforms to further opening up to outside and speeding up domestic reforms. It is an effective approach to integrate into global economy and strengthen economic cooperation with other economies, having 14 FTA partners comprising of 31 economies, among which 8 Agreements have been signed already. While Asian countries are currently trying to cooperate with economies outside the Asian region to establish a wider range of inter-regional free China, the government's "unswerving policy" is to accelerate the development of free trade areas with China's major trading partners in Asia. As an old Chinese proverb says, "close neighbors are better than distant relatives". The close geographical location between Asian countries is considered as a vital guarantee for each other's economic stability. Put differently, development and cooperating with countries far away is not regarded as beneficial for these countries own economic development. The findings of the study support the main considerations of Chinese FTA strategy and indicate that FTA existence of China with its trading partners absolutely increases the trade volume of China.

The overall findings of this study provide strong evidence of the following: a) the main economic indicators such as gross domestic product and gross domestic product per capita and free trade agreements reduce trade barriers such as tariffs between China; b) trading partners have high explanatory power for trade values of China; c) the existence of common borders and common language are indicative of cultural affinity and lower transportation cost , thus main determinants of Chinese trade values.

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APPENDIX

TEZ FOTOKOPİSİ İZİN FORMU

<u>ENSTİTÜ</u>

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ☐

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

<u>YAZARIN</u>

Soyadı :
Adı :
Bölümü :

<u>TEZİN ADI</u> (İngilizce) :

<u>TEZİN TÜRÜ</u> : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

<u>TEZİN KÜTÜPHANEYE TESLİM TARİHİ</u>: