TURKISH ECONOMIC ASSOCIATION

DISCUSSION PAPER 2011/6
http ://www.tek. org.tr

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July, 2011

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Abstract

In theory, trade and foreign direct investment (FDI) have a positive impact on spillover of technology, demand for human capital and skilled worker wages, profits and total factor productivity. Conditions of increased competition at world scale affect both the production period and change and/or support factor intensities. Beside fast improvements in information technologies, FDI and trade relations play a fundamental role in this process. Free trade conditions and better investment climates contribute to improvements in skilled labor supply and its impact on economic fundamentals by affecting the product variety and quality through structural changes in factor endowments. The rise in skilled labor capacities in developing countries contributes especially to change the landscape of factor endowments. Within this context, production activities with new production models are segmented through more than one country. As a result, comparative advantages of advanced economies against emerging countries in high tech sectors have been easing in time. In this study, we research these developments via panel data regressions and cross table analysis. Developments in FDI and trade, in both total and high-technology goods, are examined for countries/regions including China, US, Japan and EU in the 2001-2009 period.

Keywords: structural change, factor endowments, production stage segmentation, skilled labor, high tech.

Özet

Üretim ve ticarette yapısal değişim

Teoride ticaret ve doğrudan yabancı yatırımlar (DYY), teknolojinin yayılması, vasıflı insan sermayesi talebi ile vasıflı işgücü ücretleri, karlılık ve toplam faktör verimliliği üzerinde olumlu bir etkiye sahiptir. Dünya ölçeğinde artan rekabet koşulları hem üretim süreci hem de faktör yoğunlukları değişiminin nedeni ve/veya destekleyicisi olmaktadır. Bu süreçte, bilgi ve iletişim teknolojilerindeki hızlı gelişim yanında, DYY ve ticaretteki gelişmeler temel rolü oynamaktadır. Serbest ticaret koşulları ve uygun yatırım ortamı, faktör yoğunluklarındaki yapısal değişim yoluyla, ürün çeşitliliği ve kalitesini artırarak, vasıflı işgücü arzı ve onun ekonomik değerler üzerindeki etkisine katkı sağlar. Özellikle gelişmekte olan ülkelerdeki vasıflı işgücü kapasitesindeki artış faktör yoğunluklarındaki değişime daha fazla katkı yapmaktadır. Bu çerçevede, üretim faaliyetlerinde, üretim aşamalarının birden fazla ülkeye bölündüğü, yeni üretim modelleri oluşmaktadır. Bu gelişmelerin bir sonucu olarak, yüksek teknolojiye dayalı sektörlerde, gelişmiş ülkelerin gelişmekte olan ülkeler karşısındaki rekabet güçleri giderek zayıflayacaktır. Çalışmamızda, 2001-2009 dönemindeki, DYY ile toplam ticaret ve ileri teknoloji malları ticaretindeki gelişmeler Japonya, ABD, Çin ve AB için çapraz tablo analizleri ve panel veri regresyonları kullanılarak incelenmiştir.

Anahtar kelimeler: yapısal değişim, faktör yoğunlukları, üretim aşamasının bölümlenmesi, vasıflı işgücü, yüksek teknoloji.

(*)This article appears in the "9th International Conference on Knowledge and Management Proceedings" and was presented at the Conference on Knowledge and Management held between June 23-25, 2011 in Sarajevo-Bosnia&Herzegovina.

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1. Introduction

Ricardian comparative advantage and Heckscher-Ohlin's different production factor endowments between countries have been known as the major explanations of foreign trade. Each country produces and exports the goods that have the production factor abundantly, either by capital or by labor. While the actual income of the abundant factor increases due to this factor structure and under free trade conditions, the income of the scarce factor decreases.

In Stolper-Samuelson; trade contributes to the shift of the production factor, i.e. capital that has higher return, from abundant country to scarce developing countries. Labor factor also moves from lower wage countries to the countries with higher wages. In factor-price equalization model; location of production is determined solely by trade cost and factor endowments. Labor abundant countries initially have low wages, but removal of trade barriers brings product price equalization, and then wage equalization. Thereby, economic integration allows improvements in both the production and the incomes of the labor abundant economies. On the other hand, the capital endowed countries are partially removed from labor abundant sectors to capital abundant sectors, and capital factor earnings rise even more. Therefore, free trade agreements work on behalf of the endowed factor. Compatible to the Stolper-Samuelson prediction, it could be concluded that as the multinational production increases and the inward FDI rises, imports of advanced goods are supposed to be decreasing. On the other hand, skilled wages in advanced technology goods sectors increase because of possibilities of leading producers paying higher wages; this is the "within effect". Since trade in skill intensive goods increases parallel to globalization, the price of skill intensive goods decreases, mainly due to the reduction in trade costs. (Burstein and Vogel, 2010)

Trade and FDI in innovation theories have a positive impact on spillover of technology, demand for human capital, and rise in skilled workers' wages, profits and total factor productivity. Rising competition conditions in world scale either causes and/or empowers the change not only in production structure but also in factor endowments. Beside fast improvements in information technologies, FDI and trade relations convey a major role on this process. Free trade conditions and better investment climates contribute to the improvements in skilled labor supply and its impact on economic fundamentals by affecting the product variety and quality through structural changes in factor endowments. Free trade conditions and better investment climates contribute to improvements in skilled labor supply and its impact on economic fundamentals by affecting the product variety and quality through structural changes in factor endowments. For example, entrants in PhD programs in China increased by six-fold in the 1995-2003 period. (Freeman, 2005:4) Within this context, production activities result in new production models where the production stage is segmented through more than one country. According to Widodo (2009: 524), in the ASEAN+3 region this model became an interesting phenomenon based on the vertically integrated production where each country specializes in a particular stage of production process. Freeman (2005:22) stresses that advanced economies loose the comparative advantage in high tech sectors due to lower R&D and manufacturing costs in developing countries. As a result of these developments; it can be argued that fundamental changes occur in world production and trade structure.

In the rest of the study, we analyze these developments via cross-tables and panel regressions in which FDI and both total and high-tech goods' trade developments in CN, US, J and EU between the 2001-2009 period. In section 2, the literature is surveyed. The data and methodology are given in section 3 and empirical results and concluding remarks are provided in sections 4 and 5.

2. Literature and developments

Timing of switching of economic growth policy from a Solow type model that depends on factor accumulation to the innovative endogenous growth (AK) model that triggers a major structural change in production and trade is discussed in Harada (2010). In this model, the initial capital-labor ratio at the time of the switch to the AK stage plays a critical role in economic growth (Harada, pg.524). The reason for this is that, if the economy does not provide the necessary skills and has lower level of capital accumulation, it does not provide sufficient ability to innovations and growth.

While acquisition activities are considered as a major way of raising productivity through FDI at firm level, economy-wide market size and lower technology adaptation costs are structural economic requirements for more productive FDI. Initial characteristics of the firm and innovation are incentives for foreign multinationals' acquisition decisions; these have a positive effect on acquisition. In Guadalupe, Kuzmina, Thomas(2010:15-16, 20, 25), larger global markets and/or lower technology implementation costs are seen as the other major factors affecting the acquisitions. The increase in FDI results from a decline in the export trend of the investor country. Widodo (2009, 522) explains the situation for Japanese export markets; under such conditions, complementarity of the home country (Japan) and its exports to her partners decrease. In Busse, Königer and Nunnenkamp (2010); the regulatory changes and incentives, the size of the economy, the endowment of local factors of production and geographical and cultural position, and bilateral investment treaties are found to be promoting and determining factors of FDI.

By improving the competition conditions, free trade conditions support innovations which in turn require increases in profits and real wages that originate from production innovation. According to Redding (2010:28), this process allows the increases in aggregated productivity.

Trade and FDI liberalization in India allowed both changes in the market-share reallocation of firms and increases in aggregated productivity, instead of average productivity improvement following the 1991 reforms. A 10 percent reduction in tariffs and FDI liberalization increased the overall productivity by 0.55 percent, 5.6 percent and 2.4 percent respectively in the six year periods during 1986-2004. In this new-trade approach, less productive firms leave their market shares to more productive ones. Reallocation of productivity in India rose sharply at the beginning of the reforms between 1991 and 1994.(Harrison, Martin, Nataraj, 2011:4, 14, 17, 23)

China and India's trade growth involves not only labor intensive manufacturing products, as it is mentioned in traditional trade models, but also represents two way/global production sharing, where part of the production stage is undertaken in one country, and subsequent stages are undertaken in another. (Dimaranan, Ianchovichina, Martin, 2009) These so called multinational productions have complementarity results and reveal fundamental and structural conversion of trade and production stages world-wide.

Bloom, Draca, Reenen's (2011) research findings in the 2000-2007 period are parallel to what is suggested in basic trade theory; while trade stimulates technological progress through innovation activities, patenting, IT intensity and raise skilled labor demand due to import competition of China, low-tech firm activities and demand for unskilled workers shrink. This happens because of the cheaper imports on low-tech products that caused the competitive power of the incumbent firms in these sectors to decline. Trade induced technical changes were estimated to be around 15 percent in Europe during this period. In Hsieh and Ossa's (2011) study, cumulative spillover effect of Chinese productivity growth was estimated to be an average of 0.48 percent of real income. Some researchers mention about positive effects of

FDI on Chinese domestic technology improvements. But, some empirical results have revealed that "the effect of FDI spillover is not significant in Chinese high-technology industry".(Zhao, Zhang, 2010:85, 96) In Chamon, Liu and Prasad's study (2010), exports and investments are seen as major fundamental and determining factors in Chinese growth. In the same study, half of the savings increases in 1990s which allowed incremental effect on investment purchases, explained with the rising uncertainty in incomes of young employees and decrease in pension replacement ratio from about 75-80 percent to 60 percent in 1997 reform regulations. Yang and others (2011:4, 37) analyse savings figures of China; they show that there was a continuous increase above ten points following 2000 and reaching to 49, 2 percent of GDP in 2008.

Structural change in Chinese industry began after 2001 when the country joined the World Trade Organization (WTO). Prior to WTO membership the country's manufacturing industries were promoted with high tariffs, investment incentives, export subsidies and restrictions on foreign firms. After the membership, the country eliminated these restrictions and export subsidies. With the undervalued currency the exchange rate policy became the only supporting policy to manufacturing products and to export (Rodrik, 2009:6). The author finds empirically that a 10 percent appreciation of the Chinese currency should reduce the growth rate by 0.86 percent. After China's WTO accession in 2001, tax rebates for exports raised about five folds to 586.6 billion Yuan between 2002 and 2008. (Yang and others, 2011:11) China's accession to WTO brought also a new surge of FDI inflows. While most multinational FDI firms from US and Japan appear as the vertical investments seeking cost advantage, EU firms are interested with Chinese market's horizontal market enlargement aspects. (Fung and others, 2009:479, 484)

As the Chinese variety of export goods change structurally on behalf of more sophisticated technological goods, both the demand and the wages of skilled labor increased. Parallel to these developments, while the average years of schooling increased from 10.8 to 12.8, from 1995 to 2007, annual average wages increased from 6.500 Yuan to 18.253 Yuan. (Whalley, Xing, 2010:5, 9-10) Despite its comparatively small share compared to the inward direct investment, which is one of the world's largest, (Wu, Pan, Wang, 2010:72), Chinese outward investment increased by almost threefold from 3.4 % during 1994-1999 to 9.6 % of total outflows from developing countries in 2005. (Cheung, Suny, 2009:313)

3. Data and Methodology

The data was collected from UNCTAD, OECD, and Chinese government's statistics web sites which, are yearly, for the 2001-2009 period. The same data sources are studied either in the cross tables or in the panel regressions analysis.

The raw data was examined first for the FDI; changes, GDP shares, and world share analysis were entered into tables. Following these computations, the annual average changes were entered in a different table. After the general evaluation of the tables, country specific conditions and developments were taken into account in empirical work as shown below in section 4.

Cross table analysis are carried out from 26 separate tables. Explanations are focused mostly on the annual average values. In trade tables; first the export and import numbers are given in total and then, the values of domestic high-tech goods of each individual country included in the study were figured-out as well. Then, these values were evaluated in separate tables on the basis of such indicators as; changes by years, shares of group countries, and GDP shares.

After the application of the Hausman test (Gür, 2009) we decide to use fixed effect models to run the panel data regressions. The countries taken into the examinations are Japan, US, EU

16, China, Germany, France and UK and EU 13. The studies resulted in two separate cases where China was included in one, and excluded from the other one. The dependent variables examined in regression models are; FDI, total export and import, and advanced goods exports and imports. The explanatory variables used are; GDP values, FDI inward stock values, and FDI -1, growth rates, openness ((total export + total import)/GDP)) ratio, total export values, total import values, advanced goods export values, advanced goods import values, population, and the GDP-per capita values.

4. Empirical results

4.1. FDI developments and the impacts

While the total of inward FDI of the US and EU-27 add up to about two thirds of world total, outward figures exceed this ratio by almost three fourths as annual averages for the 2001-2009 period. (FDI Table 5)

FDI TABLES

Table:1. FDI stocks; inflows, outflows, changes (percent) **Japan**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
Inw/World	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Outw/World	0,04	0,04	0,03	0,03	0,03	0,03	0,03	0,04	0,04	0,03
Inward/GDP	0,02	0,02	0,03	0,03	0,03	0,03	0,03	0,05	0,05	0,03
Outw/GDP	0,09	0,09	0,10	0,10	0,10	0,11	0,13	0,16	0,18	0,12
Inw_change	- 0,00	0,01	0,13	0,07	0,04	0,06	0,19	0,35	- 0,02	0,09
Outw_change	0,07	0,01	0,09	0,09	0,04	0,14	0,17	0,20	0,08	0,10

Table:2. FDI stocks; inflows, outflows, changes (percent): **US**

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
Inward/World	34,3	26,9	26,2	24,6	24,5	23,1	20,0	16,5	17,6	23,72
Outw/World	30,1	26,0	27,7	28,9	29,3	28,5	27,3	19,2	22,7	26,63
Inward/GDP	0,25	0,19	0,22	0,23	0,22	0,25	0,26	0,18	0,22	0,22
Outw/GDP	0,23	0,19	0,25	0,28	0,29	0,34	0,38	0,22	0,31	0,27
Inw/chang	- 0,09	- 0,27	0,18	0,10	0,04	0,14	0,08	- 0,41	0,18	- 0,00
Outw/chang	- 0,16	- 0,14	0,26	0,19	0,08	0,19	0,15	- 0,70	0,28	0,01

Table:3. FDI stocks; inflows, outflows, changes (percent): **CN**

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
Inward/World	0,03	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,03	0,02
Outw/World	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01
Inward/GDP	0,15	0,15	0,14	0,13	0,12	0,11	0,10	0,09	0,10	0,12
Outw/GDP	0,03	0,03	0,02	0,02	0,02	0,03	0,03	0,03	0,05	0,03
Inw/change	0,05	0,06	0,05	0,07	0,10	0,07	0,11	0,13	0,20	0,09
Outw/chang	0,20	0,07	- 0,12	0,26	0,22	0,22	0,23	0,35	0,36	0,20

Table:4. FDI stocks; inflows, outflows, changes (percent): **EU-16**

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
Inward/World	0,23	0,28	0,30	0,31	0,28	0,28	0,29	0,30	0,29	0,29
Outw/World	0,31	0,32	0,34	0,34	0,34	0,34	0,33	0,36	0,34	0,34
Inward/GDP	0,20	0,25	0,33	0,39	0,35	0,39	0,48	0,40	0,46	0,36
Outw/GDP	0,29	0,30	0,39	0,44	0,44	0,52	0,58	0,51	0,59	0,45
Inw/chang	0,04	0,19	0,26	0,18	- 0,06	0,19	0,23	- 0,14	0,11	0,11
Outw/chang	0,01	0,04	0,25	0,15	0,06	0,21	0,16	- 0,10	0,11	0,10

FDI Table 5. 2001-2009 Annual averages;
World, GDP, Changes / Shares (percent)

FDI	J	US	CN	EU-16	EU-27
Inward/World	0,01	23,72	0,02	0,29	0,41
Outw/World	0,03	26,63	0,01	0,34	0,47
Inward/GDP	0,03	0,22	0,12	0,36	0,38
Outw/GDP	0,12	0,27	0,03	0,45	0,46
Inw/chang	0,09	- 0,00	0,09	0,11	0,11
Outw/chang	0,10	0,01	0,20	0,10	0,09

Sources;UNCTAD, UNCTADstat
Euro area GDP Source: Econ: Key tables from OECD 2010

Both inflow and outflow shares of Japan in world FDI stocks as annual/average are by 1 and 3 percent respectively, they remain small compared to US and EU for the duration of the same period. While the inward GDP share of the country's progress is stagnant at 3 percent, the outflows rises by 12 percent. The average annual inward and outward increases of FDI are 9 and 10 percent respectively. The country has net outflows compare to inflows. Thereby, with respect to these indicators; annual average change, GDP, and world share outflows are higher than the inflow indicators.

Due to larger initial stocks at the beginning of the period, FDI stocks of the **US** have the second highest numbers following EU in cases of both world and GDP shares among our sample research group of countries. Despite relatively higher initial stocks to the inwards of the country during the period, annual average change stayed very conservative; in fact it is stagnant. Stable inward FDI movements should be indicated; as a developed large market, the US appears to have gradually lost its appeal in the last decade. This result also implies a signal of decreasing competitiveness power of the country at international level.

China's FDI appears quite differently from the other countries examined in this study. When we consider the annual average figures of the 2001-2009 period; first, we notice that the worldwide share of FDI is at negligible levels; and while the inward share is at 2 percent, the outward share is just at 1 percent. Changes in the period are remarkably high and the figures for inward and outward are realized as 9 and 20 percent respectively. And lastly, the figures of GDP shares are positive; while the share of inward is by 12 percent, which is four times higher from Japan's share, the rate of outward is just the reverse of Japan's which is only 3 percent and four times smaller than the rival country's share. Higher inward FDI rate to GDP shows that the country has an increasing rate of comparative advantages at international arena.

EU has the highest FDI-inward in the world and GDP shares among the group of countries subject to this research. Annual average changes of the region in both inwards and outwards are higher than the US, and with 11 percent for inwards, EU almost has the same shares as Japan and China. And with 10 percent of the outward FDI changing share, even EU-16, have the same share as Japan's, but reaches only half of the Chinese 20 percent share. (FDI Table 5)

In FDI regression table A.2.1.; all of the three variables, openness and growth, GDP significantly is affecting the dependent variable FDI, but the only one GDP, has negative t-value. The "trend" find is as the most explanatory figure in this equation. Calculated openness variables in the table effect FDI developments positively. Thereby, it should be considered that due to the bilateral interaction, openness supports the international product segmentation through FDI.

A.2. Panel data FDI regression: J, US, EU 16, G, F, UK, EU 13 included

Table 1.
Dependent Variable: LOG(FDI/GDP)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 14:31
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	83.47265	16.45720	5.072107	0.0000
LOG(OPEN)	0.600349	0.238423	2.518004	0.0149
@TREND	0.235288	0.037570	6.262740	0.0000
GROWTH	0.038692	0.015055	2.570001	0.0131
LOG(GDP)	-4.160774	0.746318	-5.575067	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.983292	Mean dependent var	-10.27896
Adjusted R-squared	0.980079	S.D. dependent var	3.738633
S.E. of regression	0.142606	Sum squared resid	1.057492
F-statistic	306.0223	Durbin-Watson stat	1.772483
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.975803	Mean dependent var	-8.615586
Sum squared resid	1.077743	Durbin-Watson stat	1.417899

In the FDI regression table B.2.1; find the most supporting variables of the variable FDI (-1) and previous term's FDI values.

B.2. Panel data FDI regression: J, US, CN, EU 16, G, F, UK, EU 13 included

Table 1.
Dependent Variable: LOG(FDI)
Method: Panel EGLS (Cross-section random effects)
Date: 04/13/11 Time: 10:37
Sample (adjusted): 2002 2009
Periods included: 8
Cross-sections included: 8
Total panel (balanced) observations: 64
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.371603	0.717049	0.518239	0.6063
LOG(GDP)	-0.284039	0.193690	-1.466459	0.1479
OPEN	-0.624079	0.421991	-1.478891	0.1446
LOG(FDI(-1))	0.904819	0.046076	19.63754	0.0000
LOG(EX)	-0.014185	0.101317	-0.140006	0.8891
LOG(IM)	0.382936	0.210097	1.822666	0.0735

	S.D.	Rho

Cross-section random		0.000000	0.0000
Idiosyncratic random		0.133981	1.0000

Weighted Statistics

R-squared	0.983083	Mean dependent var	13.56318
Adjusted R-squared	0.981625	S.D. dependent var	1.148717
S.E. of regression	0.155715	Sum squared resid	1.406340
F-statistic	674.1003	Durbin-Watson stat	2.231618
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.983083	Mean dependent var	13.56318
Sum squared resid	1.406340	Durbin-Watson stat	2.231618

4.2. Trade developments

In this section the analyzed data taken as "annual average values" in 2001-2009 period if specified otherwise in the related paragraph.

4.2.1. Trade openness and GDP figures

Japan's GDP shares of total export and total import are 15 percent and 13 percent respectively, the same rates for high-tech sectors 4 percent for the former, and 2 percent for the latter case. The shares of the US are 7 percent for total export, and 13 percent for total import, and for the high-tech goods sector both export and import, the country has the same GDP share as 2 percent. EU has one of the highest openness shares together with China. While the calculated GDP shares of EU is 27 percent both for the total of export and import, and the shares of the advanced goods 9 percent for the export, and 5 percent for the import.

The overall tendency of advanced goods, GDP shares during the 2001-2009 periods for Japan, US and EU feature almost a flat trend. But the results for China are different from these three developed regions. The difference comes from mainly having relatively higher GDP shares of the total trade figures. Total export and total import GDP shares shows a general tendency towards remarkable increases and as an average rate they reach 29 percent, and 25 percent respectively. And secondly, except last two years, the country has an increasing trend of advanced goods export and import rates during the period. (GDP share tables: A and B.1a, 1b, 1c, 1d)

GDP SHARE TABLES:
A. TOTAL TRADE Tables; 1a. Japan, 1b. US, 1c. CN, 1d. EU

Table 1a: **Japan**/US, CN, EU :Total trade GDP shares

Years	**X total**	X to US	X to CN	X to EU	**M total**	M from US	M from CN	M from EU	**X to 3**	**M from 3**
2001	0,12	0,04	0,01	0,02	0,10	0,02	0,02	0,01	0,07	0,05
2002	0,12	0,04	0,01	0,02	0,10	0,02	0,02	0,01	0,07	0,05
2003	0,13	0,03	0,02	0,02	0,11	0,02	0,02	0,01	0,07	0,05
2004	0,15	0,03	0,02	0,03	0,12	0,02	0,03	0,01	0,08	0,06
2005	0,15	0,04	0,02	0,03	0,13	0,02	0,03	0,01	0,08	0,06
2006	0,16	0,04	0,02	0,02	0,14	0,02	0,03	0,01	0,08	0,06
2007	0,17	0,03	0,03	0,03	0,14	0,02	0,03	0,01	0,09	0,06
2008	0,18	0,03	0,03	0,03	0,18	0,02	0,03	0,01	0,09	0,07
2009	0,14	0,02	0,03	0,02	0,14	0,02	0,03	0,01	0,07	0,06
anu.ave.	0,15	0,03	0,02	0,02	0,13	0,02	0,03	0,01	0,08	0,06

Table 1b: **US**/Japan, CN, EU :Total trade GDP shares

Years	**X total**	X to J	X to CN	X to EU	**M total**	M from J	M from CN	M from EU	**X to 3**	**M from 3**
2001	0,07	0,01	0,00	0,02	0,12	0,01	0,01	0,02	0,03	0,04
2002	0,07	0,00	0,00	0,02	0,11	0,01	0,01	0,02	0,02	0,04
2003	0,07	0,00	0,00	0,02	0,12	0,01	0,01	0,02	0,02	0,04
2004	0,07	0,00	0,00	0,02	0,13	0,01	0,01	0,02	0,02	0,05
2005	0,07	0,00	0,00	0,02	0,14	0,01	0,01	0,02	0,02	0,05
2006	0,08	0,00	0,00	0,02	0,14	0,01	0,02	0,02	0,03	0,05
2007	0,08	0,00	0,00	0,02	0,14	0,01	0,02	0,02	0,03	0,05
2008	0,09	0,00	0,00	0,02	0,15	0,01	0,02	0,02	0,03	0,05
2009	0,08	0,00	0,00	0,02	0,11	0,01	0,02	0,02	0,03	0,04
anu.ave	0,07	0,00	0,00	0,02	0,13	0,01	0,01	0,02	0,03	0,05

Table 1**c**: **CN**/US, Japan, EU :Total trade GDP shares

Years	**X total**	X to US	X to J	X to EU	**M total**	M from US	M from J	M from EU	**X to 3**	**M from 3**
2001	0,20	0,04	0,03	0,05	0,18	0,01	0,03	0,02	0,13	0,07
2002	0,22	0,05	0,03	0,06	0,20	0,02	0,04	0,02	0,14	0,07
2003	0,27	0,06	0,04	0,07	0,25	0,02	0,04	0,03	0,16	0,09
2004	0,31	0,06	0,04	0,08	0,29	0,02	0,05	0,03	0,18	0,10
2005	0,33	0,07	0,04	0,09	0,29	0,02	0,04	0,03	0,19	0,09
2006	0,35	0,07	0,03	0,09	0,29	0,02	0,04	0,03	0,19	0,09
2007	0,38	0,07	0,03	0,09	0,29	0,02	0,04	0,03	0,20	0,09
2008	0,33	0,06	0,03	0,08	0,26	0,02	0,03	0,03	0,16	0,08
2009	0,26	0,05	0,02	0,06	0,21	0,01	0,03	0,02	0,13	0,07
anu.ave.	0,29	0,06	0,03	0,07	0,25	0,02	0,04	0,03	0,17	0,08

Table 1d: **EU**/US, CN, Japan : Total trade GDP shares

Years	**X total**	X to US	X to CN	X to J	**M total**	M from US	M from CN	M from J	**X to 3**	**M from 3**
2001	0,20	0,02	0,00	0,00	0,20	0,02	0,01	0,01	0,02	0,03
2002	0,20	0,02	0,00	0,00	0,20	0,01	0,01	0,01	0,03	0,03
2003	0,24	0,02	0,00	0,00	0,23	0,02	0,01	0,01	0,03	0,03
2004	0,27	0,02	0,00	0,00	0,26	0,02	0,01	0,01	0,03	0,04
2005	0,27	0,02	0,00	0,00	0,28	0,02	0,01	0,01	0,03	0,04
2006	0,29	0,02	0,01	0,00	0,30	0,02	0,02	0,01	0,03	0,04
2007	0,32	0,02	0,01	0,00	0,32	0,02	0,02	0,01	0,03	0,05
2008	0,34	0,02	0,01	0,00	0,35	0,02	0,02	0,01	0,03	0,05
2009	0,28	0,02	0,01	0,00	0,28	0,02	0,02	0,01	0,03	0,04
anu.ave.	0,27	0,02	0,00	0,00	0,27	0,02	0,01	0,01	0,03	0,04

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88, trademap.org., IMF fin.stats.March 2009

GDP SHARE TABLES
B. ADVANCE GOODS TRADE Tables; 1a. Japan, 1b. US, 1c. CN, 1d. EU

Table 1a: **Japan**/US, CN, EU : Advanced goods (*) trade GDP shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2002-2009
X advance	0,04	0,03	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
X_US/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X_CN/GDP	0,00	0,00	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X_EU/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M advance	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,03	0,03	0,02
M from US	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,00	0,01
M from CN	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from EU	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
X to 3/GDP	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
M from 3/GDP	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,01

(*) ISIC(30,85, 88, 90, 91); aircraft, and spacecraft, pharm., medicinal chemic. and botanical prod., office, acco.and comp.mach., radio, television and communication equipment and apparatus, medical, precision and optical instruments, watches and clocks.

Table 1b: **US**/J, CN, EU : Advanced goods trade GDP shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X advance	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
X_J/GDP	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
X_CN/GDP	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
X_EU/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M advance	0,02	0,02	0,02	0,02	0,03	0,03	0,03	0,03	0,02	0,02
M from J	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
M from CN	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
M from EU	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X to 3/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from 3/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01

Table 1c: **CN**/US, J, EU : Advanced goods trade GDP shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X advance	0,05	0,05	0,06	0,08	0,09	0,10	0,11	0,09	0,07	0,08
X_US/GDP	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,02	0,01	0,01
X_J/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X_EU/GDP	0,01	0,01	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
M advance	0,05	0,06	0,08	0,10	0,10	0,11	0,11	0,08	0,07	0,08
M from US	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,00	0,00	0,01
M from J	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from EU	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X to 3/GDP	0,03	0,03	0,04	0,05	0,05	0,05	0,05	0,04	0,04	0,04
M from 3/GDP	0,02	0,02	0,02	0,03	0,02	0,03	0,03	0,02	0,02	0,02

Table 1d: **EU**/US, CN, J : Advanced goods trade GDP shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X advance	0,07	0,07	0,08	0,09	0,09	0,10	0,11	0,11	0,09	0,09
X_US/GDP	0,00	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
X_CN/GDP	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
X_J/GDP	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
M advance	0,04	0,04	0,04	0,05	0,05	0,05	0,06	0,06	0,06	0,05
M from US	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from CN	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,01	0,00
M from J	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
X to 3/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from 3/GDP	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,02	0,01	0,01

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88

4.2.2. Structural change in trade relations

Japan's total export and import as an annual average during the 2002-2009 periods raised 6 and 7 percent respectively. While the changes in trade with the US, and EU stayed below the average figures of the country, the trade with China realized much more above the average rates; 18 percent rise both in total and advanced goods export, and 10 percent rise for the total import and 13 percent rise to the advanced goods import.

The changes in the US and EU trades with China similar to the Japan-China trade figures that have higher increasing rates compared to the trade with the rest of the world. The increasing trade-share rates in the annual average US-China total are higher than the US's general export and import rate increases. Annual average rise in total export and total import during the 2002-2009 periods realized as 5 percent for the US, and as 9 percent for the EU. But, the rise in the US total export to China realized as 18 percent, and increase in total import from China has reached 20 percent. The rise of export and import of advanced goods of the country to China were realized as 14 percent and 22 percent respectively.

The increasing rates of EU total trade with China are at 20 percent, and at 21 percent for the export and for the import. The respective rates for the case of high-tech sector goods trade are 17 percent and 22 percent.

TABLES OF CHANGE IN TOTAL TRADE VOLUME
A. Total trade Tables; 2a. Japan, 2b. US, 2c. CN, 2d. EU

Table 2a: **Japan**/US,CN,EU: Total trade volume (change)

Years	**X total**	X to US	X to CN	X to EU	**M total**	M from US	M from CN	M from EU	**X to 3**	**M from 3**
2001										
2002	0,03	- 0,02	0,28	- 0,04	- 0,03	- 0,08	0,07	0,00	0,02	- 0,01
2003	0,13	- 0,02	0,44	0,19	0,14	0,02	0,22	0,13	0,12	0,13
2004	0,20	0,09	0,29	0,17	0,19	0,06	0,25	0,16	0,16	0,17
2005	0,05	0,06	0,08	0,00	0,13	0,03	0,15	0,01	0,04	0,08
2006	0,09	0,08	0,16	0,03	0,12	0,06	0,09	0,03	0,09	0,07
2007	0,10	- 0,01	0,18	0,10	0,07	0,04	0,08	0,07	0,07	0,07
2008	0,09	- 0,05	0,14	0,04	0,23	0,09	0,12	0,04	0,04	0,09
2009	-0,26	- 0,31	- 0,12	- 0,28	- 0,28	- 0,23	- 0,14	- 0,20	- 0,24	- 0,18
anu.ave.	0,06	- 0,02	0,18	0,03	0,07	- 0,00	0,10	0,03	0,04	0,05

Table 2b: **US**/Japan,CN,EU: Total trade volume (change)

Years	**X total**	X to J	X to CN	X to EU	**M total**	M from J	M from CN	M from EU	**X to 3**	**M from 3**
2001										
2002	- 0,05	- 0,11	0,15	- 0,06	0,02	- 0,04	0,29	0,07	-0,06	0,06
2003	0,04	0,01	0,29	0,06	0,09	- 0,03	0,32	0,11	0,07	0,10
2004	0,13	0,04	0,22	0,14	0,17	0,10	0,35	0,13	0,13	0,17
2005	0,11	0,02	0,20	0,03	0,14	0,06	0,30	0,07	0,05	0,12
2006	0,15	0,08	0,32	0,14	0,11	0,07	0,25	0,09	0,15	0,13
2007	0,12	0,05	0,18	0,10	0,05	- 0,02	0,14	0,06	0,11	0,07
2008	0,12	0,06	0,10	0,10	0,07	- 0,04	0,08	0,02	0,10	0,03
2009	- 0,19	- 0,23	- 0,03	- 0,19	- 0,26	- 0,31	- 0,12	- 0,23	-0,17	- 0,21
anu.ave	0,05	- 0,01	0,18	0,04	0,05	- 0,03	0,20	0,04	0,05	0,06

Table 2c: **CN**/US,Japan,EU: Total trade volume (change)

Years	**X total**	X to US	X to J	X to EU	**M total**	M from US	M from J	M from EU	**X to 3**	**M from 3**
2001										
2002	0,22	0,29	0,08	0,14	0,21	0,15	0,25	0,21	0,17	0,22
2003	0,35	0,32	0,23	0,39	0,40	0,29	0,39	0,41	0,33	0,37
2004	0,35	0,35	0,24	0,39	0,36	0,22	0,27	0,29	0,34	0,27
2005	0,28	0,30	0,14	0,26	0,18	0,20	0,06	0,06	0,25	0,09
2006	0,27	0,25	0,09	0,22	0,20	0,32	0,15	0,26	0,21	0,22
2007	0,26	0,14	0,11	0,27	0,21	0,18	0,16	0,22	0,20	0,18
2008	0,17	0,08	0,14	0,13	0,18	0,10	0,12	0,17	0,11	0,13
2009	- 0,16	- 0,12	- 0,16	- 0,12	- 0,11	- 0,03	- 0,13	- 0,02	-0,13	- 0,07
anu.ave.	0,22	0,20	0,11	0,21	0,20	0,18	0,16	0,20	0,18	0,18

Table 2d: **EU**/US,CN,Japan: Total trade volume (change)

Years	**X total**	X to US	X to CN	X to J	**M total**	M from US	M from CN	M from J	**X to 3**	**M from 3**
2001										
2002	0,07	0,07	0,21	0,00	0,04	- 0,06	0,14	- 0,04	0,07	- 0,01
2003	0,19	0,11	0,41	0,13	0,20	0,06	0,39	0,19	0,14	0,17
2004	0,20	0,13	0,29	0,16	0,22	0,14	0,39	0,17	0,16	0,22
2005	0,07	0,07	0,06	0,01	0,09	0,03	0,26	0,00	0,06	0,10
2006	0,13	0,09	0,26	0,03	0,15	0,14	0,22	0,03	0,11	0,15
2007	0,15	0,06	0,22	0,07	0,14	0,10	0,27	0,10	0,09	0,17
2008	0,10	0,02	0,17	0,04	0,11	0,10	0,13	0,04	0,05	0,10
2009	- 0,22	- 0,23	- 0,02	- 0,20	- 0,23	- 0,19	- 0,12	- 0,28	-0,18	- 0,17
anu.ave.	0,09	0,04	0,20	0,03	0,09	0,04	0,21	0,03	0,06	0,09

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88, trademap.org., IMF fin.stats.March 2009.

TABLES OF ADVANCE GOODS TRADE VOLUME
B. Advanced goods trade Tables; 2a. Japan, 2b. US, 2c. CN, 2d. EU

Table 2a: **Japan**/US,CN,EU: Advanced goods(*) trade volume (change)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2002-2009
X advan.		- 0,05	0,17	0,20	- 0,01	0,04	0,03	0,03	-0,20	0,03
X to US		- 0,18	0,01	0,12	- 0,01	0,00	- 0,02	- 0,02	-0,24	- 0,04
X to CN		0,31	0,55	0,24	0,07	0,17	0,16	0,08	-0,13	0,18
X to EU		- 0,12	0,20	0,19	- 0,03	- 0,03	- 0,03	0,10	-0,24	0,00
M advan.		- 0,01	0,14	0,18	0,08	0,11	0,05	0,05	-0,12	0,06
M from US		- 0,08	0,03	0,07	0,07	0,10	0,02	- 0,02	-0,15	0,01
M from CN		0,10	0,26	0,31	0,16	0,09	0,14	0,14	-0,12	0,13
M from EU		0,03	0,08	0,20	0,04	0,07	0,00	0,04	-0,06	0,05
X_3		- 0,09	0,18	0,18	0,00	0,04	0,04	0,05	-0,20	0,03
M_3		0,00	0,12	0,18	0,10	0,09	0,06	0,06	-0,12	0,06

(*) ISIC(30,85, 88, 90, 91); aircraft, and spacecraft, pharm., medicinal chemic. and botanical prod., office, acco.and comp.mach., radio, television and communication equipment and apparatus, medical, precision and optical instruments, watches and clocks.

Table 2b: **US**/J,CN,EU: Advanced goods trade volume (change)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2002-2009
X advan.		- 0,07	0,02	0,12	0,08	0,17	0,07	0,03	- 0,05	0,05
X to J		- 0,08	0,04	0,06	0,03	0,08	0,01	- 0,01	- 0,13	- 0,00
X to CN		0,21	0,02	0,14	0,35	0,41	0,11	- 0,04	- 0,07	0,14
X to EU		- 0,07	0,04	0,18	0,00	0,13	0,11	0,09	- 0,10	0,05
M advan.		0,00	0,07	0,15	0,10	0,11	0,10	0,03	- 0,12	0,05
M from J		- 0,13	- 0,01	0,13	0,01	- 0,02	- 0,00	- 0,03	- 0,22	- 0,03
M from CN		0,27	0,25	0,45	0,38	0,28	0,18	0,06	- 0,12	0,22
M from EU		0,10	0,08	0,15	0,06	0,07	0,08	0,04	- 0,10	0,06
X_3		- 0,05	0,04	0,16	0,04	0,15	0,10	0,06	- 0,10	0,05
M_3		0,04	0,08	0,20	0,12	0,11	0,10	0,03	- 0,12	0,07

Table 2c: **CN**/US,J,EU: Advanced goods trade volume (change)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	200-2009
X advan.		0,25	0,36	0,45	0,35	0,31	0,30	0,14	- 0,12	0,26
X to US		0,27	0,25	0,45	0,38	0,28	0,18	0,06	- 0,12	0,22
X to J		0,10	0,26	0,31	0,16	0,09	0,14	0,14	- 0,12	0,13
X to EU		0,16	0,42	0,45	0,22	0,28	0,19	0,07	- 0,05	0,22
M advan.		0,29	0,46	0,40	0,23	0,25	0,17	0,06	- 0,09	0,22
M from US		0,21	0,02	0,14	0,35	0,41	0,11	- 0,04	- 0,07	0,14
M from J		0,31	0,55	0,24	0,07	0,17	0,16	0,08	- 0,13	0,18
M from EU		0,21	0,02	0,14	0,35	0,41	0,11	- 0,04	- 0,07	0,14
X_3		0,18	0,32	0,42	0,26	0,24	0,18	0,08	- 0,09	0,20
M_3		0,18	0,34	0,26	0,12	0,27	0,15	0,07	- 0,09	0,16

Table 2d: **EU**/US,CN,J: Advanced goods trade volume(change)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	200-2009
X advan.		0,07	0,19	0,18	0,07	0,10	0,15	0,05	- 0,23	0,07
X to US		0,10	0,08	0,15	0,06	0,07	0,08	0,04	- 0,10	0,06
X to CN		0,02	0,35	0,38	0,06	0,29	0,17	0,16	- 0,07	0,17
X to J		0,03	0,08	0,20	0,04	0,07	0,00	0,04	- 0,06	0,05
M advan.		0,04	0,16	0,22	0,08	0,13	0,10	0,08	- 0,09	0,09
M from US		- 0,07	0,04	0,18	0,00	0,13	0,11	0,09	- 0,10	0,05
M from CN		0,16	0,42	0,45	0,22	0,28	0,19	0,07	- 0,05	0,22
M from J		0,03	0,08	0,20	0,04	0,07	0,00	0,04	- 0,06	0,05
X_3		0,08	0,11	0,18	0,06	0,10	0,09	0,06	- 0,09	0,07
M_3		- 0,05	0,14	0,24	0,05	0,14	0,12	0,08	- 0,10	0,08

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88

China has the highest increasing rates with 22 percent for total export, and 20 percent for total import among the studied group of countries. Increasing rates of total trades with US and EU are higher compared to trades with Japan. The increasing rates of exports and imports of high-tech goods are higher than the total trade figures; ranking at 26 percent and 22 percent. The higher rate of increase in advanced goods exports compared to increases in total trade and high-tech imports denote the more China has been a net value-added gaining country due to

the structural change in production and trade activities worldwide. (Trade volume tables A. and B. 2a.Japan, 2b.US, 2c.CN, 2d.EU)

The share of three the countries i.e. US, CN, EU, in Japan's total exports and imports are 53 percent and 44 percent respectively in annual average base. Highest share for total exports belongs to the US with 23 percent, but for imports China has the highest share with 20 percent among "the group". The share of "the group" in advanced technology goods trade with Japan is 55 percent for export, and 60 percent for imports. Among the group, the highest figures for the country' export belongs to the US with 20 percent, and for imports, China has the highest share with 24 percent in Japan's import. China's share rose from 17 percent in 2001 which is the first year of the period to 29 percent in 2009 which is last year of the observed term.

The US total trade shares with three member group of countries i.e.; J, CN, EU is 35 percent both in exports and imports. The highest trade shares of the country in the group belong to EU with the 24 percent and 18 percent for total export and total import respectively. In high-tech goods' sectors the number one trade partner is also in the EU group, and the shares of EU are 34 and 24 percent for export and import by ranking. China ranks second with the country's advance goods imports with 12 percent share. While China's share in the country's advanced goods import was 5 percent in 2001 it has increased to 17 percent at the end of the studied term of 2009. The continuity of this trade indicates the fundamental change in the area of manufacturing goods in world scale, and the process is moving parallel to the argument we introduced in this study. The mentioned changing shape of the advanced goods trade reflects the gradual change in the production possibilities of the developing countries, as it is seen in the Chinese example; from labor intensive goods towards the goods producing with more sophisticated technologies.

Neither of the group-3 nor any individual country in the group has a significant higher share in EU's total trade; the calculated rates belong to group-3 for exports and imports by ranking are 11 percent and 14 percent. But the remarkable figure placed in advanced goods imports originated from group-3 that was realized as just above a quarter, 26 percent share. Despite the US with 14 percent share has the highest import partner of EU among the group-3, it has a declining rate which decreased from 18 percent in 2001 to 13 percent in 2009. And China as the second ranked country with 7 percent, its rate showing a serious improvement in EU's high-tech goods import with an increased share from 4 percent in 2001 to 10 percent in 2009.

China exports 57 percent of its total exports to these 3 regions and imports from the group by 33 percent of its total imports. While the share of Chinese advanced goods export to the group is the same as its total export, 57 percent, the country's advanced goods imports share from the group was realized as 27 percent. (Trade share tables A. and B. 3a.Japan, 3b.US, 3c.CN, 3d.EU)

TABLES OF TOTAL TRADE SHARE
A. Total trade Tables; 3a. Japan, 3b. US, 3c. CN, 3d. EU

Table 3a: **Japan**/US,CN,EU: Total trade shares

Years	**Xto3/totX**	X_US/totX	X_CN/totX	X_EU/totX	**Mfrom3/totM**	M_US/totM	M_CN/totM	M_EU/totM
2001	0,56	0,30	0,08	0,18	0,46	0,18	0,17	0,11
2002	0,55	0,29	0,10	0,17	0,47	0,17	0,18	0,12
2003	0,55	0,25	0,12	0,18	0,47	0,16	0,20	0,12
2004	0,53	0,23	0,13	0,17	0,46	0,14	0,21	0,11
2005	0,53	0,23	0,13	0,16	0,44	0,13	0,21	0,10
2006	0,53	0,23	0,14	0,16	0,42	0,12	0,20	0,09
2007	0,51	0,20	0,15	0,16	0,41	0,12	0,21	0,09
2008	0,49	0,18	0,16	0,15	0,37	0,10	0,19	0,08
2009	0,50	0,16	0,19	0,14	0,42	0,11	0,22	0,09
anu.ave.	0,53	0,23	0,13	0,16	0,44	0,14	0,20	0,10

Table 3b: **US**/Japan,CN,EU: Total trade shares

Years	**Xto3/totX**	X to J/tot X	X_CN/X	X_EU/X	**Mfrom3/totM**	M from J/M	M from CN/M	M from EU/M
2001	0,35	0,08	0,03	0,25	0,33	0,11	0,05	0,18
2002	0,35	0,07	0,03	0,25	0,35	0,10	0,06	0,19
2003	0,36	0,07	0,04	0,25	0,35	0,09	0,07	0,19
2004	0,36	0,07	0,04	0,25	0,35	0,09	0,08	0,19
2005	0,34	0,06	0,05	0,23	0,35	0,08	0,09	0,17
2006	0,34	0,06	0,05	0,23	0,36	0,08	0,11	0,17
2007	0,34	0,05	0,06	0,23	0,36	0,07	0,12	0,17
2008	0,33	0,05	0,05	0,22	0,35	0,07	0,12	0,16
2009	0,34	0,05	0,07	0,22	0,37	0,06	0,14	0,17
anu.ave	0,35	0,06	0,05	0,24	0,35	0,08	0,09	0,18

Table 3c: **CN**/US,Japan,EU: Total trade shares

Years	**Xto3/totX**	X to US/X	X to J/X	X to EU/X	**Mfrom3/totM**	M from US/M	M from J/M	M from EU/M
2001	0,64	0,20	0,17	0,27	0,36	0,08	0,18	0,11
2002	0,61	0,22	0,15	0,25	0,36	0,07	0,18	0,11
2003	0,60	0,21	0,14	0,26	0,36	0,07	0,18	0,11
2004	0,60	0,21	0,12	0,26	0,33	0,06	0,17	0,10
2005	0,58	0,21	0,11	0,26	0,31	0,06	0,15	0,09
2006	0,55	0,21	0,09	0,25	0,31	0,07	0,15	0,10
2007	0,52	0,19	0,08	0,25	0,31	0,07	0,14	0,10
2008	0,50	0,18	0,08	0,24	0,29	0,06	0,13	0,10
2009	0,52	0,18	0,08	0,25	0,31	0,07	0,13	0,11
anu.ave.	0,57	0,20	0,11	0,25	0,33	0,07	0,16	0,10

Table 3d: **EU**/US,CN,Japan: Total trade shares

Years	**Xto3/totX**	X to US/X	X to CN/X	X to J/X	**Mfrom3/totM**	M from US/M	M from CN/M	M from J/M
2001	0,12	0,10	0,01	0,02	0,15	0,08	0,03	0,03
2002	0,13	0,10	0,01	0,02	0,14	0,07	0,04	0,03
2003	0,12	0,09	0,02	0,02	0,14	0,07	0,04	0,03
2004	0,12	0,08	0,02	0,02	0,14	0,06	0,05	0,03
2005	0,11	0,08	0,02	0,01	0,14	0,06	0,05	0,03
2006	0,11	0,08	0,02	0,01	0,14	0,06	0,06	0,02
2007	0,11	0,07	0,02	0,01	0,14	0,06	0,06	0,02
2008	0,10	0,07	0,02	0,01	0,14	0,06	0,06	0,02
2009	0,11	0,07	0,03	0,01	0,15	0,06	0,07	0,02
anu.ave.	0,11	0,08	0,02	0,01	0,14	0,06	0,05	0,03

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88, trademap.org., IMF fin.stats.March 2009.

TABLES OF ADVANCE GOODS TRADE SHARE
B. Advanced goods trade Tables; 3a. Japan, 3b. US, 3c. CN, 3d. EU

Table 3a: **Japan**/US,CN,EU: Advanced goods(*) trade shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2002-2009
X to 3/X	0,56	0,54	0,54	0,53	0,54	0,54	0,55	0,56	0,56	0,55
X_US/X	0,27	0,23	0,20	0,19	0,19	0,18	0,17	0,17	0,16	0,20
X_CN/X	0,08	0,11	0,14	0,14	0,16	0,18	0,20	0,21	0,23	0,16
X_EU/X	0,21	0,20	0,20	0,20	0,19	0,18	0,17	0,18	0,18	0,19
M from 3/M	0,60	0,60	0,59	0,60	0,60	0,60	0,60	0,61	0,61	0,60
M from US	0,29	0,27	0,24	0,22	0,22	0,21	0,21	0,19	0,19	0,23
M from CN	0,17	0,19	0,21	0,24	0,25	0,25	0,27	0,29	0,29	0,24
M from EU	0,14	0,15	0,14	0,14	0,14	0,13	0,13	0,12	0,13	0,14

(*) ISIC(30,85, 88, 90, 91); aircraft, and spacecraft, pharm., medicinal chemic. and botanical prod., office, acco.and comp.mach., radio, television and communication equipment and apparatus, medical, precision and optical instruments, watches and clocks.

Table 3b: **US**/J,CN,EU: Advanced goods trade shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X to 3/X	0,45	0,45	0,46	0,48	0,46	0,45	0,47	0,48	0,45	0,46
X_J/X	0,08	0,08	0,08	0,08	0,07	0,07	0,06	0,06	0,06	0,07
X_CN/X	0,03	0,04	0,04	0,04	0,05	0,06	0,07	0,06	0,06	0,05
X_EU/X	0,33	0,33	0,34	0,36	0,33	0,32	0,33	0,35	0,33	0,34
M from 3/M	0,43	0,45	0,46	0,48	0,48	0,48	0,48	0,48	0,48	0,47
M from J	0,15	0,13	0,12	0,12	0,11	0,09	0,09	0,08	0,07	0,11
M from CN	0,05	0,07	0,08	0,10	0,13	0,15	0,16	0,17	0,17	0,12
M from EU	0,23	0,25	0,26	0,26	0,25	0,24	0,23	0,24	0,24	0,24

Table 3c: **CN**/US,J,EU: Advanced goods trade shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X to 3/X	0,69	0,65	0,63	0,62	0,58	0,54	0,49	0,47	0,48	0,57
X_US/X	0,21	0,22	0,20	0,20	0,20	0,20	0,18	0,17	0,17	0,19
X_J/X	0,19	0,17	0,15	0,14	0,12	0,10	0,09	0,09	0,09	0,13
X_EU/X	0,29	0,27	0,28	0,28	0,25	0,25	0,23	0,21	0,23	0,25
M from 3/M	0,35	0,32	0,29	0,26	0,24	0,24	0,24	0,24	0,24	0,27
M from US	0,10	0,09	0,07	0,05	0,06	0,07	0,06	0,06	0,06	0,07
M from J	0,13	0,13	0,14	0,12	0,11	0,10	0,10	0,10	0,10	0,12
M from EU	0,12	0,09	0,08	0,08	0,07	0,07	0,07	0,08	0,08	0,08

Table 3d: **EU**/US,CN,J: Advanced goods trade shares

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2001-2009
X to 3/X	0,09	0,09	0,09	0,09	0,09	0,09	0,08	0,08	0,10	0,09
X_US/X	0,07	0,07	0,06	0,06	0,06	0,06	0,06	0,06	0,07	0,06
X_CN/X	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,02	0,02	0,01
X_J/X	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
M from 3/M	0,28	0,26	0,25	0,26	0,25	0,26	0,26	0,26	0,26	0,26
M from US	0,18	0,16	0,14	0,14	0,13	0,13	0,13	0,13	0,13	0,14
M from CN	0,04	0,05	0,06	0,07	0,08	0,09	0,09	0,09	0,10	0,07
M from J	0,06	0,05	0,05	0,05	0,05	0,04	0,04	0,04	0,03	0,05

Data: OECD Economic Outlook, Volume 2010 Issue 2, No.88

4.3. Panel regression findings

4.3.1. China excluded

In table (A.1) 1, the total export regression, FDI, GDP, and growth rate taken are as the explanatory variables. All of the three variables probability level finds are smaller than 0.05 and t-value finds are higher than 2. With 10.25 t-values, GDP is observed as the most explanatory variable. In table (A.1) 2, when we extend the model by adding one more variable openness the t-value of the growth variable turns to negative -1.44, and probability level gets over the 0.05 level to 0.15. Openness becomes the most explanatory variable in this second model with the probability level smaller than the lowest level, and with the t-value 28.93. While growth rate meaningless to explain the dependent variable, GDP probability and t-values figures find significant to explain the export increases.

When the exports of advanced goods taken as the dependent variable, FDI, GDP, openness taken as the independent variables, in table (A.1) 3; the most explanatory variable calculated is the openness with 6.19 t-value and 0.00 probability. In table (A.1) 4, the case of import taken as the dependent variable**;** the most explanatory two variables, as expected find as openness and GDP among the four variables, FDI, GDP, growth and openness. The similar explanatory results find with the same variables as it is in the case of import in the case of dependent variable imports of advance goods in table (A.1) 5.

- Table (A.1) 1, FDI variable find is the least significant explanatory variable to the total export improvements of advanced countries, and the probability of FDI gets worse in table (A.1) 2 when we included the openness variable into the equation. Openness in tables (A.1) 2 and (A.1) 3 forms as the most explanatory variable on export values. That means that openness rather than FDI supports interact more with our treatments.
- Table (A.1) 4 and table (A.1) 5, openness and size of GDP for the case of total and high-tech products imports seen as the most interacting variables with our studied arguments.

A.1. Panel data trade regressions: J, US, EU 16, G, F, UK, EU 13 included

Table 1.
Dependent Variable: LOG(EX)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 14:43
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-22.25188	3.251087	-6.844444	0.0000
LOG(FDI)	0.241835	0.052227	4.630447	0.0000
LOG(GDP)	1.781161	0.173658	10.25669	0.0000
GROWTH	0.022094	0.004640	4.761987	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.994245	Mean dependent var	23.65177
Adjusted R-squared	0.993267	S.D. dependent var	8.070761
S.E. of regression	0.080687	Sum squared resid	0.345052
F-statistic	1017.319	Durbin-Watson stat	1.526723
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.990246	Mean dependent var	20.67971
Sum squared resid	0.363864	Durbin-Watson stat	1.124740

Table 2.
Dependent Variable: LOG(EX)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 14:49
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.078544	1.337375	2.301930	0.0254
LOG(FDI)	0.008777	0.016702	0.525510	0.6015
LOG(GDP)	0.827846	0.062626	13.21899	0.0000
GROWTH	-0.001977	0.001366	-1.447606	0.1537
LOG(OPEN)	1.041755	0.036001	28.93666	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.999655	Mean dependent var	40.78647
Adjusted R-squared	0.999588	S.D. dependent var	24.39562
S.E. of regression	0.034826	Sum squared resid	0.063070
F-statistic	15045.96	Durbin-Watson stat	0.808471
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.997344	Mean dependent var	20.67971
Sum squared resid	0.099076	Durbin-Watson stat	0.463135

Table 3.
Dependent Variable: LOG(EX_ADV)
Method: Panel Least Squares
Date: 04/16/11 Time: 15:13
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.564028	8.429414	0.541441	0.5905
LOG(FDI)	-0.275422	0.114821	-2.398718	0.0200
LOG(GDP)	0.870818	0.406101	2.144337	0.0366
LOG(OPEN)	1.512321	0.244089	6.195767	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.990735	Mean dependent var	18.83188
Adjusted R-squared	0.989162	S.D. dependent var	1.526904
S.E. of regression	0.158960	Akaike info criterion	-0.695713
Sum squared resid	1.339216	Schwarz criterion	-0.355533
Log likelihood	31.91497	Hannan-Quinn criter.	-0.561919
F-statistic	629.7319	Durbin-Watson stat	1.219024
Prob(F-statistic)	0.000000		

Table 4.
Dependent Variable: LOG(IM)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 14:58
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.778923	0.898695	-4.204902	0.0001
LOG(FDI)	0.012942	0.010215	1.266956	0.2108
LOG(GDP)	1.130977	0.043298	26.12070	0.0000
GROWTH	0.002368	0.001094	2.165331	0.0350
LOG(OPEN)	0.969084	0.022569	42.93884	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.999872	Mean dependent var	30.57798
Adjusted R-squared	0.999847	S.D. dependent var	16.74048
S.E. of regression	0.018549	Sum squared resid	0.017892
F-statistic	40494.09	Durbin-Watson stat	1.246120
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.999427	Mean dependent var	20.68999
Sum squared resid	0.022422	Durbin-Watson stat	0.891525

Table 5.
Dependent Variable: LOG(IM_ADV)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 15:04
Sample: 2001 2009
Periods included: 9
Cross-sections included: 7
Total panel (balanced) observations: 63
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.324597	3.442711	-0.965691	0.3387
LOG(FDI)	0.035012	0.047771	0.732909	0.4669
LOG(GDP)	0.991848	0.152265	6.513951	0.0000
LOG(OPEN)	0.831705	0.128593	6.467729	0.0000
GROWTH	-0.005224	0.005318	-0.982401	0.3305

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.997749	Mean dependent var	26.73563
Adjusted R-squared	0.997317	S.D. dependent var	11.89577
S.E. of regression	0.095025	Sum squared resid	0.469542
F-statistic	2305.378	Durbin-Watson stat	1.024128
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.994486	Mean dependent var	18.46501
Sum squared resid	0.767660	Durbin-Watson stat	0.772717

4.3.2. China included

Openness and GDP figures, as it is predicted and showed in China excluded export regression, formed again, as the major explanatory variables to the total export regression in table (B.1) 1. In table (B.1) 2, in advanced goods exports regression; the most explaining variables seen as the imports of advanced products imports, the second is GDP, and openness follows them ranking third. While the most explanatory variable in total import regression in table (B.1) 3 is GDP, openness and high-tech goods export variables ranked as first and second high explanatory variables in advanced good import regression in table (B.1) 4.

The positive impact of advanced goods imports on exports of high-tech products which is find as the most explanatory variable in table (B.1) 2 that is higher than GDP size and openness variables. This result strongly supports our arguments of international product segmentation in manufacturing sectors, factor endowment change and related result of increasing comparative advantage of China as an emerging country in high-tech products. When we put the regression findings together in table (B.1) 2, with the advanced goods trade cross-tables, where we already find relatively higher rates of China's advanced goods export (Table B.3c), and increasing trends of advanced goods imports of Japan, US and EU from China (Tables B. 3a., 3b, 3d.) the combined analysis gives us strong explanatory proofs in our conception of "structural change in production and trade". The similar results achieved for the advanced goods import regression in table (B.1) 4 that the two highest explanatory variables found as the exports of high-tech products and FDI that supporting also our above arguments**.**

B.1. Panel data trade regressions: J, US, CN, EU 16, G, F, UK, EU 13 included

Table 1.
Dependent Variable: LOG(EX)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 15:23
Sample: 2001 2009
Periods included: 9
Cross-sections included: 8
Total panel (balanced) observations: 72
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.043715	0.339728	-3.072211	0.0032
LOG(FDI)	0.002076	0.006304	0.329320	0.7431
LOG(GDP)	1.919874	0.077107	24.89872	0.0000
LOG(IM)	-0.948126	0.056905	-16.66150	0.0000
LOG(OPEN)	1.941038	0.059232	32.76995	0.0000
LOG(GDPPC)	0.033126	0.068098	0.486449	0.6285

Effects Specification
Cross-section fixed (dummy variables)

Weighted Statistics			
R-squared	0.999881	Mean dependent var	44.07443
Adjusted R-squared	0.999857	S.D. dependent var	27.38189
S.E. of regression	0.020782	Sum squared resid	0.025483
F-statistic	41323.38	Durbin-Watson stat	0.349562

Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.997532	Mean dependent var	20.63854
Sum squared resid	0.101576	Durbin-Watson stat	0.199585

Table 2.
Dependent Variable: LOG(EX_ADV)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 15:30
Sample: 2001 2009
Periods included: 9
Cross-sections included: 8
Total panel (balanced) observations: 72
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.879047	1.364366	-4.308997	0.0001
LOG(GDP)	0.633875	0.098310	6.447740	0.0000
LOG(OPEN)	0.228010	0.088309	2.581951	0.0123
LOG(FDI)	-0.216075	0.036969	-5.844797	0.0000
LOG(IM_ADV)	0.743869	0.076102	9.774591	0.0000

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.999079	Mean dependent var	32.62516
Adjusted R-squared	0.998910	S.D. dependent var	20.29748
S.E. of regression	0.108007	Sum squared resid	0.699924
F-statistic	5916.073	Durbin-Watson stat	1.538416
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.994018	Mean dependent var	18.85223
Sum squared resid	0.889372	Durbin-Watson stat	1.478829

Table 3
Dependent Variable: LOG(IM)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 15:21
Sample: 2001 2009
Periods included: 9
Cross-sections included: 8
Total panel (balanced) observations: 72
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.505352	0.408357	1.237523	0.2207
LOG(FDI)	0.041404	0.011152	3.712643	0.0005
LOG(GDP)	0.922792	0.019554	47.19224	0.0000
LOG(OPEN)	1.029651	0.022452	45.85954	0.0000
GROWTH	-0.000395	0.001233	-0.320569	0.7497

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.999743	Mean dependent var	25.71552
Adjusted R-squared	0.999696	S.D. dependent var	11.23107
S.E. of regression	0.020780	Sum squared resid	0.025908
F-statistic	21247.71	Durbin-Watson stat	1.109661
Prob(F-statistic)	0.000000		
	Unweighted Statistics		
R-squared	0.999386	Mean dependent var	20.62943
Sum squared resid	0.026672	Durbin-Watson stat	1.006133

Table 4.
Dependent Variable: LOG(IM_ADV)
Method: Panel EGLS (Cross-section weights)
Date: 04/16/11 Time: 15:28
Sample: 2001 2009
Periods included: 9
Cross-sections included: 8
Total panel (balanced) observations: 72
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.403121	1.188838	0.339088	0.7357
LOG(GDP)	0.457064	0.101904	4.485238	0.0000
LOG(EX_ADV)	0.396330	0.068098	5.819979	0.0000
LOG(OPEN)	0.637452	0.096641	6.596093	0.0000
LOG(FDI)	0.081935	0.040219	2.037242	0.0461
GROWTH	-0.007808	0.004167	-1.873695	0.0659
	Effects Specification			
Cross-section fixed (dummy variables)				
	Weighted Statistics			
R-squared	0.998346	Mean dependent var	24.79142	
Adjusted R-squared	0.998009	S.D. dependent var	9.653460	
S.E. of regression	0.079733	Sum squared resid	0.375081	
F-statistic	2967.339	Durbin-Watson stat	1.475200	
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.997090	Mean dependent var	18.54519	
Sum squared resid	0.422768	Durbin-Watson stat	1.617128	

5. Concluding remarks

We have reviewed the recent literature deals with the changing shape of international trade, FDI, and production stages, and then, the recent developments in Chinese economy were examined.

We first entered the statistical figures of the data that we collected and processed into cross-tables and the regression models. Then, through the analysis we showed how the production and trade patterns are structurally changing. The computational results indicate how advanced-goods import trends of developed countries, and export trends of high- tech products originated from China are changing. The developments in FDIs and especially high

technology goods trade evidently explain the structural changes in Chinese manufacturing production.

As indicated at empirical results sections, for the studied developed countries; “the annual average increasing rates of total and high-tech goods exports to China and imports from China” are higher than “their total and high-tech goods export and import rising rates” in the cases of trade with each other and trade with the world. These are the supporting proves to the changing structure of China’s manufacturing production sectors which at the same time reflect the changing profile of the factor endowments on behalf of the skilled labor intensity in total production factor equations. Thereby, such improvements strongly support our arguments put forward in this study that landscape of the production and trade structures are changing through segmentation of production stages at the international arena.

As a result, the advanced-goods manufacturing regions are tending to move from developed world through developing countries, as seen in the Chinese example. Thereby, it should be concluded that the comparative advantage of advanced countries in high-tech, and higher value added products gradually easing against the emerging countries such as China. Further, this kind of structural changes require new approaches to the predictions of the classical trade and production theories that international trade and production activities were explaining with the factor endowments and comparative advantages.