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Trade flows and trade specialisation: The case of China ☆

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ABSTRACT

Using annual data for the periods 1992–2012, this paper examines trade flows between China and its main trade partners in Asia, North America and Europe, and whether increasing trade has led to industrial structural adjustment and changes in China's trade patterns. The analysis is based on both economic indicators and the estimation of a gravity model, and applies recently developed panel data methods that explicitly take into account unobserved heterogeneity, specifically the fixed effect vector decomposition (FEVD) technique. The findings confirm the significant change in China's trading structure associated with the fast growth of foreign trade. In particular, there has been a shift from resource- and labour-intensive to capital- and technology-intensive exports.

1. Introduction

Since the reform process started and an opening-up policy was adopted, China has experienced a sharp increase in its growth rate and also its trade with the rest of the world: it has successfully converted itself from a country with protectionist trade policies to an outward-oriented one with an open economy. During this transition its trade relations with the rest of the world went through various stages, from isolation and dependence on the Soviet economy to openness. Its accession to the World Trade Organization (WTO) was a key step giving China the opportunity to participate in world trade within a multilateral trade system.

China's integration into the global economy has been one of the main drivers of its economic growth. A particularly important contribution to GDP and employment growth has been made by some of its industries with comparative advantages and an increasing specialisation level. China has pursued in recent years export-oriented economic policies and becomes a big trader in world markets and the biggest economy after the US and Japan. International trade has also helped improve the productivity of some domestic industries and led to faster technological progress. In particular, large imports of capital and intermediate goods have had an important effect on productivity through the technology incorporated in them; "learning by doing" has also played a key role. An increase in trade of machinery parts and components (both exports and imports) and the convergence of the commodity composition of exports and imports have made intra-industry trade more important than before in East Asia (Ando, 2006).

The last decades have seen a further, sharp rise in trade flows between China and the rest of the world, the European Union (EU), the US, Japan and other OECD economies becoming major trade partners for China. Its competitiveness mainly reflects low labour costs: despite the fast economic growth of the past three decades manufacturing wages are still low in China compared to the

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OECD and most East Asian countries (Adams, Gangnes, & Shachmurove, 2006). Foreign direct investment (FDI) inflows combining low labour costs and foreign technology have also improved the efficiency of Chinese industries. This has resulted in inter-industry spillovers to China's manufacturing sector (Wei & Liu, 2006), and in technology and management skill flows (Adams et al., 2006).

However, the global financial crisis of 2007–8 affected the main Chinese export markets (EU, US, and Japan) and both export growth and FDI have decreased over the last few years, although less than in the US and the European countries most hit by the crisis.

The present study analyses trade flows between China and its main trade partners in Asia, North America and Europe. In particular, it examines whether increasing trade has also led to industrial structural adjustment and changes in China's trade patterns. The analysis is based on both economic indicators and the econometric estimation of a gravity model, which is suitable for both intra- and inter-industry trade. It uses developed panel data methods that explicitly take into account unobserved heterogeneity, i.e. the fixed effect vector decomposition (FEVD) technique proposed by Plumper and Troeger (2007).

The paper is organised as follows. Section 2 provides some information on the evolution of China's trade flows with its main partners. Section 3 outlines the gravity model which is the theoretical framework underlying the empirical analysis. Section 4 discusses the econometric model and the empirical results. Section 5 offers some concluding remarks.

2. The evolution of China's international trade

Before 1978, China was a centrally planned economy with minimal trade with the rest of the world and low export and import rates, its exports being only some manufactured goods and raw materials sold to be able to import goods not produced domestically. The adopted protectionist and import substitution policies were aimed at improving China's export structure and fostering the growth of the domestic industry and of the economy as a whole. International trade normally facilitates capital accumulation, optimal resource allocation, technological progress and productivity improvements. However, in the case of China both the static and dynamic gains from free trade were limited, owing to the lack of competition.

From 1978, China has pursued trade liberalisation in addition to making other significant changes to its economic structure with the aim of establishing a socialist market economy. However, this has been a gradual process. Sustained economic growth and the resulting increase in average income initially led to a sharp rise in imports. At the beginning of the 1980s, tariffs were imposed on many products to stop the inflow of foreign products into the Chinese market. To encourage the market mechanism and a more effective resource allocation the Chinese government cancelled its import substitution list in the 1980s, and gradually reduced import and export restrictions in the form of both tariffs and non-tariff barriers. Following the adoption of liberalisation policies, foreign investors were able to set up joint ventures and import new technology into China: FDI had an important role in the transfer of technology and of management skills.

In 2001, China joined WTO. To meet the membership requirements, it had to modify and improve its administrative regulations and laws, in particular those concerning foreign trade and economic cooperation (Cross, 2004), such as the Trademark Law, and the Law on Joint Ventures with Chinese and Foreign Investment. Other legislation not in compliance with WTO requirements was revised or abolished. China's WTO membership has strengthened and improved the multilateral trading system, and promoted world economic and trade development. Furthermore, it has contributed to reducing the technological gap between China and the developed countries. After becoming a WTO member, China continued to reduce trade restrictions: in 2004 it lowered its average tariff rate to 10.7%; by 2012, it was below 9%; non-tariff barriers such as licenses, import quotas, trading practices etc. have also been gradually removed. The dismantling of trade barriers led to a restructuring of the industries that previously had strong government protection (such as the automobile, chemical and electronics ones — Greeven (2004)).

The steady expansion of China's international trade since its opening up shows how a latecomer can create a place for itself in the international markets. Trade volumes have grown in the last 21 years at an average annual rate of 18.1% for exports and 17.7% for imports (see Table A1). Over this period, the trade balance has normally been in surplus (see Fig. A5). China's share in global trade and its global ranking have gone up steadily: in 2012 its trade volume accounted for 11.3% of global trade (see Table A2), outperforming other emerging countries. The structural reforms of recent years have significantly improved its competitiveness and trade performance: the share of primary goods in total exports was initially higher than that of manufactured goods, but has been declining over time and has been overtaken by the latter. China's main trading partners since its foreign trade was liberalised have been the OECD economies, accounting for 49.7% of total trade in 2012. China's top eighteen (18) trading partners in 2012 in terms of trade volume and share are shown in Table A3. Trade with these countries accounted for 62.4% of total trade in 2012. The main trading partner in 2012 was the EU (14.1%), followed by the US (12.6%) (see Tables A2 and A3). Trade with the rest of the world has increased by a factor of 23 since 1992 (see Table A1) and even more, by a factor of 25, with the EU and US (see Fig. A6). However, trade with emerging economies is also becoming important, with China looking for new potential markets for its products.

A few previous studies have investigated trade between China and the rest of the world. In particular, Yang and Martinez-Zarzozo (2014) examined trade creation and diversion effects of the free trade agreements between China and ASEAN using a sample of 31 countries over the period from 1995 to 2010. They used aggregate and disaggregate export data for agricultural and manufactured goods (chemical products, machinery and transport equipment). They found that these free trade agreements (ACFTA) led to significant trade creation. Lee, Park, and Wang (2013) analysed China's imports, estimating the relative importance of the extensive margin (number of goods) versus the intensive margin (the amount traded per good), and examining the role of both firm heterogeneity and product heterogeneity, shedding some light on China's trade patterns following its recent emergence as a globally significant importer. Bahmani-Oskooee and Ratha (2010) tested the S-Curve using bilateral trade data between the US and China. They reported that there is no evidence of an S-Curve at the aggregate level; however, disaggregate data by commodity (two and three digit SITC classifications) indicate the existence of such a curve in almost 50% of the cases in a sample of almost 100 industries.

Xing and Whalley (2014) used a database on the commodity transactions of firms to analyse internal trade in China. They found a positive relationship with international trade in most cases, which suggests complementarity between the two. Internal trade in China has grown quickly but with seasonal fluctuations, and it remains smaller than inter-state trade in the US and intra-EU trade. Marelli and Signorelli (2011) analysed the integration of China and India into the global economy and the effects of trade on their economic growth. They highlighted the fact that China has gone beyond the initial industrialisation stage (specialisation in traditional manufacturing) and is increasingly specialising in more innovative sectors such as telecommunications and office equipment.[1]

Our main focus is on the evolution of trade patterns for China since its opening up. In particular, we examine whether increasing trade flows have led to industrial structural adjustment. As can be seen from Figs. A1 and A3 and Table A6, Chinese exports of machinery, transport equipment increased sharply between 1992 and 2012: whilst the labour-intensive sectors dominated in the early years of the period being analysed, the capital intensive ones have become much more important in recent years. Initially, 39.85% of exports was represented by miscellaneous manufactured articles, 19% by basic manufactures, 16 % by machinery and transport equipment and 5% by chemicals and related products; therefore, exports of labour-intensive sectors, with the comparative advantage of low labour costs, dominated. However, the relative importance of capital-intensive industries has increased over time: the three main export sectors in 2012 were machinery and transport equipment (47.12%), miscellaneous manufactured articles (26.05%), and basic manufactures (16.31%). The percentages for sectors such as basic manufactures and miscellaneous manufactured articles have instead declined since 1992 (from 19% to 16.31%, and from 39.85% to 26.05% respectively). As for imports, in addition to capital-intensive products (35.94%), China is also importing mineral fuels (17.22%) and crude materials (14.83%) necessary for the development of its domestic industries (see Figs. A2 and A4).

The analysis of sectoral trade adjustment is based on revealed comparative advantage calculations. We use the indicator developed by Lafay (1990), which measures the relative contribution of product k to the overall trade balance, a positive (negative) sign indicating the existence of a comparative advantage (disadvantage). Table A4 shows the evolution of trade patterns over the years. The comparative advantage for China vis-à-vis its main trade partners still concerns labour-intensive products, in particular miscellaneous manufactured articles (apparel and clothing accessories, footwear, and furniture), but has been declining over time. Generally, capital-intensive sectors have a comparative disadvantage. An example is the machinery, transport equipment sector, although its exports have increased (and the disadvantage decreased) over time. However, most recently China has also developed a comparative advantage in capital-intensive sectors such as office machines (75), telecommunications and sound recording equipment (76), and electric machinery (77) vis-à-vis the EU. The main comparative disadvantage occurs for road vehicles (78).

The other index calculated for the analysis of trade patterns is the Grubel and Lloyd (1975) one, which is widely used to measure intra-industry trade. According to classical theory, inter-industry trade (IT) implies export and import flows of complementary products, whilst intra-industry trade (IIT) is characterised by simultaneous export and import flows of comparable size within the same industry. The GL index indicates that intra-industry trade dominates when it is close to 1. A high share of intra-industry trade suggests a high level of industrial development, and can have significant long-term benefits. The results are reported in Table A5. There appears to be an increase in the GL index during the period under investigation, which indicates a growing importance of intra-industry trade. In 1992, inter-industry trade was dominant, but by 2012 the relative importance of intra-industry trade had increased. However, the index by itself does not allow us to distinguish between vertical and horizontal intra-industry trade.

Overall, the above analysis suggests that China's entry into the global market and the rapid growth of the volume of its foreign trade have led to significant changes in trade patterns, namely a shift in the composition of exports from labour-intensive products to capital- and technology-intensive goods, i.e. from light industry in the early years of the sample to machinery and electronic goods with high technology in recent years. Next, we outline the gravity model which is the theoretical framework underlying the subsequent panel data analysis aimed at shedding more light on the determinants of trade between China and its main partners as well as its changing patterns.

3. The gravity model

The gravity model is widely used as a benchmark to estimate trade flows between countries.[2] Trade flows from country *i* to country *j* are modelled as a function of the supply of the exporter country, the demand of the importer country and trade barriers. In other words, national incomes of two countries, transport costs (transaction costs) and regional agreements are assumed to be the main determinants of trade. Initially inspired by Newton's gravity law, gravity models have become essential tools in the analysis of international trade flows. The first applications were rather intuitive, without theoretical foundations. They included the contributions of Tinbergen (1962) and Pöyhönen (1963). Subsequently, the new international trade theory provided theoretical justifications for these models in terms of increasing returns of scale, imperfect competition and geography (transport costs) (see Anderson (1979); Bergstrand (1985); Helpman & Krugman (1985)).

Linnemann (1966) proposed a gravity model based on a Walrasian, general equilibrium approach. He explained exports of country *i* to country *j* in terms of the interaction of three factors: potential supply of exports of country *i*, potential demand of imports from country *j*, and trade barriers. The first variable is a positive function of the exporting country's income level and can also be interpreted

[1] Ando (2006) studied the developments in trade structure and vertical international production sharing in East Asia in the 1990s. He found an increase in the importance of vertical intra-industry trade (IIT) increased reflecting the expansion of back-and-forth transactions in vertically fragmented cross-border production processes. Vertical international production sharing became a key feature of the East Asian economies in the 1990s. A more general study by Arora and Vamvakidis (2004) analysed the effects of trade on economic growth for a large sample of countries. Their panel estimation results suggest that industrial countries benefit from trading with developing countries growing rapidly, whilst emerging economies gain from trading with developed countries with relatively high income and technology.

[2] Eichengreen and Irwin (1995) consider it "the workhorse for empirical studies of regional integration".

as a proxy for product variety. The second is a positive function of the importing country's income level. The third is a negative function of trade costs, transport costs, and tariffs.

Bergstrand (1989) also included per capita income, which is an indicator of demand sophistication (demand for luxury versus necessity goods), and incorporated factor endowment variables (Heckscher–Ohlin) and taste variables (Linder) in the following specification:

$$PX_{ij} = \Psi_0 (Y_i)^{\Psi_1} \left({}^{Y_i}\!/\!_{L_i} \right)^{\Psi_2} \left(Y_j \right)^{\Psi_3} \left({}^{Y_j}\!/\!_{L_j} \right)^{\Psi_4} \left(D_{ij} \right)^{\Psi_5} \left(A_{ij} \right)^{\Psi_6} e_{ij} \quad (1)$$

where PX_{ij} represents flows from country i to country j, Ψ_0 is the intercept, Y_i and Y_j are the GDP of countries i and j respectively, (Y_i/L_i) and (Y_j/L_j) stand for GDP per capita of countries i and j respectively, D_{ij} represents the geographical distance between the economic centres of two partners, and A_{ij} factors aiding (e.g., common language and historical bonds) or representing a barrier to trade between partners.

Helpman (1987) used a model of trade in differentiated products to estimate the share of intra-industry trade (Grubel–Lloyd index for four-digit SITC groups) for separate cross-sections of country pairs for the period 1970–1981. He found that the share of intra-industry trade is negatively correlated with income differences and positively correlated with country size. Also, the more similar factor endowments are, the larger the share of intra-industry trade is. Several other studies (Evenett & Keller, 2002; Hummels & Levinsohn, 1995) have reported similar results.

The gravity model has also been widely used in the applied literature to evaluate the impact of regional agreements (see Carrere (2006); Frankel (1997)), the border effect on trade flows (Anderson & Van Wincoop, 2003), and trade potential (Baldwin, 1994; Péridy, 2005).

4. Econometric analysis

4.1. Econometric issues

The gravity model is the theoretical underpinning of the econometric framework we adopt. As heterogeneity plays an important role in bilateral flows, individual fixed effects are introduced into the empirical model to take it into account. The evolution over time of countries' behaviour can also be examined through temporal fixed effects (for economic or political events).

Most studies estimating a gravity model apply the ordinary least square (OLS) method to cross-section data. However, several papers have argued that standard cross-section methods lead to biased results because they do not take into account heterogeneity (e.g., historical, cultural and linguistic factors). For example, Matyas (1997) stresses that the cross-section approach is affected by misspecification and suggests that the gravity model should be specified as a "three-way model" with exporter, importer and time effects (random or fixed ones). Panel data methods are therefore preferable as they enable one to control for specific effects (such as fixed or random effects), and hence eliminate the potential endogeneity bias resulting from unobserved individual heterogeneity. Egger and Pfaffermayr (2003) underline that the omission of specific effects for country pairs can bias the estimated coefficients. An alternative solution is to use an estimator to control bilateral specific effects as in a fixed effect model (FEM) or in a random effect model (REM). The advantage of the former is that it allows for unobserved or misspecified factors that explain simultaneously the trade volume between two countries and lead to unbiased and efficient results.

Plumper and Troeger (2007) have proposed a more efficient method called "the fixed effect vector decomposition (FEVD)" to accommodate time-invariant variables. Using Monte Carlo simulations, they compared the performance of the FEVD method to some other existing techniques, such as the fixed effect, or random effect, or the Hausman–Taylor methods. Their results indicate that the most reliable technique for small samples is FEVD if time-invariant variables are present and the other variables are correlated with specific effects, which is likely in our case. Therefore the FEVD approach will be taken in this study.

4.2. Model specification

Our aim is to analyse the determinants of trade between China and its main partners as well as of trade specialisation by estimating a gravity model. Following trade theory, we estimate a trade equation where difference in relative factor endowments ($DGDPT_{ij}$) is the main determinants of specialisation. The bigger the difference between the partners' factor endowments, the higher the share of inter-industry trade will be. Helpman (1987) in fact found a negative correlation between the share of intra-industry trade and differences in relative factor endowments.

We model bilateral exports as a function of GDP, the difference in per capita income, geographical distance, FDI inflows and the dummy variables defined below. The total trade of each country is given by the sum of inter- and intra-industry trade volumes.

The estimated equation is the following:

$$X_{ijt} = e^{a_0} GDP_{it}^{a_1} GDP_{jt}^{a_2} DGDPT_{ijt}^{a_3} DIST_{ij}^{a_4} LLK_i^{a_5} WTO_{ijt}^{a_6} CRS_t^{a_7} FDI_{it}^{a_8} e^{u_{ij}} e^{\eta_t} e^{\varepsilon_{ijt}} \quad (2)$$

where:

- X_{ijt} denotes total trade between countries i and j at time t with $i \# j$ (source: COMTRADE);
- a_0 is the intercept;
- GDP_{it} stands for Gross Domestic Product of country i, source: IMF;
- GDP_{jt} stands for Gross Domestic Product of country j, source IMF;

Table 1
Bilateral trade between China and the rest of the world.

Variables	1992 → 2012	1992 → 2001	2002 → 2012
	X_{ijt}	X_{ijt}	X_{ijt}
GDP_{it}	1.209	0.752	1.241
	(24.37)***	(13.87)***	(21.52)***
GDP_{jt}	0.803	0.778	0.983
	(18.79)***	(14.32)***	(16.29)***
$DGDPT_{ijt}$	−0.084	0.179	−0.025
	(4.16)***	(7.02)***	(2.07)**
$DIST_{ij}$	−1.273	−1.860	−0.810
	(29.14)***	(19.26)***	(32.41)***
LLK_{ij}	−0.303	−0.545	−0.187
	(12.09)***	(14.14)***	(4.17)***
WTO_{ijt}	0.048	–	0.052
	(1.79)*	–	(2.13)**
FDI_{it}	0.241	0.094	0.303
	(8.70)***	(2.23)**	(14.17)***
CRS_t	−0.027	–	−0.070
	(1.67)*	–	(1.78)*
Constant	3.188	7.142	1.324
	(29.33)***	(47.10)***	(10.67)***
Observations	7980	3800	4180
R-squared	0.89	0.91	0.94

t statistics in parentheses.
Note: t-values are reported below each coefficient. Data sources: X_{ijt} denotes total trade between countries i and j (millions USD — source: COMTRADE database); GDP_{it}, GDP_{jt} stand for Gross Domestic Product of country i and country j (millions USD — source: International Monetary Fund (IMF) database); $DGDPT_{ijt}$ is the difference in Gross Domestic Product per capita between partners and is a proxy for economic distance or comparative advantage intensity (USD — source: IMF; authors' calculations); WTO_{it} is a dummy variable that equals 1 if country i joined the World Trade Organization (WTO), and zero otherwise (source: WTO); $DIST_{ij}$ represents geographical distance between the capitals of country i and country j respectively (kilometres — source: CEPII database (Centre d'Etudes Prospectives et d'Informations Internationales)); LLK_{ij} is a dummy variable that is equal to 1 if countries i and j are landlocked, and zero otherwise (source: CEPII database); FDI_{it} represents FDI inflows into China in year t (millions USD — source: UNCTAD database); CRS_t is a dummy variable for the global economic crisis — equal to 1 starting from year 2007 and 0 otherwise.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

- $DGDPT_{ijt}$ is the difference in GDP per capita between partners and is a proxy for economic distance or comparative advantage intensity, source: authors' calculations;
- $DIST_{ij}$ represents geographical distance between the capitals of country i and country j respectively, source: CEPII;
- LLK_{ij} is a dummy variable that is equal to 1 if countries i and j are landlocked, and zero otherwise, source: CEPII;
- WTO_{it} is a dummy variable that equals 1 if country i joined the WTO, and zero otherwise;
- FDI_{it} represents FDI inflows into China in year t, source: UNCTAD;
- CRS_t is a dummy variable for the global economic crisis equal to 1 for 2007–2008 and to 0 otherwise;
- u_{ij} is country-pair fixed effects;
- η_t is time effects;
- ε_{ijt} is the error term.

After log-linearisation, Eq. (2) becomes the following in a static context:

$$Log\left(X_{ijt}\right) = a_0 + a_1 \log(GDP_{it}) + a_2 \log\left(GDP_{jt}\right) + a_3 \log\left(DGDPT_{ijt}\right) + a_5 \log\left(DIST_{ij}\right) + \\ + a_6 LLK_{ij} + a_7 WTO_{ijt} + a_8 \log\left(FDI_{jt}\right) + a_9 CRS_t + u_{ij} + \eta_t + \varepsilon_{ijt}. \quad (3)$$

The data are annual and cover a period of 21 years (1992–2012). As indicated above, the data sources are COMTRADE, IMF, CEPII, UNCTAD.[3] We proceed in three stages. First, we analyse trade between China and the rest of the world (190 countries), then focus on a subset, i.e. its main trading partners (18 developed countries).[4] Finally, we analyse trade between China and the EU, which has become China's main trade partner. The model is estimated over the whole sample, and then over two subsamples (1992–2001 and 2002–2012) in order to detect any changes in trade specialisation for China vis-à-vis its partners.

The expected sign for the effect of country size (measured by GDP) on bilateral exports is positive. Also, export supply and import demand should be a positive function of the income of the trade partners. The sign of the coefficient on difference in GDP per capita, which is a measure of the difference in factor endowments between countries, should be positive as well according to the Heckscher-

[3] COMTRADE — International Trade Statistics Database; IMF — International Monetary Fund; CEPII — Centre d'Etudes Prospectives et d'Informations Internationales; UNCTAD — United Nations Conference on Trade and Development.
[4] US, Japan, Hong Kong, South Korea, Taiwan, Germany, Australia, Singapore, Netherlands, Indonesia, United Kingdom, France, Italy, Canada, Malaysia, Russian Federation, India, Thailand — countries whose annual average trade is higher than 2 billion USD.

Ohlin hypothesis — the greater this difference, the greater the relative importance of inter-industry trade will be. On the contrary, new trade theory would imply a negative coefficient. Geographical distance is a proxy for transport costs, tariff and non-tariff barriers and should have a negative coefficient. WTO membership instead is expected to have a positive sign. Finally, the sign of the coefficient on the financial crisis dummy is expected to be negative given the available evidence of a decline in Chinese trade over that period.

4.3. Results

The estimation results using FEVD are reported in Tables 1 to 3. For the static panel data analysis, FEVD is the most appropriate method given our sample size, and produces a high R^2 (0.88 — see Tables 1 to 3). The advantage of this method is that it also highlights the effects of time-invariant variables on trade flows. Fixed effects are included to account for country-specific effects as well as other factors not already considered that might affect trade.

It can be seen that the coefficients are significant in almost all cases and their signs are consistent with theory. The country size of China and its trade partners are important factors determining trade flows. Geographical distance is negatively related to trade volumes as expected. WTO membership has a positive impact on trade. There is also a positive effect of FDI on trade between China and the rest of the world. This may reflect the needs of the Chinese subsidiaries of multinationals to import intermediate goods and equipment, which suggests that there is trade at firm level. Also, FDI inflows take place mainly for the industries and sectors with a comparative advantage reflecting lower labour costs, further improving productivity and increasing exports. The financial crisis had a negative effect on trade, especially exports. The subsample analysis highlights a shift towards trade in capital goods in the second period, possibly resulting from a production fragmentation strategy pursued by multinationals.

The descriptive statistics show that almost 60% of trade during the periods 2000–2012 took place with the main partners, these being developed countries. It is interesting to analyse trade and specialisation patterns (see Table 2). Bilateral exports are affected positively by country size, WTO membership and FDI. On the contrary, the distance variable (a proxy for transportation costs) and the financial crisis have a negative effect. The main determinant of trade patterns is the difference in GDP per capita. As before, in the second subsample a shift towards capital-intensive goods can be observed. The descriptive analysis also shows an increase in trade for the mechanical and electrical equipment sectors. This may reflect a higher number of back-and-forth transactions as the production process becomes more fragmented: imports of intermediate goods and equipment are used by local subsidiaries to produce goods to be exported. Over the period examined there was a sizeable increase in imports of intermediate goods, especially after 2000. Besides, since then the presence of multinationals in China has increased considerably, and fast economic growth has been experienced.

The results for trade between China and the EU, currently its main trade partner, are reported in Table 3.

Table 2
Bilateral trade between China and its main trading partners.

Variables	1992 → 2002	1992 → 2001	2002 → 2002
	X_{ijt}	X_{ijt}	X_{ijt}
GDP_{it}	1.210	1.150	0.855
	(12.58)***	(9.38)***	(28.18)***
GDP_{jt}	1.027	1.284	0.715
	(10.62)***	(10.55)***	(23.49)***
$DGDPT_{ijt}$	−0.350	0.521	−0.046
	(2.15)**	(7.21)***	(1.77)*
$DIST_{ij}$	−1.499	−1.902	−0.883
	(33.51)***	(41.57)***	(48.10)***
LLK_{ij}	−0.393	−0.101	−1.206
	(8.16)***	(1.22)	(21.91)***
WTO_{ijt}	0.039		0.041
	(1.68)*		(1.89)*
FDI_{it}	0.260	0.085	0.195
	(5.75)***	(2.23)**	(6.19)***
CRS_t	−0.070	–	−0.095
	(2.32)**		(2.14)**
Constant	5.737	7.754	3.710
	(33.81)***	(35.98)***	(68.34)***
Observations	756	360	396
R-squared	0.80	0.88	0.91

t statistics in parentheses.

Note: t-values are reported below each coefficient. Data sources: X_{ijt} denotes total trade between countries i and j (millions USD — source: COMTRADE database); GDP_{it}, GDP_{jt} stand for Gross Domestic Product of country i and country j (millions USD — source: International Monetary Fund (IMF) database); $DGDPT_{ijt}$ is the difference in Gross Domestic Product per capita between partners and is a proxy for economic distance or comparative advantage intensity (USD — source: IMF; authors' calculations); WTO_{it} is a dummy variable that equals 1 if country i joined the World Trade Organization (WTO), and zero otherwise (source: WTO); $DIST_{ij}$ represents geographical distance between the capitals of country i and country j respectively (kilometres — source: CEPII database (Centre d'Etudes Prospectives et d'Informations Internationales)); LLK_{ij} is a dummy variable that is equal to 1 if countries i and j are landlocked, and zero otherwise (source: CEPII database); FDI_{it} represents FDI inflows into China in year t (millions USD — source: UNCTAD database); CRS_t is a dummy variable for the global economic crisis — equal to 1 starting from year 2007 and 0 otherwise.

* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 3
Bilateral trade between China and EU-27.

Variables	1992 → 2012	1992 → 2001	2002 → 2012
	X_{ijt}	X_{ijt}	X_{ijt}
GDP_{it}	1.306	1.389	0.871
	(15.37)***	(10.13)***	(15.27)***
GDP_{jt}	0.949	0.945	0.989
	(11.06)***	(6.72)***	(17.88)***
$DGDPT_{ijt}$	−0.306	0.791	−0.146
	(2.27)**	(5.54)***	(2.10)**
$DIST_{ij}$	−0.301	−2.017	−0.260
	(13.62)***	(34.16)***	(15.63)***
LLK_{ij}	−0.055	−0.070	−0.037
	(1.65)*	(1.73)*	(1.68)*
WTO_{ijt}	0.058	–	0.074
	(1.75)*	–	(1.72)*
FDI_{it}	0.212	0.104	0.248
	(2.36)**	(2.17)**	(7.21)***
CRS_t	−0.129	–	−0.142
	(2.05)**	–	(2.39)**
Constant	−2.225	−7.415	−2.834
	(2.54)**	(5.21)***	(4.67)***
Observations	1134	540	594
R-squared	0.92	0.91	0.95

t statistics in parentheses.
Note: t-values are reported below each coefficient. Data sources: X_{ijt} denotes total trade between countries *i* and *j* (millions USD — source: COMTRADE database); GDP_{it}, GDP_{jt} stand for Gross Domestic Product of country *i* and country *j* (millions USD — source: International Monetary Fund (IMF) database); $DGDPT_{ijt}$ is the difference in Gross Domestic Product per capita between partners and is a proxy for economic distance or comparative advantage intensity (USD — source: IMF; authors' calculations); WTO_{it} is a dummy variable that equals 1 if country *i* joined the World Trade Organization (WTO), and zero otherwise (source: WTO); $DIST_{ij}$ represents geographical distance between the capitals of country *i* and country *j* respectively (kilometres — source: CEPII database (Centre d'Etudes Prospectives et d'Informations Internationales)); LLK_{ij} is a dummy variable that is equal to 1 if countries *i* and *j* are landlocked, and zero otherwise (source: CEPII database); FDIit represents FDI inflows into China in year *t* (millions USD — source: UNCTAD database); CRSt is a dummy variable for the global economic crisis — equal to 1 starting from year 2007 and 0 otherwise.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

The estimated coefficients are almost always significant and their signs are consistent with the predictions of the gravity model. The country size of the exporting country and its trade partners accounts well for bilateral exports between China and the EU, and has a positive effect. Access to a sizeable market such as the EU increases trade volumes. Similarly, geographical distance and the financial crisis are again found to have a negative effect, whilst WTO membership has a positive one. The effects of the financial crisis on exports are found to be even more pronounced in this case since the EU experienced a particularly severe (debt) crisis. According to difference in GDP per capita, there is a shift towards trade in capital-intensive goods in the second period. China is a net exporter vis-à-vis the EU of office machines (75), telecommunications and sound recording equipment (76), electric machinery and parts (77), and a net importer of machinery for specialized industries (72), general industrial machinery (74) and road vehicles (78). FDI inflows from the EU have a positive effect, which indicates complementarity between FDI and trade, and consequently a predominance of vertical FDI generating new trade flows through the fragmentation of the production process.[5] Further, FDI inflows concern sectors for which China has a comparative advantage.

5. Conclusions

In this paper, we have investigated the evolution of trade flows between China and its main trade partners in Asia, North America and Europe over the period 1992–2012 using economic indicators (Lafay, 1990; Grubel and Lloyd (1975)), and panel data techniques which take into account heterogeneity and hence avoid potential biases. Our findings can be summarised as follows. China's international trade has grown steadily since the implementation of the opening-up policy, both exports and imports rising significantly. Overall, trade has increased at an average annual rate of 18.1% in the last twenty years, and the balance of trade has improved over time. China has become a big trader in world markets; although the OECD countries have been its main trading partners (the EU in particular, followed by the US and Japan), trade with the emerging economies has also increased. China relies heavily on export-led growth, and therefore a weaker world economy (for instance, following the financial crisis of 2007–8) has a negative impact on its export and GDP growth.

The most important finding of our analysis is the significant change in China's trade structure associated with the fast growth of foreign trade. In particular, there has been a shift from labour-intensive to capital- and technology-intensive exports. Most recently China has also developed a comparative advantage in capital-intensive sectors such as office machines and telecommunications and sound recording equipment vis-à-vis its main partners. Massive technology transfer through intermediate goods has contributed

[5] Bloningen (2001), and Head and Ries (2001) also find a relationship between complementarity and fragmentation of the production process.

significantly to the improvement in China's manufactured exports. The technological upgrading has led to highly internationalised and competitive industries (including the electrical machinery sector) being able to sell their exports to the developed economies. A convergence in the commodity compositions of exports and imports and the increase in trade in machinery parts and components indicate that intra-industry trade has become much more important in the most recent years. On the whole, there is evidence of both static and dynamic benefits of trade fostering Chinese economic growth.

Appendix A

Table A1
Trade between China and the rest of the world.

	Yearly rate (%)			Growth vis-à-vis 1992		
Year	Export	Import	Total trade	Export	Import	Total trade
1992	–	–	–	–	–	–
1993	8.0	28.7	18.1	1.1	1.3	1.2
1994	31.9	11.2	20.9	1.4	1.4	1.4
1995	23.0	14.2	18.7	1.8	1.6	1.7
1996	1.5	5.1	3.2	1.8	1.7	1.8
1997	21.0	2.5	12.2	2.2	1.8	2.0
1998	0.6	−1.5	−0.3	2.2	1.7	2.0
1999	6.1	18.2	11.3	2.3	2.1	2.2
2000	27.8	35.8	31.5	2.9	2.8	2.9
2001	6.8	8.2	7.5	3.1	3.0	3.1
2002	22.4	21.2	21.8	3.8	3.7	3.7
2003	34.6	39.8	37.1	5.2	5.1	5.1
2004	35.4	36.0	35.7	7.0	6.9	7.0
2005	28.4	17.6	23.2	9.0	8.2	8.6
2006	27.2	19.9	23.8	11.4	9.8	10.6
2007	25.9	20.8	23.6	14.4	11.8	13.1
2008	17.3	18.5	17.8	16.8	14.0	15.5
2009	−16.0	−11.2	−13.9	14.1	12.5	13.3
2010	31.3	38.8	34.7	18.6	17.3	18.0
2011	20.3	24.9	22.5	22.3	21.6	22.0
2012	7.9	4.3	6.2	24.1	22.5	23.3
Average	**18.1**	**17.7**	**17.8**	–	–	–

Source: COMTRADE — authors' calculations.
Bold values indicate significance at average growth rate.

Table A2
China's trade shares.

Year	Chinese trade as a % of World Trade			China's trade with the OECD as a % of total Chinese trade			China's trade with the EU as a % of total Chinese trade			China's trade with ASEAN as a % of total Chinese trade		
	Export	Import	Total	Export	Import	Total	Export	Import	Total	Export	Import	Total
1992	2.4	2.3	2.3	38.2	50.9	44.4	9.9	14.4	12.1	3.5	3.5	3.5
1993	2.6	3.0	2.8	55.8	58.2	57.1	14.1	16.2	15.2	3.9	5.4	4.7
1994	3.1	2.9	3.0	55.6	62.2	58.8	13.6	16.7	15.1	4.5	6.6	5.5
1995	3.1	2.8	2.9	56.6	63.0	59.6	13.7	16.5	15.0	5.8	8.0	6.9
1996	3.0	2.7	2.9	59.9	61.5	60.7	14.0	14.6	14.3	6.2	9.3	7.7
1997	3.5	2.7	3.1	57.3	60.5	58.7	13.9	13.6	13.8	6.3	10.8	8.2
1998	3.5	2.7	3.1	59.8	62.3	60.9	16.4	14.9	15.7	4.8	11.1	7.5
1999	3.6	3.0	3.3	63.2	63.5	63.3	16.6	15.6	16.1	5.3	11.0	7.9
2000	4.1	3.6	3.8	63.3	58.7	61.1	16.5	13.9	15.3	5.8	14.3	9.8
2001	4.5	4.0	4.2	63.2	59.1	61.2	16.7	15.0	15.9	5.9	14.0	9.8
2002	5.2	4.6	4.9	62.2	56.0	59.2	16.3	13.5	14.9	5.9	15.9	10.6
2003	6.0	5.5	5.8	62.1	54.9	58.6	18.0	13.3	15.7	5.8	18.1	11.7
2004	6.7	6.2	6.4	61.4	54.1	57.9	18.3	12.6	15.5	5.9	19.6	12.6
2005	7.6	6.4	7.0	61.2	51.3	56.6	19.1	11.2	15.4	5.7	22.0	13.3
2006	8.3	6.7	7.5	59.6	50.4	55.4	19.6	11.5	15.9	5.7	22.9	13.4
2007	9.2	7.0	8.1	58.0	50.2	54.6	20.1	11.6	16.4	5.7	22.3	13.0
2008	9.3	7.2	8.2	57.0	49.1	53.5	20.5	11.7	16.6	6.3	19.8	12.3
2009	10.0	8.3	9.2	56.4	51.9	54.4	19.7	12.7	16.5	5.7	20.0	12.3
2010	10.9	9.5	10.2	55.6	51.2	53.6	19.7	12.1	16.1	5.7	18.8	11.9
2011	11.0	10.0	10.5	54.2	49.7	52.1	18.8	12.1	15.6	5.8	17.5	11.4
2012	12.2	10.5	11.3	51.5	47.6	49.7	16.3	11.7	14.1	5.8	18.3	11.7

Source: COMTRADE — authors' calculations.

Table A3
The top trading partners (% of total Chinese trade).

Year	Total trade with the 18 main partners			Of which:											
				US			Japan			Hong-Kong			Germany		
	Export	Import	Total	Export	Import	Total	Export	Import	Total	Export	Import	Total	Export	Import	Total
1992	87.0	84.3	85.7	10.1	11.0	10.6	13.7	16.9	15.3	44.2	25.4	35.0	2.9	5.0	3.9
1993	83.6	83.5	83.5	18.5	10.3	14.1	17.2	22.4	20.0	24.0	10.0	16.6	4.3	5.8	5.1
1994	84.6	83.6	84.1	17.7	12.0	14.9	17.8	22.8	20.2	26.7	8.2	17.7	3.9	6.2	5.0
1995	83.6	82.4	83.0	16.6	12.2	14.5	19.1	22.0	20.5	24.2	6.5	15.9	3.8	6.1	4.9
1996	84.0	81.9	83.0	17.7	11.6	14.8	20.4	21.0	20.7	21.8	5.6	14.1	3.9	5.3	4.5
1997	83.2	80.7	82.1	17.9	11.5	15.1	17.4	20.4	18.7	24.0	4.9	15.6	3.6	4.3	3.9
1998	81.6	81.6	81.6	20.7	12.0	16.9	16.1	20.2	17.9	21.1	4.7	14.0	4.0	5.0	4.4
1999	81.5	80.9	81.2	21.5	11.8	17.1	16.6	20.4	18.3	18.9	4.2	12.1	4.0	5.0	4.5
2000	80.5	75.5	78.2	20.9	9.9	15.7	16.7	18.4	17.5	17.9	4.2	11.4	3.7	4.6	4.2
2001	79.9	76.0	78.0	20.4	10.8	15.8	16.9	17.6	17.2	17.5	3.9	11.0	3.7	5.7	4.6
2002	79.7	76.0	77.9	21.5	9.2	15.7	14.9	18.1	16.4	18.0	3.6	11.1	3.5	5.6	4.5
2003	78.6	73.4	76.1	21.1	8.2	14.9	13.6	18.0	15.7	17.4	2.7	10.3	4.0	5.9	4.9
2004	77.8	70.8	74.4	21.1	8.0	14.7	12.4	16.8	14.5	17.0	2.1	9.8	4.0	5.4	4.7
2005	76.6	68.3	72.7	21.4	7.4	14.9	11.0	15.2	13.0	16.3	1.9	9.6	4.3	4.7	4.4
2006	74.0	66.5	70.7	21.0	7.5	14.9	9.5	14.6	11.8	16.0	1.4	9.4	4.2	4.8	4.4
2007	71.3	64.5	68.3	19.1	7.3	13.9	8.4	14.0	10.8	15.1	1.3	9.1	4.0	4.7	4.3
2008	68.2	61.6	65.3	17.7	7.2	13.0	8.1	13.3	10.4	13.3	1.1	7.9	4.1	4.9	4.5
2009	68.3	63.1	65.9	18.4	7.7	13.5	8.1	13.0	10.4	13.8	0.9	7.9	4.2	5.5	4.8
2010	67.8	61.9	65.0	18.0	7.4	13.0	7.7	12.7	10.0	13.8	0.9	7.8	4.3	5.3	4.8
2011	66.6	59.0	63.0	17.1	7.1	12.3	7.8	11.2	9.4	14.1	0.9	7.8	4.0	5.3	4.6
2012	66.8	57.3	62.4	17.2	7.4	12.6	7.4	9.8	8.5	15.8	1.0	8.8	3.4	5.1	4.2

Source: COMTRADE — authors' calculations.

Table A4
Lafay index: China and its main partners.

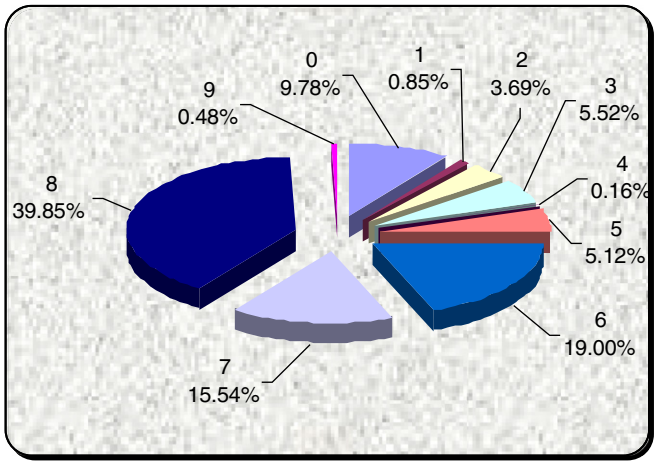
	Lafay China	US			Japan			Germany		
SITC-2	Text	1992	2002	2012	1992	2002	2012	1992	2002	2012
62	Rubber manufactures, n.e.s.	0.05	0.20	0.34	−0.15	−0.13	−0.11	0.05	−0.09	−0.01
63	Wood and cork manufactures	0.23	0.32	0.29	0.45	0.62	0.39	0.49	0.04	0.23
64	Paper, paperboard and articles thereof	−1.08	−0.51	0.02	−0.64	−0.25	0.23	−0.47	−0.46	0.07
65	Textile yarn, fabrics, made up articles, etc.	2.38	0.70	0.90	−0.61	−0.38	0.66	3.96	1.39	1.30
66	Non-metallic mineral manufactures, n.e.s.	0.68	0.39	0.28	0.13	0.25	0.02	0.50	0.32	0.63
67	Iron and steel	−0.37	0.13	0.15	−5.54	−3.18	−1.44	−2.60	−1.49	−0.32
68	Non-ferrous metals	−0.64	−0.18	−0.34	−0.28	−0.46	−1.05	−0.33	−0.48	−0.59
69	Manufactures of metals, n.e.s.	1.57	1.61	1.15	0.12	0.46	0.52	1.75	1.44	0.94
71	Power generating machinery and equipment	−1.47	−0.53	−0.63	−1.48	−0.40	−0.75	−2.30	−2.52	−1.02
72	Machinery for specialized industries	−2.92	−1.35	−0.62	−7.57	−4.21	−2.41	−10.79	−7.74	−3.24
73	Metal working machinery	−0.58	−0.57	−0.23	−0.75	−1.17	−1.72	−2.21	−2.18	−1.93
74	General industrial machinery n.e.s.	−0.59	−1.23	0.06	−3.16	−1.58	−0.41	−3.28	−3.79	−3.88
75	Office machines and adp machines	−0.93	1.98	6.76	−1.12	2.30	3.18	0.40	4.28	8.00
76	Telecommunications and sound recording equipm	−0.76	2.57	4.67	−2.56	1.99	3.63	−0.17	7.04	2.72
77	Electric machinery, n.e.s. and parts	−0.85	−2.08	−0.43	−2.86	−8.58	−5.27	−1.58	0.31	1.17
78	Road vehicles	−0.96	0.85	−1.06	−4.20	−1.55	−3.05	−8.26	−5.03	−12.15
79	Other transport equipment	−4.98	−3.45	−2.20	−0.46	0.03	−0.24	−0.61	0.32	−0.54
81	Prefabr. buildings; sanitary, lighting, fixtrs etc.	0.16	0.71	0.57	−0.05	0.10	0.39	0.02	0.62	0.97
82	Furniture and parts thereof	1.16	1.81	1.75	0.25	0.92	1.18	0.66	0.33	1.38
83	Travel goods, handbags and sim. containers	0.78	0.59	0.71	0.23	0.67	0.58	0.61	0.79	0.76
84	Articles of apparel and clothing accessories	9.65	3.05	3.27	11.79	11.30	7.26	10.78	4.75	5.65
85	Footwear	8.53	2.84	1.44	0.77	1.03	0.88	2.65	0.61	1.28
87	Instruments and apparates n.e.s.	−2.23	−1.99	−1.45	−0.88	−1.36	−2.20	−1.26	−1.63	−1.80
88	Photographic equipment, optical goods etc.	0.20	0.09	−0.08	−0.72	−0.59	−0.82	0.02	0.62	0.21
89	Miscellaneous manufactured articles, n.e.s.	4.35	5.10	2.81	0.83	1.56	1.94	3.56	2.91	2.82

Source: COMTRADE – authors' calculations.

Table A5
Grubel–Lloyd index: China and its main partners.

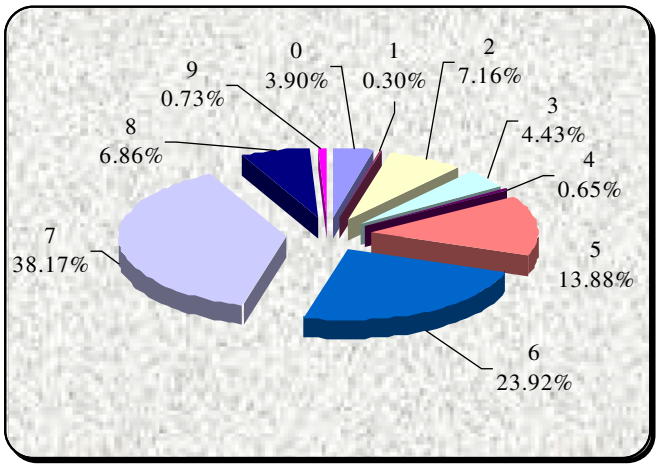
	Grubel–Lloyd China	US			Japan			Germany		
SITC-2	Text	1992	2002	2012	1992	2002	2012	1992	2002	2012
0	Live animals	0.05	0.54	0.39	0.02	0.43	0.68	1.00	0.58	0.05
3	Fish and fish preparations	0.26	0.23	0.55	0.05	0.10	0.08	0.04	0.10	0.06
6	Sugars, sugar preparations and honey	0.08	0.37	0.20	0.04	0.36	0.06	0.02	0.43	0.80
8	Feeding stuff for animals	0.03	0.32	0.65	0.35	0.05	0.03	0.26	0.26	0.09
9	Miscellaneous edible products and preparations	0.64	0.93	0.93	0.40	0.17	0.32	0.59	0.21	0.82
22	Oil seeds, oleaginous fruits	0.05	0.00	0.01	0.00	0.01	0.01	0.00	0.93	0.00
27	Crude fertilizers and crude minerals	0.22	0.46	0.41	0.04	0.07	0.24	0.07	0.60	0.40
28	Metalliferous ores and metal scrap	0.00	0.01	0.01	0.12	0.45	0.01	0.04	0.01	0.00
29	Crude animal, vegetable materials n.e.s.	0.64	0.70	0.65	0.12	0.30	0.15	0.05	0.14	0.17
33	Petroleum and products	0.13	0.55	0.43	0.11	0.32	0.27	0.05	0.79	0.34
41	Animal oils and fats	0.05	0.07	0.20	0.44	0.06	0.01	0.00	0.00	0.28
43	Processed animal or vegetable oils, etc.	0.47	0.75	0.81	0.71	0.28	0.63	0.35	0.93	0.50
51	Organic chemicals	0.37	0.69	0.63	0.53	0.20	0.47	0.63	0.69	0.73
52	Inorganic chemicals	0.36	0.60	0.69	0.20	0.55	0.44	0.53	0.69	0.35
53	Dyeing, tanning and colouring material	0.26	0.32	0.64	0.24	0.50	0.42	0.09	0.43	0.42
54	Medicinal and pharmaceutical products	0.40	0.22	0.55	0.64	0.73	0.45	0.27	0.24	0.48
55	Perfume, cleaning, preparations etc.	0.41	0.41	0.56	0.08	0.41	0.79	0.30	0.30	0.43
56	Fertilizers, manufactured	0.00	0.00	0.54	0.47	0.01	0.05	0.00	0.00	0.00
57	Plastics in primary forms	0.05	0.17	0.27	0.04	0.04	0.21	0.28	0.08	0.14
58	Plastics in non-primary forms	0.12	0.57	0.69	0.08	0.08	0.27	0.16	0.18	0.44
59	Chemical materials and products, n.e.s.	0.17	0.30	0.40	0.46	0.52	0.43	0.29	0.16	0.31
61	Leather, dressed fur, etc.	0.12	0.25	0.09	0.27	0.27	0.13	0.20	0.30	0.13
62	Rubber manufactures, n.e.s.	0.65	0.19	0.19	0.18	0.72	0.71	0.85	0.31	0.42
63	Wood and cork manufactures	0.17	0.13	0.03	0.10	0.21	0.02	0.04	0.11	0.24
64	Paper, paperboard and articles thereof	0.07	0.32	0.25	0.20	0.18	0.71	0.17	0.10	0.26
65	Textile yarn, fabrics, made up articles, etc.	0.13	0.17	0.13	0.46	0.53	0.39	0.19	0.22	0.29
66	Non-metallic mineral manufactures, n.e.s.	0.23	0.18	0.32	0.21	0.60	0.42	0.23	0.31	0.48
67	Iron and steel	0.34	0.25	0.33	0.08	0.25	0.26	0.04	0.07	0.50
68	Non-ferrous metals	0.07	0.57	0.48	0.27	0.58	0.38	0.04	0.25	0.32
69	Manufactures of metals, n.e.s.	0.25	0.17	0.20	0.86	0.81	0.59	0.36	0.56	0.68
71	Power generating machinery and equipment	0.23	0.63	0.54	0.26	0.62	0.58	0.22	0.13	0.49
72	Machinery for specialized industries	0.09	0.43	0.62	0.02	0.11	0.29	0.02	0.06	0.19
73	Metal working machinery	0.36	0.43	0.76	0.05	0.13	0.17	0.16	0.09	0.14
74	General industrial machinery n.e.s.	0.53	0.76	0.54	0.09	0.45	0.64	0.16	0.29	0.40
75	Office machines and adp machines	0.55	0.38	0.05	0.20	0.69	0.37	0.48	0.46	0.06
76	Telecommunications and sound recording equipm	0.27	0.31	0.05	0.28	0.49	0.51	0.19	0.34	0.28
77	Electric machinery, n.e.s. and parts	0.42	0.36	0.35	0.27	0.41	0.43	0.22	0.46	0.73
78	Road vehicles	0.18	0.10	0.09	0.03	0.10	0.26	0.01	0.06	0.09
79	Other transport equipment	0.30	0.09	0.16	0.14	0.80	0.25	0.03	0.14	0.07
81	Prefabr. buildings; sanitary, lighting, fixtrs etc.	0.12	0.03	0.03	0.30	0.39	0.10	0.76	0.14	0.11
82	Furniture and parts thereof	0.03	0.02	0.03	0.23	0.23	0.15	0.23	0.82	0.30
83	Travel goods, handbags and sim. containers	0.00	0.00	0.00	0.06	0.02	0.01	0.00	0.01	0.02
84	Articles of apparel and clothing accessories	0.00	0.00	0.00	0.05	0.08	0.01	0.01	0.01	0.00
85	Footwear	0.01	0.02	0.01	0.06	0.70	0.01	0.00	0.03	0.01
87	Instruments and apparates, n.e.s.	0.20	0.50	0.59	0.17	0.18	0.48	0.14	0.36	0.33
88	Photographic equipment, optical goods etc.	0.46	0.47	0.40	0.40	0.65	0.48	0.56	0.45	0.58
89	Miscellaneous manufactured articles, n.e.s.	0.13	0.11	0.16	0.44	0.59	0.46	0.09	0.22	0.35
93	Special transactions and commodities not classified	0.85	0.08	0.01	0.90	0.01	0.08	0.81	0.21	0.75
96	Coin (not gold coin or legal)	0.89	0.96	0.24	0.00	0.00	0.14	0.00	0.00	0.01

Source: COMTRADE — authors' calculations.



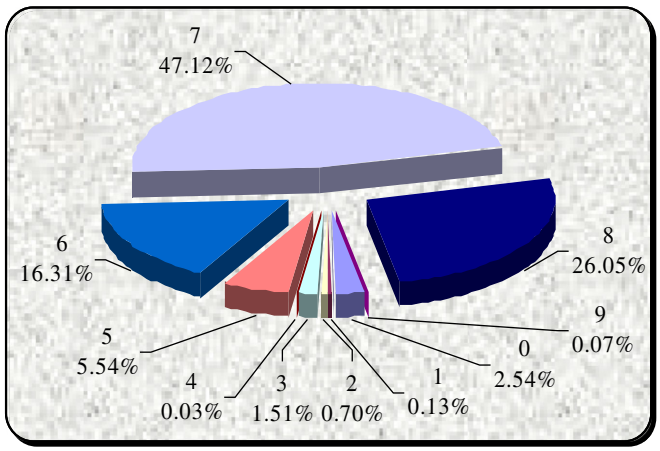
Source:Comtrade

Fig. A1. Chinese exports to the rest of the world (1992).



Source:Comtrade

Fig. A2. Chinese imports from the rest of the world (1992).



Source:Comtrade

Fig. A3. Chinese exports to the rest of the world (2012).

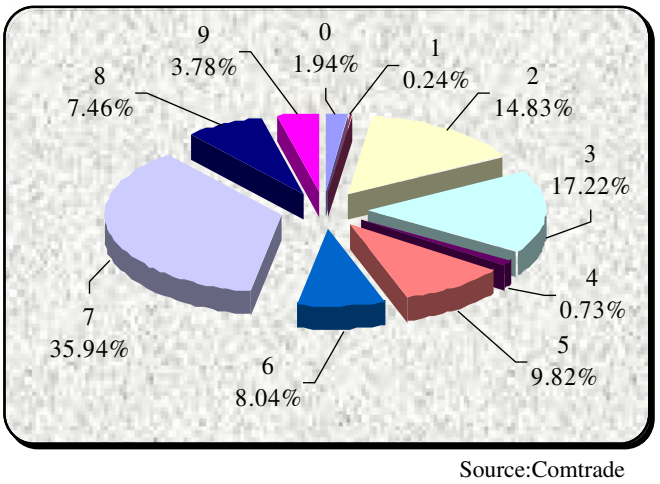


Fig. A4. Chinese imports from the rest of the world (2012).

Table A6
List of SITC — 1 sectors.

Code	Sector	Code	Sector
0	Food and live animals	5	Chemicals and related products, n.e.s.
1	Beverages and tobacco	6	Basic manufactures
2	Crude materials, inedible, except fuels	7	Machinery, transport equipment
3	Mineral fuels etc.	8	Miscellaneous manufactured articles
4	Animal and vegetable oils and fats	9	Goods not classified elsewhere

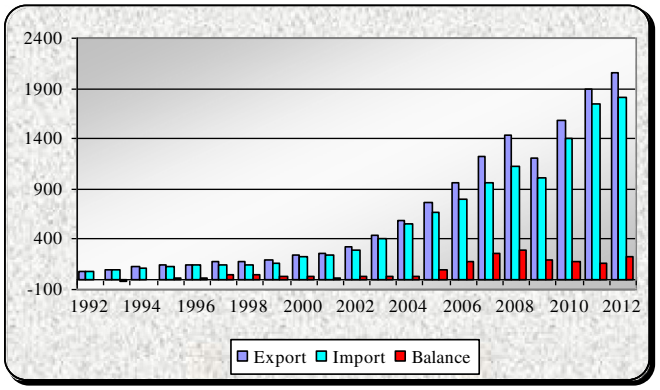
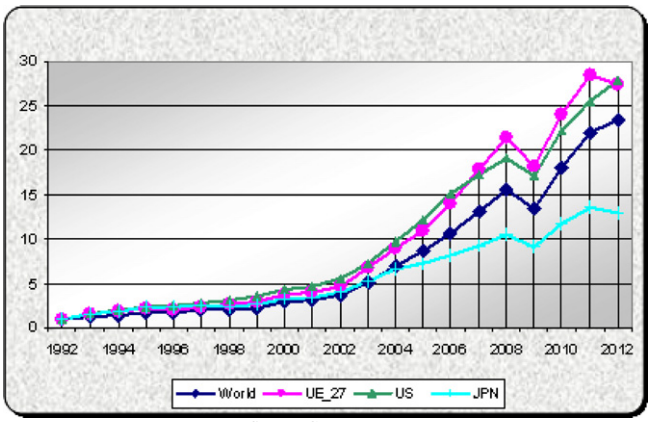


Fig. A5. Trade between China and the rest of the world (billions $).



Source: Comtrade

Fig. A6. Trade growth since 1992.

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