Changing Chinese Foreign Trade Competitiveness

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The reinforcement of China's global economic, political and geopolitical role has attracted the attention of the international community more and more distinctly to the „Asian lion" over the past decade. A wide range of scientific literature, numerous studies and books deal with China's position in global economy, its role in the Asian region (Ming-Te & Tai-Ting Liu, 2012; Haltmaier et al., 2007; Wang, 2004), its economic, diplomatic relations with the United States (Morrison, 2013; Wang, 2010) and the European Union (Chen, 2012; Yi, 2006), and the analysis of the quality of these relations.

There exist hardly any countries that, strangely enough, are not involved (interested) in China's increasing strength in the field of working capital investments, international trade or diplomatic relations. China is seeking to establish its leading role in the Far-Eastern region by expanding its trade relations, taking confidence building measures and launching fundraising campaigns. It was an active participant and initiator of numerous multilateral and regional co-operations. All these are to prove that the rising China is committed to the integration and opening. Owing to China's opening, the world's largest market and one of the most determining investment spots became accessible. One of the most significant stages of these processes was the country's accession to WTO in 2001, which opened new territories to China and its partners to handle economic conflicting interests directly connected with foreign trade relations and rising from their possible background regulation.

China's reform processes and its WTO-accession contributed to dynamic increase of Chinese international trade. In our research we were seeking the changes in product and partner structure of the foreign trade occurred parallel with the increase of Chinese international trade.

Data and methods

To our analysis we used the database of UNComtrade and the International Trade Centre (ITC) for the concrete calculations in two- and four-digit subdivisions according to the Harmonized System Codes (HS) standardized by the World Customs Organization (WCO). We chose the year of the WTO accession to the base period. The latest year is 2012 for which detailed statistics are completely available at the time of the closure of the manuscript.

Over statistical indicators we applied specific indexes and models in the course of research. To reflect the structure modification of international trade our paper use the Lawrence index (L) (Bender-Li, 2002), which gives an index value from zero to one. That index indicates the complete upheaval by close to unity value and shows little change by close to zero value. This index is defined as (specially for the export):

$$L = \sum_i \left| \frac{x_{ij}^t}{\sum_i x_{ij}^t} - \frac{x_{ij}^0}{\sum_i x_{ij}^0} \right| \quad (1)$$

where x_{ij}^t are, respectively, exports of product/sector „i" of country „j" in a given year (t, where 0 specially means the base period) (subsequently m_{ij} are imports). Lawrence index is suitable for reflection the similarity between the export and the import structure.

Concentration ratio (CR_n) is used to determine the structure, the measure of trade specialization. The CR_n indicator means the total share of the "n" largest units in the trade. Over and above the concentration ratio we can also use the Herfindahl-Hirschman Index (HHI) to characterize the extent of the concentration and its tendency. The HHI is calculated by summing the squares of all individual market shares. Unlike the CR_n concentration ratio, the HHI reflects both the distribution of the market shares of the tops and the composition of the market outside the tops. The index ranges from near 0 to 1, when it reaches its maximum of 1, then the market is controlled by one unit.

We applied the Constant Market Share (CMS) method to reply the question "*What kind of changes characterize the Chinese international trade from the accession to WTO and these changes are advantageous or not*?" The CMS analysis is based on the assumption that a country's share in a certain market remains unchanged on the same competitiveness level. According to traditional CMS model on the one hand the modification in the import of the reference market (structural effect), on the other hand the tendency of the country's share in the reference market (residual effect) – which is the indicator of the changes occurring in competitiveness – influence the export change together. According to *Nilsson* et al. (2006) the model is defined as follows:

$$x^t - x^0 = \Delta x = \underbrace{\left[\left(\frac{M^t}{M^0} - 1\right)x^0\right]}_{1.} + \underbrace{\left[x^t - x^0 - \left(\frac{M^t}{M^0} - 1\right)x^0\right]}_{2.} \quad (2)$$

where M is the import of the reference market.

We examined the extent of the intra-industrial defined as a two-way trade in similar products used the Grubel-Lloyd index, which is defined as follows (Bojnec et al., 2005):

$$GL = 1 - \sum_i \frac{|x_{ij} - m_{ij}|}{\sum_i (x_{ij} + m_{ij})} \quad (3)$$

If there is no import or export in trade, the 0 value of the index indicates perfect inter industrial trade. On the other hand if the export is equal to the import, so the value of the indicator is unity that is the trade is intra-industrial. First we survey the changes related to the WTO accession which had essential effect on the tendency of the Chinese international trade.

Change on the global economic scene

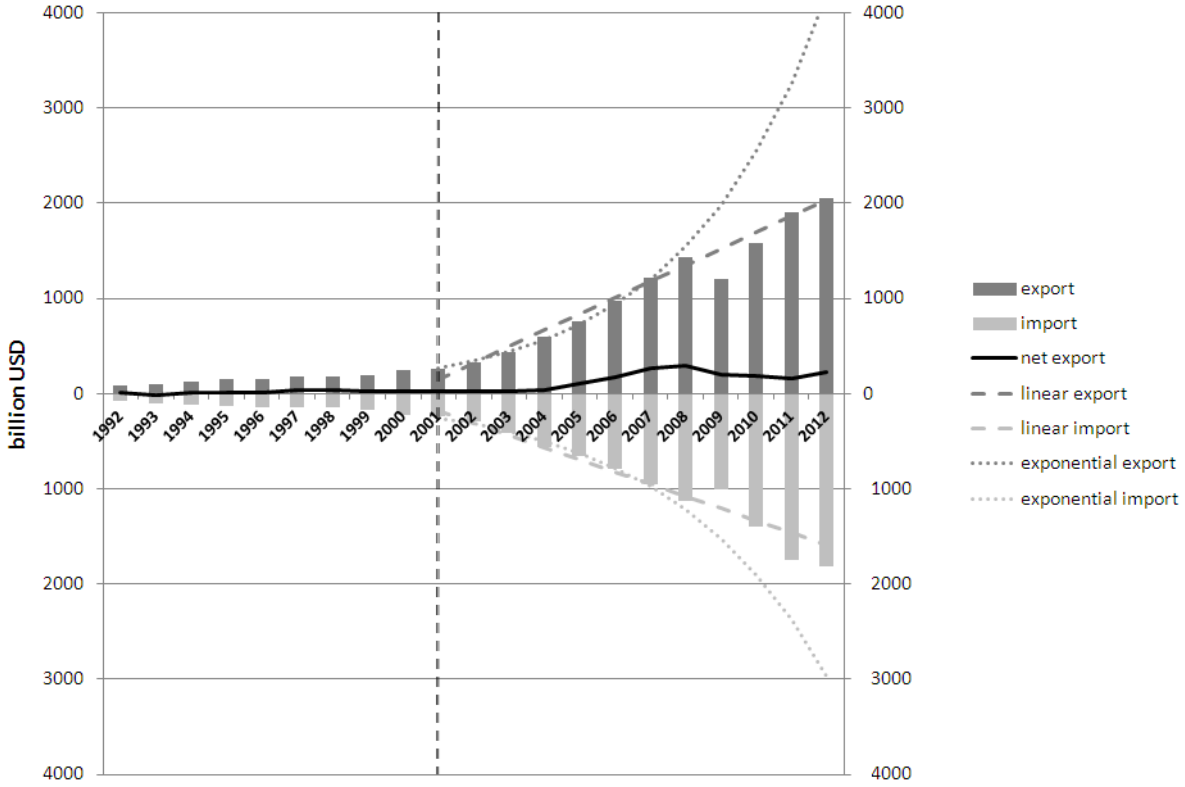
China's role in the international trade has been gradually rising in value over the past two decades. The UNComtrade database contains data from 1992 as regards Chinese international trade of goods. Figure 1 proves that the year of 2001 was a landmark in the history of Chinese economy.

The year 2012 was the 4th year in which China achieved the largest export in the world. At that time the country's complete export of goods and services was US$ 2,240.21 billion, which meant 10.0% of the global export. While it had a 4.3% share of the world's export of goods at the turn of the century, this indicator was 11.3% in 2012.

Considering the import China's market share has increased from 3.9% to 9.9%. From 2009 it is stably the second largest importer of goods. By its import year of last year, which was US$ 1818 billion, China's balance of trade was above US$ 200 billion again in 2012.

From the accession to WTO the Chinese export increased yearly by US$ 162.06 billion on an average, while its import by US$ 143.15 billion. The effect of the crises of 2008 is observable in the Chinese trade tendency, but we proved that to 2011 China succeeded in reaching the level of the trend characterized the country before the crisis in accordance with Jánossy's famous theory of trend lines (for more details see Fehér & Poór, 2013).

Figure 1: The tendency of Chinese trade position
(trend prediction on the basis of the pre-crisis trend)



Source: On the basis of the database of COMTRADE

A question may arise: to what extent this dynamic trade increase was the same from the point of view of the product structure. The Lawrence index gives 0.72 value for the export, and 0.75 for the import. As index shows little change by close to zero value, we can establish that the structure of the export also the import has significant changed.

First consider the modification of the export. To some extent the concentration of the export has increased (HHI_{2001}=0.009, HHI_{2012}=0.017). Table 1 and 2 contains the most important export products of the year of 2001 and 2012 in two- and four-digit subdivisions. As regards the export of the machinery and mechanical appliances,

electrical equipments (HS 84-85) China has remarkable role on a world scale. Its world market share has reached 20.6% on the basis of the data of 2012.

In the case of Portable digital data processing machines (HS 847130) China's world market share reached the 74.5% in 2012, while the following most important exporters and their proportion are the USA with 4.4%, Netherlands with 3.8% and Germany with 2.8 %. From this product made in China the USA imported 31.8%, Hong Kong 15.2% and Netherlands 9.5% while Germany 6.5%! In case of this product the increase of the world total export is almost negligible since 2002, while China's share in export has increased; that means a significant rearrange to the advantage of China in the output of the world.

Table 1: The most important product groups of the export in 2001 and 2012 (export share, %)

Code	*Denomination*	*2001*		*2012*	
'85	Electrical machinery and equipment and parts thereof	1.	19.3%	1.	23.8%
'84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	2.	12.6%	2.	18.3%
'62	Articles of apparel and clothing accessories, not knitted or crocheted	3.	7.1%	6.	3.0%
'61	Articles of apparel and clothing accessories, knitted or crocheted	4.	5.1%	3.	4.2%
'64	Footwear	5.	3.8%	10.	2.3%
			CR=47.9%		

Code	*Denomination*	*2001*		*2012*	
'85	Electrical machinery and equipment and parts thereof	1.	19.3%	1.	23.8%
'84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	2.	12.6%	2.	18.3%
'61	Articles of apparel and clothing accessories, knitted or crocheted	4.	5.1%	3.	4.2%
'94	Furniture, lamps, prefabricated buildings	8.	2.8%	4.	3.8%
'90	Optical, photographic, medical or surgical instruments	11.	2.4%	5.	3.6%
				CR=53.7%	

Source: Own calculation on the basis of the database of ITC

Chinese textile and textile articles have 36.6% share in the world export in 2012. From the point of view of numerous textile articles China manages the 90% (!) of the global export, for example in the case of the cotton or knit crochet. Though the proportion of certain Chinese textile articles (for example HS 430230) has decreased in total export but the role of these product groups in international trade has decreased by itself.

Considering the primary sector China has negligible export. In the case of the ores, the mineral oils and the metals and the articles of metals its export is continuously decreasing. On the basis of this it can be laid down as a fact that the products produced by the Chinese primary sector (with few exceptions) are nearly absolutely used in China. Concerning the export China applies export controls to support the home industry.

Table 2: The most important products of the export in 2001 and 2012 (export share, %)

Code	*Denomination*	*2001*		*2012*	
’8471	Automatic data processing machines and units thereof; magnetic or optical readers, etc	1.	4.9%	1.	8.0%
’8473	Parts and accessories suitable for use solely or principally with machines of headings	2.	3.1%	6.	1.5%
’8525	Transmission apparatus for radio-telephony, radio-broadcasting or television; television cameras, etc	3.	1.9%	30.	0.6%
’6204	Women’s or girls’ suits, ensembles, jackets, blazers, dresses, skirts, trousers, overalls, breeches and shorts	4.	1.8%	24.	0.8%
’6110	Jerseys, pullovers, cardigans, waistcoats and similar articles, knitted or crocheted	5.	1.8%	18.	1.0%
			CR=13.6%		

Code	*Denomination*	*2001*		*2012*	
‘8471	Automatic data processing machines and units thereof; magnetic or optical readers, etc	1.	4.9%	1.	8.0%
‘8517	Electric apparatus for line telephony or telegraphy telephone sets, modems, facsimile machines	11.	1.3%	2.	7.5%
‘8542	Electronic integrated circuits & microassemblies; parts thereof	19.	1.0%	3.	2.6%
‘9013	Liquid crystal devices, lasers	104.	0.2%	4.	1.9%
‘8901	Vessels for the transport of persons or goods cruise ships, excursion boats, ferry boats, cargo ships, barges	34.	0.6%	5.	1.6%
					CR=21.5%

Source: Own calculation on the basis of the database of ITC

Consider the partner structure of the export we can establish greater stability compared with the product structure. The Lawrence index of the export indicates 0.34 value. Table 3 contains the share of the most important importers of China. From the point of view of the partner structure the concentration shows significant decrease (HHI_{2001}=0.109, HHI_{2012}=0.070), that is China enters into relations with more and more countries.

Table 3: The most important importers of China and their shares, %

Importers	*2001*	*2012*
EU28	16.8	16,4
USA	20.4	17.2
Hong Kong, China	17.5	15.8
Japan	16.9	7.4
Republic of Korea	4.7	4.3
Total	*76.3*	*61.1*

Source: Own calculation on the basis of the database of ITC

From the first 20 most important countries the largest expansion of the Chinese export since the accession to WTO can be demonstrated in the trade done with Brazil, Vietnam, and India. At the same time in the last 3 years the largest increase is observable in relation to the Russian Federation, Brazil and Thailand. In the case of the European countries the Chinese export has generally increased seven/eightfold. As these countries’ import has not increased to such an extent therefore we can

establish that the import structures of the countries rearrange significant, products made in China have more and more proportion in the import of these countries.

There is a close connection between the value of the export and the import (see Figure 1). China needs resources for its economic growth, which makes sure its further growth. These resources, however, are not at its disposal without restraint so those must be imported.

Table 4: The most important product groups of the import in 2001 and 2012 (import share, %)

Code	*Denomination*	*2001*		*2012*	
’85	Electrical machinery and equipment and parts thereof	1	22.9%	1	21.0%
’84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	2	16.6%	3	10.0%
’27	Mineral fuels, mineral oils	3	7.2%	2	17.2%
’39	Plastics and articles thereof	4	6.3%	7	3.8%
’72	Iron and steel	5	4.5%	12	1.3%
			CR=57.6%		

Code	*Denomination*	*2001*		*2012*	
’85	Electrical machinery and equipment and parts thereof	1	22.9%	1	21.0%
’27	Mineral fuels, mineral oils	3	7.2%	2	17.2%
’84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	2	16.6%	3	10.0%
’26	Ores, slag and ash	11	1.7%	4	7.4%
’90	Optical, photographic, medical or surgical instruments	6	4.0%	5	5.9%
					CR=61.4%

Source: Own calculation on the basis of the database of ITC

China’s complete product import exceeded US$1,818.20 billion in 2012. On the basis of the CR and HHI indicator we can establish that the Chinese import more concentrated than the export (HHI_{2001}=0.013, HHI_{2012}=0.036) and the concentration of the import has increased similar to the export during the period under survey. Table 1 and 2 contains the most important import products of the year of 2001 and 2012 in two- and four-digit subdivisions.

On the basis of the table above the import is relatively stabile in two-digit subdivisions, the first 3 group of products are invariably the Mineral fuels, mineral oils and the Machinery and Mechanical Appliances; Electrical Equipments, which cover near the 50% of the Chinese import.

Compare the most important export and import group of products it can be laid down as a fact that from the first 5 most important groups of products three is already the same in 2012, which directs the attention to the phenomenon of the intra-industrial trade. But on the basis of the GL index we can establish that the Chinese trade is rather characterized by the inter-industrial trade extent of which is basically unchanged (GL_{2001}=0,38, GL_{2012}=0,36). The values of the export/import structure similarity index prove the same, consequently the value of the index does not indicate significant change and between the export and import product structure there is an essential difference. In four-digit subdivision it is clear that the role of resources has increased in import (see Table 5).

Table 5: The most important products of the import in 2001 and 2012 (import share, %)

Code	*Denomination*	*2001*		*2012*	
’8542	Electronic integrated circuits & microassemblies; parts thereof	1.	7.0%	2.	10.6%
’2709	Petroleum oils and oils obtained from bituminous minerals, crude	2.	4.8%	1.	12.1%
’8473	Parts and accessories suitable for use solely or principally with machines of headings	3.	2.8%	16.	1.0%
’8517	Electric apparatus for line telephony or telegraphy telephone sets, modems, facsimile machines	4.	2.2%	7.	2.2%
’8471	Automatic data processing machines and units thereof; magnetic or optical readers, etc	5.	2.0%	9.	1.9%
			CR=18.8%		

Code	*Denomination*	*2001*		*2012*	
’2709	Petroleum oils and oils obtained from bituminous minerals, crude	2.	4.8%	1.	12.1%
’8542	Electronic integrated circuits & microassemblies; parts thereof	1.	7.0%	2.	10.6%
’2601	Iron ores and concentrates, including roasted iron pyrites	16.	1.0%	3.	5.3%
’9999	Other articles	29.	0.7%	4.	3.8%
’9013	Liquid crystal devices, lasers	38.	0.6%	5.	3.1%
					CR=34.9%

Source: Own calculation on the basis of the database of ITC

The partner structure of the import is less stabile compared with the export, the value of the Lawrence index is 0.5. Table 6 contains the share of the most important exporters of China at the beginning and in 2012. From the point of view of the partner structure the concentration shows significant decrease similar to the export (HHI_{2001}=0.076, HHI_{2012}=0.047), consequently from the point of view of the import the establishment – China enters into relations with more and more countries is still more true. The order of the first 5 partners has changed to a certain degree – opposed to the export characterizing steadiness.

There are important new importers in China’s life, for example the Sub-Saharan African countries multiplied altogether their export towards China by twenty-three-fold within this short period of time (2001-2012). The relation of China and the SSA countries we examined in an earlier study (Fehér & Poór, 2013).

Table 6: The most important exporters of China and their shares, %

Exporters	*2001*	*2012*
EU28	16.8	16.4
Japan	17.6	9.8
Republic of Korea	9.6	9.3
USA	10.8	7.4
Taipei	11.2	7.3
Total	*66.0*	*50.2*

Source: Own calculation on the basis of the database of ITC

The CMS method is one of the procedures suitable for analyzing the order and the tendency of the international trade. The objective of the application of the method is to highlight the factors which influence the export performance and its tendency (Ahmadi-Esfahani, 2006). By the application of the CMS model the components of the export change can be separated (one of them is owing to increase of the reference market and the other is because of the change of competitiveness. The sensitivity of the model to only one year data we tried to eliminate by that means we used averaged data of three years following one another. Table 7 contains the results of the model.

On the basis of the results it can be laid down as a fact that the export expansion following the WTO accession is mostly owing to Machinery and Mechanical Appliances; Electrical Equipment, but the role of Textile and Textile Articles as well as the Other articles is important too. In case of the Agricultural and the Mineral Products the negligible increase of the export is owing to expansion of the reference market. Except Raw Hides and Skins, Leather, Fur skins and Articles thereof in case of the other group of products the competitiveness component has more importance.

Conclusions

Since the accession to the WTO Chinese foreign trade has soared. China's fascinating economic performance has been accompanied by an increasing need for raw materials, which is mainly fulfilled from import. We proved that these changes led to fundamental modification in the product structure of the international trade. Nevertheless the increase of concentration shows that China found those products in which it can become specialized in this new environment and those products which are essential in production of the most important export products and their acquisitions are connected with the foreign market.

Considering the partner structure the structural change is not significant, but remission of concentration is well-marked. This points to the fact that WTO-accession makes the increase of foreign trade connection possible in relation to more and more countries. On the basis of the results of the CMS model it can be laid down as a fact that significant export increase of China owing to the increase of its market share which is ex post indicator of its revealed competitiveness in international trade.

Table 7: Results of CMS model

Code	*Denomination*	*Export change from 2001/03 to 2010/12 billion US$*		
		Total	*Structural effect*	*Residual effect*
01-05	Live Animals; Animal Products	9.28	5.12 (55.1%)	4.17 (44.9%)
06-15	Vegetable Products	11.68	11.32 (96.9%)	0.36 (3.1%)
16-24	Prepared Foodstuffs; Beverages, Spirits and Vinegar; Tobacco	16.99	9.32 (54.9%)	7.67 (45.1%)
25-27	Mineral Products	*23.03*	*35.15*	*-12.13*
28-38	Products of the Chemicals or Allied Industries	73.52	23.11 (31.4%)	50.42 (68.6%)
39-40	Plastics and Articles thereof; Rubber and Articles Thereof	54.13	17.20 (31.8%)	36.94 (68.2%)
41-43	Raw Hides and Skins, Leather, Fur skins and Articles thereof	18.54	10.27 (55.4%)	8.27 (44.6%)
44-49	Pulp of wood or of other Fibrous Cellulosic Material	22.09	3.53 (16.0%)	18.56 (84.0%)
50-63	Textile and Textile Articles	168.37	43.88 (26.1%)	124.49 (73.9%)
64-67	Footwear	37.97	12.90 (34.0%)	25.06 (66.0%)
68-71	Articles of Stone, Plaster, Cement, Mica; Ceramic Products; Glass/ware	53.77	13.72 (25.5%)	40.05 (74.5%)
72-83	Base Metals and Articles of Base Metal	114.89	34.72 (30.2%)	80.17 (69.8%)
84-85	Machinery and Mechanical Appliances; Electrical Equipment	662.73	153.21 (23.1%)	509.51 (76.9%)
86-89	Vehicles, Aircraft, Vessels and Associated Transport Equipment	90.28	17.46 (19.3%)	72.82 (80.7%)
90-97	Other articles	141.06	35.74 (25.3%)	105.32 (74.7%)
	Total	1498.34	524.35 **(35.0%)**	973.99 (**65.0%**)

Source: Own calculation on the basis of the database of ITC

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