TRADE IN HIGH-TECH PRODUCTS BETWEEN THE EUROPEAN UNION AND CHINA

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Abstract
The article aims to present the volumes and patterns of the trade in high-tech products between the European Union and China. The calculations use the statistical data obtained from the UN Comtrade database. The analysis covers the years 2004-2014 and assumes the unchanging composition of the European Union (as of the end of 2013).
The findings indicate that the European Union's and China's trade potentials in the high-tech sectors are slowly evening out. In 2014 China supplied the world market with about 22.5% of all high-tech products, while the 28 EU member states – with 26.4%.

A marked imbalance can be observed in the trade in high-tech products between the EU and China. China was an important supplier of technologically advanced products for the European Union, but a much less important market for the EU high-tech goods. The EU countries are important destinations for Chinese high-tech exports, but considerably less important suppliers of such products to the Chinese market. As a result, the EU recorded a deficit in the bilateral trade in high-tech products.

Trade between the European Union and China in the analysed period of time comprised mainly telecommunications equipment, electronics, computers and office machines, scientific instruments, and aerospace products.

Keywords: knowledge-based economy, high-tech products, foreign trade, European Union, China

Introduction

Literature[1] often defines the current stage in the development of the economy as the knowledge-based economy, in which knowledge plays a decisive role in stimulating economic and social growth. This is related to the concept of information society, already in use in the 1970's and connected with A. Toffler's theory of technological waves[2]. The building of this economy involves, among other things, the development of such modern industries as informatics and microelectronics, universally recognized as technologically advanced and forming part of the high-tech sector. As early as in the 1940's, J. A. Schumpeter[3] wrote about the significance of technological and technical progress for the growth of a modern economy, only to be followed by other economists, for example, P. Romer and G. M. Grossman[4]. In this situation, all countries have to face the challenge of international competition.

[1] Cf.: *The Future of the Global Economy. Towards a Long Boom?,* OECD, Paris 1999, www.oecd.org/futures/35394025.pdf (28.01.2016); Słownik innowacji - leksykon haseł, Innovation Portal, http://www.pi.gov.pl/parp/chapter_96055.asp?soid=256993FED9734DD0B31A4785E53F81F5 (08-12-2014); A. Koźmiński, *Jak tworzyć gospodarkę opartą na wiedzy?,* in: *Strategia rozwoju Polski u progu XXI wieku*, Chancellery of the President of the Republic of Poland, Komitet Prognoz "Polska 2000 Plus" at Prezydium Polskiej Akademii Nauk, , Elipsa, Warszawa 2001; A. Kukliński (ed.), *Gospodarka oparta na wiedzy : wyzwanie dla Polski XXI wieku*, Komitet Badań Naukowych, Warszawa 2009; W. Welfe (ed.), *Makroekonometryczny model gospodarki opartej na wiedzy*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 2010; E. Dworak, *Gospodarka oparta na wiedzy w Polsce : ocena, uwarunkowania, perspektywy*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 2012.
[2] A. Toffler, *Budowa nowej cywilizacji. Polityka trzeciej fali (Creating a New Civilization: The Politics of the Third Wave)*, Zysk i S-ka, Poznań 1996; A. Toffler, *Trzecia Fala (The Third Wave)*, Państwowy Instytut Wydawniczy, Warszawa 1997.
[3] J.A. Schumpeter, *Kapitalizm, socjalizm, demokracja (Capitalism, Socialism and Democracy)*, PWN, Warszawa 2009; J.A. Schumpeter, *Teorie rozwoju gospodarczego (The Theory of Economic Development)*, PWN, Warszawa 1960.
[4] P. Romer, *Endogenous Technical Change*, "Journal of Political Economy" 1990, Vol. 98, No. 5, pages.stern.nyu.edu/~promer/Endogenous.pdf (27-07-2015); P. Romer, *Increasing Returns and Long-Run Growth, "*Journal of Political Economy" 1986, Vol. 94, No. 5, ihome.ust.hk/~dxie/OnlineMacro/romerjpe1986.pdf (27-07-2015); G.M. Grossman, E. Helpman, *Innovation and Growth in the Global Economy*, The MIT Press, Cambridge Mass., London 1991.

The article is an attempt to present and discuss the volumes and patterns of the trade in high-tech products between the European Union and China. The analysis draws on the data obtained form the UN Comtrade database, which are compiled according to the list of high-tech products developed by OECD[5], with the use of the relevant correspondence tables between HS and SITC[6]. The study covers the years 2004-2014 and assumes the unchanging composition of the EU as of the end of 2013.[7]

1. The potential of the European Union and China in high-tech trade

One of the most significant determinants of growth in high-tech trade is R&D expenditure and a related number of patents obtained by the entities operating in the high-tech sectors in a given country.

Data presented in Table 1 indicate that in 2004 the EU countries had a substantial advantage over China with respect to GDP and R&D spending, measured with purchasing power parity (PPP). While the GDP of the EU-28 countries exceeded USD 13.6 trln (at current prices) and USD 13 trln (according to PPP), China's GDP stood at USD 2 trln (at current prices) and only USD 5.6 trln (according to PPP). The EU-28 countries spent 1.67% of their GDP on research and development, which made almost USD 218 bln according to purchasing power parity. At the same time, R&D expenditure in China amounted to slightly below USD 70 bln (according to PPP), which accounted for 1.23% of GDP.

In 2013, the advantage of the Euroepan Union over China was no longer so strong. Although GDP at current prices was significantly higher in the EU-28 (almost USD 18 trln) than in China (USD 9 trln), GDP measured with purchasing power parity offered a completely different picture. The GDP of the European Union as a whole stood at USD 17.9 trln and was only slightly higher than China's GDP of USD 16 trln.

Table 1. GDP and R+D expenditures in European Union and China.

Countries	2004				2013			
	GDP (in bln USD)	R&D as % of GDP	GDP by current PPP (in bln USD)	R&D expenditure by current PPP (in bln USD)	GDP (in bln USD)	R&D as % of GDP	GDP by current PPP (in bln USD)	R&D expenditure by current PPP (in bln USD)
EU-28	13 683.1	1.67	13 089.8	218.7	17 970.8	1.91	17 900.0	342.4
EU-15	12 913.0	1.79	11 638.6	208.6	15 516.4	2.06	15 469.9	317.9
China	1 944.7	1.23	5 632.1	69.3	9 181.2	2.08	16 157.7	336.5

PPP - purchasing power parity
Source: http://unctadstat.unctad.org/EN/ (23.01.2016), Main Science and Technology Indicators, http://stats.oecd.org/ (22.01.2016).

According to the OECD data (Table 1), R&D expenditures by PPP in China amounted to USD 336.5 bln and were close to the corresponding expenditures in the EU-28, which exceeded USD 342 bln. Notably, however, China's expenditures were higher than R&D spending in the old EU member states (EU-15). They accounted for 2.08% of China's GDP, whereas in the UE-28 they went over just 1.9% of GDP. The World Bank data are similar to the OECD data, as they place China's R&D spending at 1.22% of GDP in 2004 and at 2.01% in 2013[8].

[5] List of high-tech products according to SITC rev. 3, http://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm (13-12-2014); List of high-tech products according to SITC rev. 4, http://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm (13-12-2014)

[6] *Complete HS and SITC conversion and correspondence tables along with detailed note on its conversion methodology*; http://unstats.un.org/unsd/trade/conversions/HS%20Correlation%20and%20Conversion%20tables.htm (25-11-2014); *Correspondence HS 2012 – HS 2002; Correspondence HS 2002 - HS 2012*; http://unstats.un.org/unsd/cr/registry/regot.asp?Lg=1 (22-11-2014).

[7] In 2004 the European Union expanded from 15 to 25 member states. More countries joined in 2007 and 2013. In reality then, the European Union has had 28 member states only since 1 July, 2013.

[8] http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS (22.01.2016).

On the other hand, Eurostat data show the European Union in a slightly more positive light, as they place EU-28's R&D spending at 1.76% of GDP in 2004, 2.01% in 2012, and 2.03% in 2014, while China's R&D expenditures – at 1.23 (2004) and 1.98% (2012). [9]

It can be worthwhile to mention that the R&D expenditure target defined in the EU's development strategy adopted in 2010 for the next ten years (*Europe 2020*) was 3% of GDP,[10] though the member countries were free to set their individual targets. As a result, six countries set it at the level of 3% recommended in the strategy (Belgium, Denmark, Germany, Estonia, France, Slovenia), three at the lever higher than in the strategy (Sweden, Finland, Austria), Portugal adopted the target of 2.7-3.3%, while Great Britain refrained from setting it at all. The remaining 17 member states (the majority) set the national target lower than the one defined in the strategy.[11] As the OECD data show, in 2013 most countries fell far behind the adopted targets (Table 2), while China significantly improved its position in this area over the performance of the developed EU economies.

Table 2. R+D expenditures in the European Union's countries and China in 2013 (in % of GDP)

Level of R+D expenditures (in % of GDP)	Country (level of R+D expenditures in % of GDP)	
0.00-0.99	Romania (0.39), Cyprus (0.48[a]), Latvia (0.60), Bulgaria (0.65), Greece (0.80), Croatia (0.81), Slovak Rep. (0.83), Poland (0.87), Malta (0.89), Lithuania (0.95)	
1.00-1.99	Luxembourg (1.16), Spain (1.24), Italy (1.26), Portugal (1.37), Hungary (1.41), Ireland (1.58[b]), United Kingdom (1.63), Estonia (1.74), Czech Rep. (1.91; 1.92[a]), Netherlands (1.98)	
2.00-2.99	France (2.23), Belgium (2.28), Slovenia (2.59), Austria (2.95; 2.81[a]), Germany (2.85)	China (2.08; 2.01[a])
3.00	**The aim for EU-28 in *Europe 2020***	
3.00 and more	Denmark (3.06), Sweden (3.30), Finland (3.31)	

[a] World Bank data
[b] 2012
Source: Main Science and Technology Indicators, http://stats.oecd.org/ (22.01.2016), http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS (22.01.2016)

The results yielded by the expenditures can, however, be clearly distinguished. The data on the number of high-tech patents per every million of active population, granted by the US Patent and Trademark Office to the entities based in China and the European Union are presented in Table 3.[12]

Table 3. Number of patents[a] in high-tech sectors per every 1 million of active population, granted by USPTO in years 2000-2009.

Country/group of countries	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
EU-28	-	-	40.823	41.761	41.185	38.821	39.275	39.642	37.459	28.414
China	0.273	0.327	0.535	0.782	1.085	1.608	1.810	2.273	2.624	-

[9] ec.europa.eu/eurostat/data/database (23.01.2016); http://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_expenditure (23.01.2016).
[10] *Europe 2020. A European strategy for smart, sustainable and inclusive growth*, Communication from the European Commission KOM(2010), Brussels 3.3.2010, final, http://ec.europa.eu/eu2020/pdf/1_PL_ACT_part1_v1.pdf. (23.01.2016)
[11] *Overview of Europe 2020 Targets*, http://ec.europa.eu/europe2020/pdf/targets_en.pdf. (23.01.2016); Main Science and Technology Indicators, http://stats.oecd.org/ (22.01.2016).
[12] Eurostat data provide only a number of patent applications submitted to the European Patent Office, but they do not quote the number of patents granted. The number of granted patents is provided in USPTO data. Due to significant differences related to growth and resources between countries, it is difficult to compare the absolute number of granted patents. This is the reason why the article presents a relative measure, i.e. the number of high-tech patents granted per 1 million of active population in particular countries. Source: Eurostat Database, http://ec.europa.eu/eurostat/data/database (25-01-2016).

[a] When a patent was invented by several inventors from different countries, the respective contributions of each country are taken into account. [http://ec.europa.eu/eurostat/cache/metadata/en/pat_esms.htm (25.01.2016)].

Source: Eurostat Database, http://ec.europa.eu/eurostat/data/database (25-01-2016).

In the years 2000-2008, the US patent office granted from 80,000 to 90,000 patents in the high-tech sectors every year. The initial data show that in 2009 this number dropped significantly to 70,000.[13] In 2008, Taiwan's entities performed the strongest and USPTO granted more than 340 high-tech patents per 1 million of active population to them. The entities from the USA, Japan, and South Korea were granted a slightly lower number of patents – about 250 each.[14] The EU entities (UE-28 as a whole) were given 37 patents (per every million of active population), which on its own shows that the EU lags behind the top-performing countries. Moreover, in the years 2000-2009 this number steadily decreased. The same statistics for China are even worse, because the figure of 2 patents (per every million of active population) puts the country in the position close to Poland's and shows what a great distance separates it from the world's leading countries.[15] It should be noted, however, that China reported a growth in the number of patents granted on an annual basis, which means that while the EU's positions deteriorated in this area, China's situation improved.

2. High-tech products in trade between the European Union and China

In the years 1999-2014, the value of global trade (calculated at current prices) rose from about USD 5.5 trln to nearly USD 18 trln, which represents almost a threefold increase.[16] In 2014, The EU-28 countries delivered over 33% of all exports to the world market, while China – 13%. Since 2009, China has consistently ranked first among global exporters and second among global importers.[17]

In the years 1999-2014, the value of global trade in high-tech products also tripled: from USD 1 trln to USD 3 trln. In 2014, apprx. 26.4% of high-tech products originated in the EU-28 countries, while 22.5% came from China.[18] Additionally, the share of these products in total global trade decreased from about 18% (1999) to 16.4% (2014).[19] Data presented in Table 4 show that in the analyzed years (2004-2014) this trend was also characteristic of the European Union and China. From 2004 to 2014, the share of high-tech products in the EU exports decreased from 14.4% to 13%, while their share in imports fell from 15.3% to 13.4%. The old EU member states recorded a more pronounced decline (from 14.7% to 13.3% in exports and 15.5% to 13.3% in imports) than the new EU countries. High-tech products accounted for 11.1% of the EU-13 exports in 2004 and 10.7% in 2014, whereas their share in the imports of the new EU member states remained relatively unchanged at the level of apprx. 14%. Interestingly, in 2004 technologically advanced products constituted a higher share of exports and imports in the old EU countries, while in 2014 their share in the EU-13 imports was already marginally higher than in the imports of the old member states. High-tech products seem to play a much more significant role in China's foreign trade. In 2004, they accounted for 30% of exports and 32% of total imports of the country. In 2014, despite a certain decline, they still represented 28% of exports and 27.8% of total imports in China.

[13] Eurostat Database, http://ec.europa.eu/eurostat/data/database (25-01-2016).
[14] Eurostat Database, http://ec.europa.eu/eurostat/data/database (25-01-2016)
[15] M. Fronczek (2015), *Polski handel zagraniczny produktami high-tech w latach 2005-2013 (Polish foreign trade in high-tech goods in years 2005-2013)*, "Europa Regionum" vol. 25, pp. 93-107.
[16] UN Comtrade, http://comtrade.un.org/db/ (20.01.2016).
[17] *International Trade Statistics 2010*, WTO, Geneva 2010, https://www.wto.org/english/res_e/statis_e/its2010_e/its10_toc_e.htm (25.01.2016); *International Trade Statistics 2011*, WTO, Geneva 2011, https://www.wto.org/english/res_e/statis_e/its2011_e/its11_toc_e.htm (25.01.2016); *International Trade Statistics 2012*, WTO, Geneva 2012, https://www.wto.org/english/res_e/statis_e/its2012_e/its12_toc_e.htm (25.01.2016); *International Trade Statistics 2013*, WTO, Geneva 2013, https://www.wto.org/english/res_e/statis_e/its2013_e/its13_toc_e.htm (25.01.2016); *International Trade Statistics 2014*, WTO, Geneva 2014, https://www.wto.org/english/res_e/statis_e/its2014_e/its14_toc_e.htm (25.01.2016); *International Trade Statistics 2015*, WTO, Geneva 2015, https://www.wto.org/english/res_e/statis_e/its2015_e/its15_toc_e.htm (25.01.2016).
[18] UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.
[19] UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations, M. Fronczek (2015), *Handel produktami high-tech - Unia Europejska na tle wybranych krajów*, in: Unia Europejska wobec wyzwań przyszłości. Aspekty prawne, finansowe i *handlowe*, E. Małuszyńska, G. Mazur, P. Idczak (eds.), Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań, pp. 279-290.

Table 4. Share of high-tech products in Chinese and European Union's foreign trade in 2004 and 2014.

Country/group of countries	2004				2014			
	Export		Import		Export		Import	
	Total (in bln USD)	High-tech products (in %)	Total (in bln USD)	High-tech products (in %)	Total (in bln USD)	High-tech products (in %)	Total (in bln USD)	High-tech products (in %)
EU-28	3 692.6	14.4	3 734.5	15.3	6 020.6	13.0	5 908.8	13.4
EU-15	3 388.4	14.7	3 370.0	15.5	5 219.6	13.3	5 101.4	13.3
EU-13	304.2	11.1	364.5	13.9	801.0	10.7	807.4	13.7
China	593.3	30.3	561.2	32.1	2 342.3	28.3	1 958.0	27.8

Source: UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.

The analysis of bilateral trade flows for technologically advanced products between the EU-28 and China reveals an interesting picture (Table 5).

Table 5. Share of the European Union in foreign trade of high-tech products of China and share of China in foreign trade of high-tech products of the European Union in 2004 and 2014 (in %).

Countries	2004		2014	
	Export	Import	Export	Import
Share of the European Union in foreign trade of high-tech products of China				
EU-28	21.96	8.19	15.38	8.07
EU-15	20.32	7.85	12.90	7.60
EU-13	1.65	0.34	2.48	0.47
Share of China in foreign trade of high-tech products of the European Union				
EU-28	2.33	9.95	4.66	17.77
EU-15	2.44	9.71	5.06	16.57
EU-13	0.65	12.48	1.42	25.15

Source: UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.

In 2004, about 22% of high-tech products exported by China entered the EU-28 markets, in particular the markets of the old member states (20.3%), as compared to 1.7% for the new member states. In 2014, the EU's share in China's high-tech exports decreased to 15.4%. The major recipients were still the old member states (12.9%), but the new EU countries increased their share, albeit still small, to 2.5%. As far as imports are concerned, the EU-28's share in high-tech imports to China was considerably lower than its share in exports. Both in 2004 and 2014, it was very similar and stood at about 8%. The main European exporters were the EU-15 countries (7.7-7.9%). This indicates that the EU-28 countries were an important market for China's technologically advanced exports, while they remained relatively insignificant as the suppliers of these products.

Yet, if the trade in high-tech products between the European Union and China is analyzed from the opposite perspective, it is clear that for the EU-28 countries China was a definitely important supplier of technologically advanced goods rather than the market for them. In 2004, The EU-28 exported about 2.3% of high-tech products to China, while in 2014 the figure grew to 4.7% (goods originated mainly from the old EU member states). On the imports side, the share of China is considerably higher. Nearly 10% in 2004 and as much as 17.8% in 2014 of high-tech goods came from China. China became an important supplier of those goods to the new EU member states, which in 2004 imported 12.5% of all high-tech products from China only to increase this value to 25% in 2014.

Table 6. Balance of the European Union's foreign trade in high-tech products (in mln USD).

Group of countries	2004		2014	
	Total	With China	Total	With China
EU-28	-40 346.8	-44 526.3	-10 800.4	-104 093.6
EU-15	-23 587.7	-38 443.3	13 963.7	-77 547.7
EU-13	-16 759.0	-6 083.0	-24 764.1	-26 545.9

Source: UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.

In the light of the trends discussed earlier, it is hardly surprising that the balance of trade in high-tech products between the European Union and China was unfavorable (Table 6). In 2004, The EU-28 recorded a deficit in total foreign trade in high-tech goods at USD 40 bln, with USD 23.5 bln for the EU-15 and USD 16.8 bln for the EU-13. In 2014, the EU still ran a deficit in high-tech trade, but it was considerably smaller than in 2004 (USD 10.8 bln). The improvement was caused by a surplus achieved by the EU-15 countries in the trade in these products, as the new member states recorded an even higher deficit of USD 25 bln than in 2004.
The situation was far worse in trade with China. Both in the case of the old and the new EU member states, trade in high-tech products with China displayed a significant and still increasing advantage of imports over exports. In 2004, the EU-28 recorded a deficit of USD 44.5 bln, while in 2014 the deficit grew to reach USD 100 bln. The figures for EU-15 countries stood at USD 38 bln (2004) and USD 77.5 bln (2014), while for the EU-13 – USD 6 bln and USD 26.5 bln respectively.

3. Patterns of trade in high-tech goods between the European Union and China by groups of products
High-tech exports from the EU-28 to China were dominated by telecommunications and electronic equipment as well as aerospace products, while imports by computers, electronics, and telecommunications equipment (Table 7).

Table 7. Structure of the European Union's trade in high-tech products with China by groups of these products in 2004 and 2014 (w %).

Groups of high-tech products	2004						2014					
	Export			Import			Export			Import		
	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13
Aerospace	25.8	26.3	2.0	0.7	0.7	0.0	30.0	31.0	2.6	0.5	0.6	0.1
Computers office machines	5.1	5.1	4.1	50.9	52.0	41.9	3.4	2.9	16.0	41.0	41.9	37.1
Electronics, telecommunications	40.5	40.1	64.7	39.1	37.8	49.5	24.7	24.2	40.8	48.6	46.5	57.0
Pharmacy	1.6	1.6	3.3	0.7	0.8	0.3	7.1	7.3	1.7	1.3	1.5	0.4
Scientific instruments	14.1	14.2	8.7	2.4	2.4	1.9	21.4	21.2	26.2	3.5	3.8	2.0
Electrical machinery	2.8	2.8	3.7	5.0	5.0	4.9	2.0	2.0	1.8	3.6	3.9	2.4
Chemistry	1.2	1.1	3.8	1.1	1.1	1.4	3.2	3.3	1.0	1.1	1.2	0.5
Non-electrical machinery	8.8	8.8	9.7	0.1	0.1	0.1	8.2	8.1	9.9	0.6	0.6	0.4
Armament	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.

In 2004, the old EU member states sold mainly electronics and telecommunications goods (40% of high-tech exports), aerospace products (26%), and scientific instruments (14%) to China. In turn, the new EU countries supplied the Chinese market mainly with electronics and telecommunications equipment (nearly 65% of all technologically advanced products exported by them to China). In 2014, the EU-15 major high-tech exports to China were aerospace products (31%), electronics and telecommunications (24%), and scientific instruments (21%). The new member states still sold mainly electronics and telecommunications (40%), but also scientific instruments (26% of high-tech exports to China).

In 2004, the most important technologically advanced imports from China to both the old and new EU countries were: computers and office machines (apprx. 50%) and electronics and telecommunications (apprx. 40%). In 2014, the situation did not change significantly, apart from a slight shift involving an increase in the imports of electronics and telecommunications equipment (apprx. 49%) and a decrease in the imports of computers and office machines (apprx.41%).

It is also worthwhile to analyze China's share in the EU's foreign trade in high-tech goods by groups of products (Table 8).

Table 8. Share of China in the European Union's foreign trade in high-tech products by groups of these products in 2004 and 2014 (in %).

Groups of high-tech products	2004						2014					
	Share of China in exports of			Share of China in imports of			Share of China in exports of			Share of China in imports of		
	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13
Aerospace	4.97	5.02	0.56	0.75	0.77	0.05	7.80	7.94	1.11	0.68	0.68	0.50
Computers office machines	0.54	0.57	0.10	17.33	16.81	25.07	1.13	1.20	0.88	38.58	37.09	47.34
Electronics, telecommunications	2.67	2.87	0.80	10.75	10.50	12.60	4.26	5.01	1.19	25.56	24.73	28.73
Pharmacy	0.45	0.44	0.78	1.01	1.03	0.80	1.89	1.92	0.60	1.50	1.50	1.63
Scientific instruments	2.86	2.94	0.83	2.66	2.64	2.93	7.08	7.30	4.08	5.75	5.81	5.33
Electrical machinery	2.44	2.63	0.59	14.35	14.68	12.08	4.46	5.01	0.99	25.73	26.55	21.44
Chemistry	0.78	0.75	1.84	3.11	3.03	3.80	4.07	4.35	0.59	4.58	4.87	2.91
Non-electrical machinery	5.20	5.38	1.93	0.47	0.50	0.29	8.96	9.45	3.98	3.46	3.64	2.65
Armament	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.30	0.01	3.43	3.54	3.12
Total	2.33	2.44	0.65	9.95	9.71	12.48	4.63	5.02	1.42	17.77	16.57	25.15

Source: UN Comtrade, http://comtrade.un.org/data/ (20.01.2016), own calculations.

In 2004, The UE countries sold China about 2.3% of all high-tech products that they exported. China's largest share was in aerospace products (5%), electronics and telecommunications (2.7%), scientific instruments (2.9%), electrical machines (2.4%), and non-electrical machinery (5.2%). In 2014, China's share in the EU's high-tech exports increased to about 4.6% and it was the highest for non-electrical machinery (5.2%), aerospace products (7.8%), and scientific instruments (7.1%). It should also be noted that China was a much less significant market for the new EU countries, as, irrespective of the type of goods, China's share in their high-tech exports did not exceed 2% in 2004 and stood at about 4% in 2014.

The situation concerning imports was completely different. Taking into account the EU's high-tech import patterns, it should be emphasized that China is one of major suppliers of these technologically advanced products. In 2004, it supplied 17% of imported computers and office machines, 11% of electronics and telecommunications, and 14% of electronic machines. In 2014, its importance grew even further, since almost 40% (in the case of the new Member states nearly a half!) of all computers and office equipment and 25% of electronics, telecommunications, and electrical machines imported by the EU came from China.

Conclusion

The analysis of the data presented above allows for the formulation of the following conclusions:

1. The EU's and China's potentials in the high-tech sectors are slowly evening out. In 2004, R&D expenditures in China were markedly lower than in the EU-28 (they ranged from 1.22 to 1.23% of GDP depending on a source), but in 2013 they exceeded the EU spending in this area (2.03-2.08% compared to the UE-28's 1.91%). In 2013, China's R&D expenditures measured with PPP almost reached the EU-28 R&D spending, while exceeding total R&D outlays incurred by the old EU member states.
2. The distance between the EU-28 and China can be observed in the view of these expenditures. In the years 2000-2008, the number of high-tech patents granted by USPTO to the entities operating in China was markedly lower than the number of such patents obtained by the EU entities. However, the number for China grew, while the corresponding EU-28 values decreased.
3. Since 2009 China has been the leading world exporter and the second largest world importer. In 2014, it supplied the international market with about 22.5% of all high-tech products, while the 28 EU countries – with 26.4%.
4. There is a visible imbalance in the trade in high-tech products between China and the European Union. China is an important supplier of technologically advanced products for the European Union, but a much less important market for the EU high-tech goods. On the other hand, the markets of the EU countries are important destinations for Chinese high-tech exports, but considerably less important suppliers of such products to the Chinese market (although the EU-28 share in China's high-tech imports stood at 8% in 2014, while China's share in the EU' high-tech exports was merely 2.3%). Such a situation is reflected in a high and still growing deficit in the trade in high-tech products between the EU and China.
5. The following products held the dominant position in the trade in high-tech goods between the EU and China: telecommunications equipment, electronics, computers and office machines, scientific instruments, and aerospace products.
6. The calculations revealed that while in 2004 about 10% of all high-tech products imported to the EU came from China, in 2014 it was nearly 18%. In fact, China supplied almost 40% of computers and office machines and 25% of electronics, telecommunications equipment, and electrical machinery imported by the EU.

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