

COMPARISON OF THE STEEL DEMAND BETWEEN THE EUROPEAN UNION AND CHINA

Lenka FOJTÍKOVÁ

VSB-Technical University of Ostrava, Ostrava, Czech Republic, EU, lenka.fojtikova@vsb.cz

Abstract

The steel sector is important for the European Union industrial base. The paper is focused on the analysis of the steel demand in the European Union (EU) and China, the two main producers and traders in the world. Two methods are applied for this purpose. Firstly, the method of apparent steel use (ASU) per capita is used and then the method of true steel use (TSU) per capita will be applied. It presents the finding of steel production, steel trade as well as indirect steel trade in these countries. All these indicators are compared between the EU and China. The analysis confirms that while the economic growth and increase of income level in China contributed to increase of the steel demand in China in 2003-2012, the steel demand of the EU was negatively influenced by the world economic crisis. The results of the analysis are discussed and graphically presented.

Keywords: steel consumption, indirect trade in steel, anti-dumping measures, scrap industry

1. INTRODUCTION

Metal industries (the metallurgy of ferrous and non-ferrous metals) are considered the basic industries such as metal production is the first important upstream step in the value added chain of many industries producing investment goods such as mechanical engineering, automotive, shipbuilding, aerospace, construction industries, etc., but also consumer goods. From this point of view, metal industries occupy an important place in the industrial structure of most developed economies and in many rapidly growing developing economies.

The research object of the paper is to find the steel demand in the European Union (EU) and China per capita and to compare it in time. The analysis will be based on the delineation of the steel production in the EU and China, the calculation of apparent steel use and true steel use in both of them. This way, the paper brings a comparison of the EU steel demand with China in the period of 2003-2012. The structure of the article is as follows. Firstly, the methodological access of the concept of the steel demand will be introduced and subsequently the analysis of the steel demand in the EU and China will be performed. Discussion will be focused on some economic, social and ecological issues that are connected with steel production. The conclusion summarizes the main trends in the steel production and trade in the EU and China and mentions some effects on the EU and its member states in the future.

2. DEFINITION AND MEASURING OF THE STEEL DEMAND

The demand for steel is defined as the quantity of steel products that users are willing and able to buy at a given price over a given period in a certain country or region. Steel purchases contribute to the demand irrespective of whether the purchase is for stockholding or manufacturing. The amount of steel consumed in an economy is mainly linked to two factors: on the one hand, the importance of the industry sector and its structure, on the other hand the income of its population and its demand for steel intensive products such as machines, transport equipment, cars, etc. These factors are unique to each country and variable in time depending on the economic development and the growth of welfare. Döhrn and Krätschell analyzed steel consumption per head between countries and identified the driving factors of global steel production. They confirm that the steel demand will increase relative to economic activity, with rising living standards, but it will decline when the income surpasses a level at which the consumer's preferences shift towards services.

Another factor influencing steel consumption that they identified is the share of investment in GDP. [1] Guaraná, J., Molajoni, P. and Szewczyk, A. analyzed Brazilian indirect trade in steel and describe it with the economic development of Brazil in the period from 1968 to 2012. They also focus on indirect trade in steel by regions and by sectors and document that the composition of indirect imports of steel was changed in time. The expansion of the middle class and the rise in the household income led to an increase of Brazilian imports in the automotive sector. [2]

2.1 Methods of measuring the steel demand

There are several methods of measuring the steel demand. One of the most often used is apparent steel use (ASU), which is expressed in volume terms as deliveries minus net exports of steel industry goods. [3] The metric ton (Mt) is used as a unit of measurement.

$$ASU = D - NEx \quad (1)$$

Where D represents deliveries and NEx are net exports of steel industry goods (export minus import). ASU takes into account only the impact of direct trade in steel products in estimating the steel use of a country and it does not take into account the part of steel used through the imports (exports) of steel containing goods.

This method takes into account the trade of steel products in estimating the steel demand, but it does not consider trade in steel embedded in different industrial products such as cars, ships, machines, white goods, etc. The trade with these products is called indirect trade in steel and covers exports and imports of goods which contain steel. To calculate the indirect trade in steel, it is necessary to estimate how much steel is used in each manufactured product. This is called a steel coefficient. According to WSA methodology, the steel coefficient is the amount of finished steel products in tons that is needed to produce one ton of a manufactured product. [1]

A concept called true steel use (TSU) was developed for better understanding of the factors affecting a country steel demand and is obtained by deducting net indirect exports of steel (NIEx) from ASU. [3] TSU can be expressed in finished steel products or the crude steel equivalent.

$$TSU = ASU - NIEx \quad (2)$$

The concept of TSU offers several uses. Besides the fact that TSU gives us a better picture of the steel demand in a country than ASU, it also more closely correlates with macroeconomic indicators like GDP, industrial production and gross fixed capital formation. The combination of TSU and macroeconomic indicators can improve predicting the results of the steel demand in the medium and long term. TSU is also important when comparing steel use among countries and gives a clearer view of steel consumption and the industries in which a country specializes. It also better indicates the scrap availability of a country in the future.

The data used for the calculation of steel consumption were taken from the World Steel Association and the International Steel Statistics Bureau (ISSB). The data about the population in the EU and China in 2003-2012 were obtained from the database of the United Nations Conference on Trade and Development (UNCTAD). The data about the EU include 27 member countries (all EU member countries without Croatia).

3. STEEL DEMAND AND TRADE IN THE EUROPEAN UNION AND CHINA

Crude steel represents one of the most important sources of material that is needed for the production of some merchandise like cars, machines, engineering products, etc. in developed as well as developing countries. The rapid economic growth in some regions like China, Brazil, India and Russia (BRIC) led to the increase of the demand for merchandise products of which some are dependent on steel deliveries. It increased the demand for crude steel in the world and contributed to the increase of the price of crude steel in the world market. Statistics confirm that the leading producer of crude steel is China, whose share in the world steel production reached more than 46% in 2012. China also takes the first position among the leading steel

exporters. More than half of the world crude steel exports in 2012 were carried out by China. The European Union is the second leading producer and importer of crude steel in the world when we exclude intra-EU trade. [4] Taking into account the fact that most of the EU member countries are energetically dependent on the deliveries of oil and gas from the third countries, they have to innovate steel production and to invest in new modern technology. But the production of crude steel also has unecological aspect. In order to lower the cost of production, developed countries relocated the production of crude steel to developing countries where there do not exist such strong environmental standards and environmental policies as in their home countries.

3.1 Comparison of crude steel production between the EU and China

From 2003 to 2012, the crude steel production in the EU declined by 14%, from 193 mil. Mt to 169 mil. Mt. Although in the first years the EU recorded surpluses, the decline of steel production started in 2008 and continued in 2009. The financial and economic crisis in the world was the main reason of this decline because the consumption of industrial products declined worldwide and it showed negatively on the demand for steel. [5] In the EU, the demand for steel is created by the economic and financial situation of only several industrial sectors using steel. For example, the share of the construction and car industries in the total steel demand is about 40%. The prosperity of steel is also strongly dependent on engineering, electrotechnical and electronic industries. [6] The financial crisis hit all of these sectors. The EU's steel production again started to increase in 2010, but it has not achieved the pre-crisis level yet. On the other hand, the economic crisis did not influence the steel production in China. China's steel production increased more than three times during 2003-2012, from 222 mil. Mt to almost 717 mil. Mt and was growing all the time (see Fig. 1).

In the EU, the main producers of steel are concentrated into three countries - Germany, Italy and France. They share in the total EU steel production by more than one half. These countries have a strong industrial history and companies like Thyssenkrupp or Gruppo Riva, which belong to the biggest steel companies in the world, are situated on their territories.

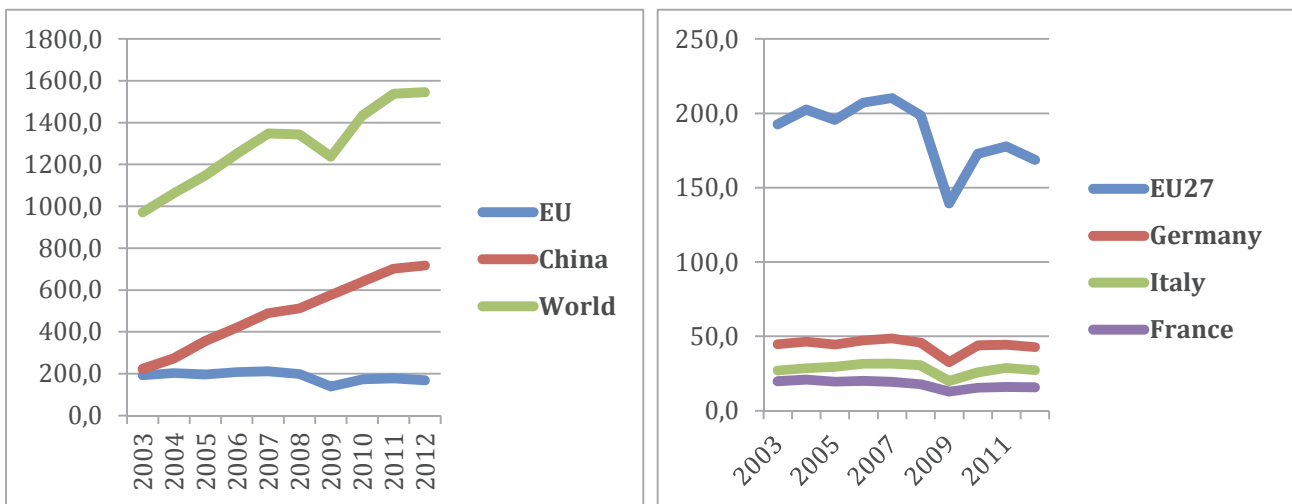


Fig. 1 Production of crude steel in the EU and China, 2003-2012 (million Mt) (own data processing, [6])

3.2 Comparison of steel trade in the EU and China

The second component of the steel demand is trade. Fig. 2 shows the development of steel exports and imports in the EU (the graph on the left side) and in China (the graph on the right side) in the period of 2003-2012. In this period, the EU usually achieved a positive trade balance in trade in steel. Only three years were

exceptions - 2006, 2007 and 2008, in which the EU imported more finished steel products than it exported. The EU recorded the highest trade surplus in steel in 2012 in the amount of 16.8 mil. Mt. The total turnover of the EU's steel trade reached 262.8 mil. Mt in the same period. The largest EU trade steel exporters are Germany, Italy, France, Belgium, the Netherlands, Spain, the United Kingdom, etc. China recorded a negative trade balance in 2003 and 2004. But in the following years China recorded growing trade surpluses. In 2012, the trade surplus in steel trade reached 40.6 mil. Mt, whereas the total turnover of China's steel trade reached 68.9 mil. Mt. From the comparison of these results between the EU and China in the period of 2003-2012 it is obvious that the EU reached an average annual turnover of steel trade (export + import) of almost 278 mil. Mt and China only 62 mil. Mt. But China was able to achieve higher trade surpluses than the EU. For example, China's trade surplus in steel was more than two times higher than the EU's trade surplus in 2012. It is also important to note that the data about the EU steel trade in **Fig. 2** include intra-regional trade (intra-EU trade) and in this case the volume of the total EU steel trade is bigger than China's steel trade. The membership of China in the World Trade Organization (WTO) also contributed to this development. China has been a member of this international organization since 2001 and although it had to make some commitments to trade liberalization and multilateral obligations, it opened the door to the market of more than 150 countries in the world. [7]

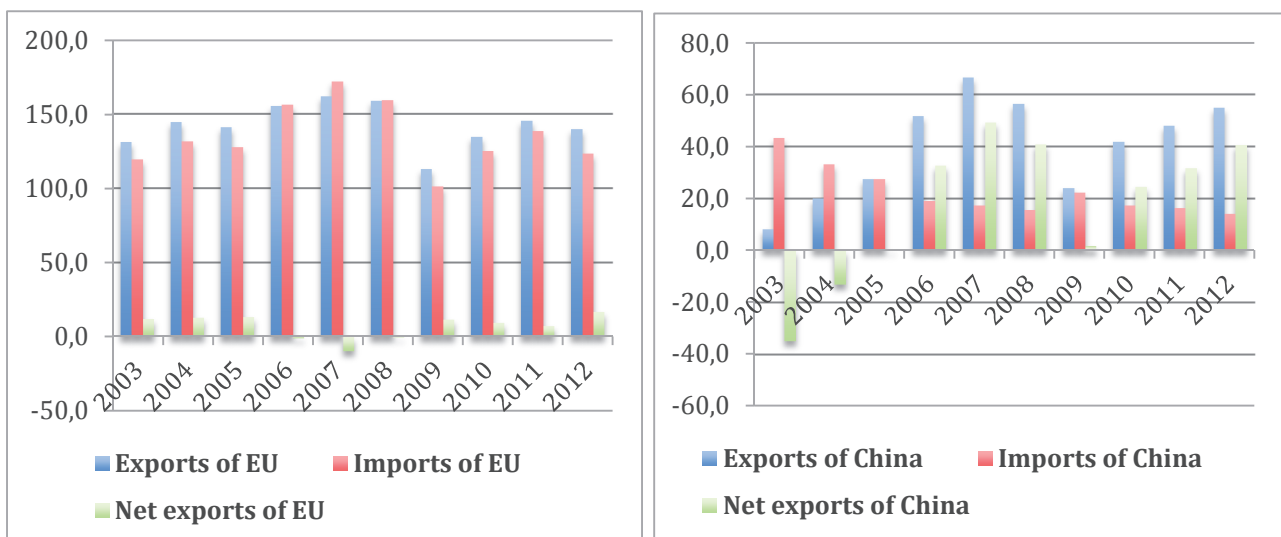


Fig. 2 Exports and imports of steel products of the EU and China, 2003-2012 (million Mt) (own data processing, [6])

Currently, the world steel industry registers a surplus capacity in the amount of about 542 mil. tons, from which almost 200 mil. tons come from China. In the EU the excess capacity of steel production is estimated at about 80 mil. tons. [8] This situation in the world steel market often leads to introducing some protectionist practices (such as export limitation, export duty on materials, license regimes, etc.) in international trade that are usually solved by the WTO. According to the last trade defense statistics that were published by the European Commission, in the period of 2009 to 2013, 25 new investigations in the iron and steel sector were initiated. They were mainly connected with anti-dumping measures. [9] Most often the participants of these trade disputes were China, India, Ukraine, Russia, Turkey, etc. The EU submitted two complaints to China. On the other hand, three countries (Brazil, India and China) accused the EU of dumping in exporting steel products and the USA applies provisional safeguard measures to the imports of certain steel products from the EU. [10] The steel sector in the EU represents one of the sensitive areas and the import of steel products from the third countries is subject to quantitative restrictions. For this purpose there is an integrated electronic network known

as SIGL (Système Intégré de Gestion de Licences), which is a computer system linking the European Commission to the departments issuing import authorizations in the EU member states.

4. RESULTS AND DISCUSSION

Using formula (1) we got results about the steel demand in the form of apparent steel use in the EU and China. Taking into consideration the total population of these countries, we got apparent steel use per capita. The results (that are derived from deliveries and direct trade in steel) confirmed the position of China as the leading producer and exporter of steel in the world. While the consumption of finished steel products in the EU reached almost 300 kilograms per head in 2012, it was more than 499 kilograms in China in the same period. It confirms the theoretical assumption that the increasing incomes of people in „emerging economies“ lead to the growth of steel consumption. The consumption of finished steel products in China increased 2.5 times during the last ten years (see **Table 1**). Steel is a raw material that is used for the production of steel products like tubes, pipes, tanks, containers, etc., but also for the production of other industrial products like cars, machines, etc. that are not included in ASU. For this reason, formula (2) was used and the steel demand called TSU was calculated. The results of TSU give a clearer view of the steel consumption pattern and the industries in which the countries specialize. Indirect trade that is included into this indicator lowers the level of the steel demand in both countries (see **Table 1**).

Table 7 Apparent Steel Use and True Steel Use per capita in the EU and China, 2003-2012 (kg per capita)
 (own calculation, [6, 9])

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ASUEU	368	384	368	419	441	398	254	324	337	300
ASUCH	201	222	275	298	336	357	433	460	498	499
TSUEU	350	376	353	406	435	388	240	313	327	280
TSUCH	193	212	261	278	309	325	398	433	461	457

Indirect steel trade also has an implication for the future. It is possible to estimate the future scrap availability of a country, because the steel indirectly exported is no longer available for recycling at the end of its life. The scrap industry has economical as well as ecological aspects. Now, the EU steel industry and the domestic scrap sector count 710 thousand workers. [10] Increasing the share of steel produced from scrap will create more EU jobs by the substitution of imported iron ore and coal by domestic scrap and improve the EU balance of trade. The production of scrap from steel scrap contributes to lowering energy consumption by 75% and saves about 90% of entrance sources. From the environmental point of view, the production of scrap brings a lower devastation of air, consumption of water and also a lower contamination of water. [11, 12]

CONCLUSION

The analysis of the steel demand showed an increase of the world steel production in 2003-2012 by 37%, from 971 mil. Mt to 1 543 mil. Mt. China and the EU are the main steel producers and traders in the world. The comparison of the steel production of the EU and China showed an increase of steel production by 31 % in China, from 222 mil. Mt to 717 mil. Mt, and a decline of steel production by 14%, from 192 mil. Mt to 169 mil. Mt, in the EU during the following period. When comparing the steel trade in the EU and China, it is important to note that there are big differences in data if the intra-EU steel trade is taken into account or only the extra-

EU steel trade. The results showed that although the EU achieved average annual surpluses in steel trade of 7 mil. Mt, in China the average annual trade surpluses were 17 mil. Mt. While the EU steel trade was negatively influenced by the world financial and economic crisis, China gradually changed its trade deficit of 35 mil. Mt in 2003 to a trade surplus of 41 mil. Mt in 2012. Generally, the economic crisis affected the EU's steel demand (apparent steel use as well as true steel use) that was lower than in China. The steel demand expressed in TSU was lower than ASU in both countries all the time. It indicates that net indirect steel export improves trade balance but on the other hand it decreases the steel demand and it also has effects on scrap industry in these countries.

REFERENCES

- [1] DÖHRN, R., KRÄTSCHHELL. *Long Term Trends in Steel Consumption*. Ruhr Economic Papers. Working paper, RUHR. [Online], [cit. 2. 2. 2014]. See from http://www.rwi-essen.de/media/content/pages/publikationen/ruhr-economic-papers/REP_13_415.pdf
- [2] GUARANÁ, J., MOLAJONI, P., SZEWCZYK, A. *Brazilian Indirect Trade in Steel in 1970-2011*. Working paper, World Trade Association. [Online], [cit. 2. 2. 2014]. See from http://www.worldsteel.org/dms/internetDocumentList/working-papers/Indirect_trade_longer_series_Brazil_2013_11_08ver2/document/Brazilian%20indirect%20trade%20in%20steel,%201970%20-%202011.pdf
- [3] MOLAJONI, P., SZEWCZYK, A. *Indirect Trade in Steel: Definitions, methodology and applications*. Working paper, World Trade Association. [Online], [cit. 6. 2. 2014]. See from <http://www.worldsteel.org/dms/internetDocumentList/working-papers/Indirect-trade/document/Indirect%20trade.pdf>
- [4] INTERNATIONAL STEEL STATISTICS BUREAU. [Online]. See from <http://www.issb.co.uk>
- [5] WORLD STEEL ASSOCIATION. *21st century Steel*. 2008-2009 update. [Online], [cit. 10. 2. 2014]. See from <http://www.worldsteel.org/dms/internetDocumentList/bookshop/21st-century-steel/document/21st%20century%20steel.pdf>
- [6] WORLD STEEL ASSOCIATION. *Steel Statistical Yearbook 2013*. [Online], [cit. 11. 2. 2014]. See from http://www.worldsteel.org/dms/internetDocumentList/bookshop/SSY_2013/document/Steel%20Statistical%20Yearbook%202013.pdf
- [7] FOJTÍKOVÁ, L. China's External Trade after Its Entrance into the WTO with the Impact on the EU. *Proceedings of the 1st International Conference on European Integration 2012*, ICEI 2012, pp. 56-65.
- [8] EFR - The European Ferrous Recovery and Recycling Association. *Implications of the EU Steel Action Plan and other EU initiatives for Steel scrap production and trade*. [Online], [cit. 12. 2. 2014]. See from http://www.efr2.org/html/downloads/implications_of_the_EU_steel_action_plan.pdf
- [9] UNCTAD. *Statistics. Population*. [Online], [cit. 12. 2. 2014]. See from <http://unctadstat.unctad.org/TableView/tableView.aspx>
- [10] EUROPEAN COMMISSION. Trade. *Antidumping, Antisubsidy and Safeguards*. [Online], [cit. 15. 2. 2014]. See from http://trade.ec.europa.eu/doclib/docs/2013/august/tradoc_151694.pdf
- [11] WTO. Dispute settlement. *The Disputes*. [Online], [cit. 20. 2. 2014]. See from http://www.wto.org/english/tratop_e/dispu_e/find_dispu_cases_e.htm#results
- [12] EURLex. Sdělení Komise Evropskému parlamentu, Radě, Evropskému hospodářskému a sociálnímu výboru a Výboru region. *Akční plan pro konkurenceschopné a udržitelné hospodářství v Evropě*. [Online], [cit. 22. 2. 2014]. See from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0407:FIN:CS:HTML>
- [13] WORLD STEEL ASSOCIATION. *Steel's Contribution to a Low Carbon Future*. Worldsteel position paper. [Online], [cit. 22. 2. 2014]. See from <http://www.worldsteel.org/dms/internetDocumentList/press-release-downloads/2013/Steel-s-Contribution-to-a-Low-Carbon-Future/document/Steel's%20Contribution%20to%20a%20Low%20Carbon%20Future.pdf>