Master Thesis

The effect of overcapacity in steel industry on antidumping actions against China

August 2018

Graduate School of International Studies
Seoul National University
International Commerce Major
Huynh Thi Kieu Trang

The effect of overcapacity in steel industry on antidumping actions against China

Thesis Advisor: Prof. Ahn Dukgeun

Submitting a master's thesis of International Studies

August 2018

Graduate School of International Studies

Seoul National University

International Commerce Major

Huynh Thi Kieu Trang

Confirming the master's thesis written by

Huynh Thi Kieu Trang

August 2018

Chair: Prof. Kim Chong-Sup

Vice Chair: Prof. Rhee Yeongseop

Examiner: Prof. Rhee Ahn Dukgeun

Abstract

This paper presents an empirical study on the impact of the world overcapacity in the steel industry on antidumping (AD) actions against China. The study aims to analyse this effect since the 2000s when China tremendously expands its steelmaking capacity which is believed to negatively cause a considerable increase in the world unutilized capacity or overcapacity. It finds that there is a positive and significant relationship between the volume of steel excess capacity and the number of AD actions against China in this sector. The study further analyses this the linkage in different angles including development level of countries and combining with free trade agreement (FTA) effect. The result reveals that industrializing countries shows a more statistically significant evidence in terms of being more sensitive to file AD actions against China than developed counterparts. However, the imbalanced division of the data into two groups may affect this result. Moreover, China non-FTA partners show statistically significant effect while FTA partners seem to be more cautious to take AD actions against China with less statistical significance results. The study ends with some policy recommendations to reduce the China's rampant expansion in the steel industry and suggestions to enhance the effectiveness of AD under the WTO to deal with this problem.

Keywords: anti-dumping, overcapacity/excess capacity, steel industry, against China.
Student ID.: 2016-23538

중국산 철강 반덤핑 정책에 대한 철강 분야에서 과잉 생산력의 영향

본 논문은 주로 세계 철강산업에서 생산력 광잉이 중국의 덤핑 활동 (AD)에 대해 준 영향을 연구한다. 연구 기간은 중국에서 철강 생산력을 광범위와 급속도로 확대시키기 시작하였던 2000년대부터이다. 중국이 철강 생산력을 확대함에 따라, 세계 여러 나라의 철강 생산력이 상당히 큰 영향을 받았으며, 과잉 생산력으로 되어 버렸다. 본 연구에서 철강 생산능력 과잉과 중국의 덤핑에 대한 반 덤핑 활동 간에 상관성이 있으며 유기적인 관계인 것으로 보여 준다. 또한, 본 논문에서는 철강 생산력 과잉의 영향을 받고 있는 나라들의 발전 속도.정도나 자유무역협상(FTA)의 영향까지를 포함하여 다양한 측면에서 그 관계를 살펴보기로 시도해 보았다. 연구 결과에 따르면, 개발도상국들은 선진국들보다 훨씬더 많은 영향을 받고, 중국 덤핑 활동을 대응하는 데에 있어 더 예민하고 적극적인 것으로 결론을 내릴 수 있다. 그러나, 개발도상국과 선진국 2 가지 블록에 국가의 개수가 다르므로 그러한 연구 결과를 가져다 줬을 것이라는 가능성을 완전히 배제할 수도 없다. 그외에, 또 다른 연구 결과로 중국과 FTA 파트너가 아닌 국가들은 여러 반 덤핑 활동과 정책을 적극적으로 진행하고 있는 반면, 중국과 FTA 파트너인 국가들은 이에 대한 조심스러운 조치를 취하는 모습을 드러낸 것이다. 마지막으로 본 논문은 중국에서 철강 생산력 확대를 줄이고, WTO에서 규정한 반 덤핑 정책들의 효과를 높이도록 몇 가지 제안을 제기하면서 글의 끝을 맺었다.

키워드: 반덤핑, WTO, 중국산 철강, 철강 과잉 생산력

학생번호: 2016-23538

Contents

ABBREVIATIONS

AD	Anti-dumping
ADA	Anti-dumping Agreement
ASEAN	Association of Southeast Asian Nations
EC	European Community
EU	European Union
FTA	Free Trade Agreement
GATT	General Agreement on Tariffs and Trade
IMF	International Monetary Fund
OECD	Organisation for Economic Co-operation and Development
SOEs	State-own enterprises
UN	United Nations
US	United States
WTO	World Trade Organization

List of figures

List of tables

Chapter 1. Introduction

1.1. Background of the study

The world is experiencing another return of global steel crisis which is claimed to be the most alarming predicament since 1986. The enormous expansion in steelmaking capacity triggers trade friction among countries and escalates the growing trend of protectionism. For instance, at the writing of this study, President Donald Trump has passed an import restriction measure up to 25 percent tariff against steel import. This action causes huge controversy within the United States (US) and impacts its trade relation with other countries as well as poses a far-reaching impact on the stability of the World Trade Organization (WTO). Importantly, it is worth mentioning that most of countries have long embraced implicit protectionism in steel industry, commonly under the form of antidumping (AD) actions to counteract the issue. At the same time, China has drawn a lot of attention due to its enormous expansion in steelmaking capacity, accounting for the lion share of that of the world. To illustrate, figure 1.1 shows that the constant increase in steelmaking capacity in China goes hand in hand with the general rise in the number of AD actions against the country in this sector since the 2000s. China's dramatic increase in steel production is believed to cause a lot of troubles to other steel producing countries who have been dampened their capacity operation resulting in unutilized capacity (overcapacity). Being drawn by these two globally debated issues of steel overcapacity and AD actions against China,

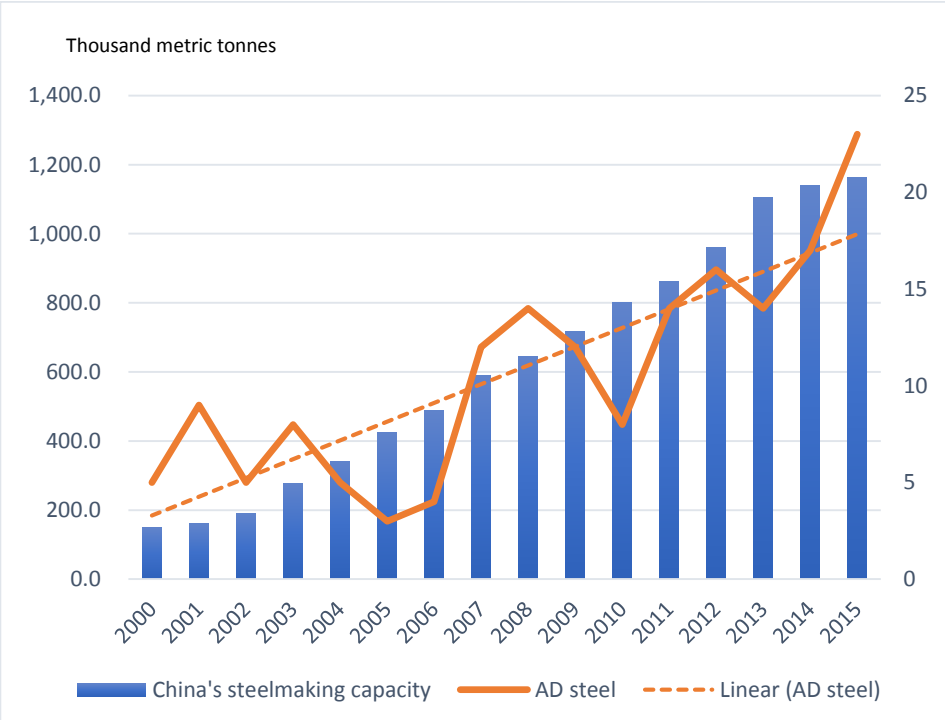
I am passionate in dissecting the linkage between them by conducting an empirical study to understand more about the issue.

Basically, the effect of excess capacity in steel on causing trade friction among steel producers is observable and is documented by many articles including both daily news and academic studies. However, it becomes challenging to find an empirical study applying econometric model and aggregate data to compute and analyse the relationship to substantiate this common belief. This is where my research comes in. The rationale is synthetized by several striking facts. Firstly, AD has been the most popular trade remedy action employed by member countries since the establishment of the WTO, much far exceeds safeguard and countervailing duties. Secondly, steel sector belongs to the most disputed product group subjected to AD investigation. This fact pops a question of why is steel severely subject to AD actions? Meanwhile, the world economy is witnessing an immense volume of steel overcapacity. As being demonstrated in figure 1.2, despite being relatively fluctuated over the timeframe, the amount of overcapacity experienced a considerably upward trend. Simultaneously, this accompanied with the gradual increase in the number of AD actions against China (except the 3-year period after the global financial crisis).

Connecting the dots, it would be plausible to ask does overcapacity in steel industry significantly leads to the increase in AD actions against the country when putting together with other important factors? This study aims at filling the gap in current literature on this issue. In short, my assumption is that if a country faces steel overcapacity, it will be more likely to conduct AD actions against steel products

imported from China. The proceeding sessions will elucidate steps toward solving this research question.

Figure 1. 1 China steelmaking capacity and AD action against it



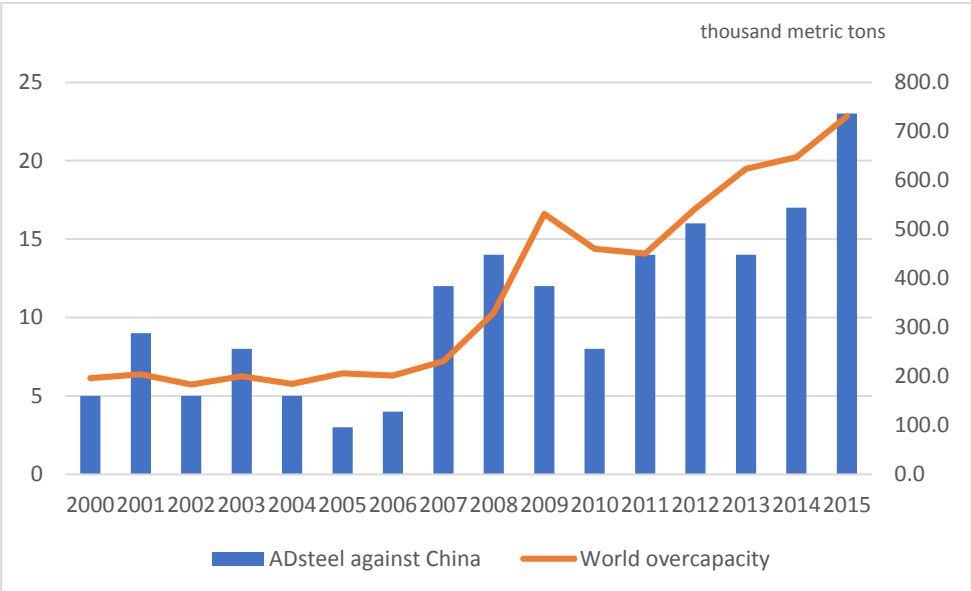
Source: Author composed from data of OECD and World Bank antidumping database

1.2. Literature review

1.2.1. Studies on overcapacity in the steel industry

Regrading studies on overcapacity (excess capacity) in the steel industry, there are several important works. Firstly, OECD is most enthusiastic in studying about this industry when it provides a database on steelmaking capacity of almost all countries, including OECD and non-OECD members. Besides, there is another study of OECD (2015), measuring capacity in steel development in the world. This study emphasizes

Figure 1. 2 World steel overcapacity and AD action against China in steel industry (2000-2015)



Source: Author composed from data of OECD and World Bank antidumping database

its purpose is to help provide knowledge and information to response to the issue of excess capacity. It concludes that despite the shrinking demand, the world steel overcapacity is likely to continue with most of the increase attributed by non-OECD countries. At the same time, the organization further conducted another study about global steel overcapacity and provides some policies for new investing project. Another informative research is of Brun (2016). He conducted a very comprehensive study on overcapacity in steel with a special focus on the case of China. He provided causes and consequences as well as suggested crucial policies to solve this problem. In terms of regional distribution of steel overcapacity, there is an interesting study of Kawabata (2017). He carefully estimates the volume of excess capacity in China and several other countries and regions.

1.2.2. Studies on AD actions on the steel industry

At a glance, the displaced production from import urges the governments to take certain actions and interventions to protect threatened domestic industries. For instance, according to Brun (2016) during the steel crisis happened from 1997 to 2002 period, trade measures against East Asian and Former Soviet Union (FSU) countries were significantly increased, when the US, EU, Canada, and Mexico were the major users of AD and countervailing duty cases. In 2002, President George W. Bush agreed to impose a 30 percent tariff on some certain steel imports based on a calculation by the United States International Trade Commission (USITC) that determined serious injury suffered by the domestic industry. Additionally, in 2015, there were considerably 145 new trade restrictive measures conducted by G-20 nations, an average of 20 cases per month, most of them are in the metals industry. Also, U.S. Commerce recorded that in August 2016 there were 161 AD and countervailing duty cases on steel products have currently been enacted. That is because overcapacity in the steel industry has caused significant problems such as low prices, weak profitability, bankruptcies, job losses at industrial and national level. The most recent action is from President Donald J. Trump's decision of imposing 25 percent tariff on steel import from other countries in early of 2018, which directly targets Chinese steel producers. In the case of China, trade friction with other countries is the most prominent impact of its rampant expansion in steelmaking capacity. It is understandable when China's export surges leading to lower prices and the loss of market share for import-competing domestic producers who will eventually act for the sake of their survival. More importantly, the

country has long been blamed for its economic system which grants a lot unfair benefits to domestic producers.

Besides, there have been several important studies about AD actions in the steel industry. One of the early attempts is of Gene M. Grossman (1985) who did a study to examine whether the imports of steel was the most important cause of injury to a U.S steel industry. The conclusion of Gene's study was contradicting to the claims of the Bethlehem Steel Corporation and the US in their petition to the ITC (International Trade Commission), imports were not the most significant cause of injury to the U.S. steel industry. However, the author also emphasized that the period of the study played a crucial role in determining this effect. He holds that other considerations of secular decline of the industry and the changes in exchange rates should be considered. Besides, Robert W. Staiger (1994) who tried to estimate the trade impact of U.S antidumping law and the determinants of suit filing activity during the period 1980-1985. He concluded that substantial trade restriction was encountered with the investigation and suspension effect but not related to withdrawal effect. Though the study does not directly relate to AD actions in the steel industry, it focuses on manufacturing products and provides an insight that AD action or investigation can be abused for the sake of trade restriction, sending signals that can threaten partner country to voluntarily dampen their export. More recent studies include Benjamin H. Liebman (2006) which touched upon the effect of safeguards on steel prices imposed in 2002 in the US. The study pointed out that the improvement of U.S. steel market is largely due to the decline in production capacity, improved macroeconomic conditions and a falling dollar rather than the safeguards measures. Furthermore, it also

mentioned that China's steel import from the US during this period also helped to revive the U.S. steel market. Lastly, Rachel Tang (2010) conducted a study on the impact of China's steel industry on the US. The research directly addressed the concerns of China's steel expansion capacity, which were deemed to be unfairly intervened by its government, on the U.S. steel industry. It stated that more trade remedies were increasingly used in the US against China, including AD and countervailing cases. All in all, the existing studies focus largely on the case of the U.S. antidumping law and its steel industry, and some of them address the impact of China's steel export on causing injury to other trading partners. They also focus mainly on a surge in import from other countries and fluctuations in macro-factors as the motivations for AD actions. However, as we can see, there has been no study aimed at addressing the effect of overcapacity on AD actions in steel sector. At the same, it is also acknowledged that overcapacity in a country can be caused by the surge of import from foreign countries. Yet, it can also stem from a considerable increase in production capacity of the domestic industry. The latter case is considered to be more suitable to explain the current situation. Hence, its effect might not be identical to import volume soar and therefore deserves an independent study. Up to this time, there is also no existing research directly works on the linkage between excess capacity in the steel industry having an impact on AD actions.

1.3. Significance of the study

The study can make contribution in several aspects. First, it attempts to seek for the missing piece of the existing literature, as an empirical as well as a case study to testify

and strengthen the prevalent conception regarding how overcapacity in steel can affect AD actions. Second, its econometric model is expected to generalize the pattern and pave the way for future prediction if the present scenario keeps going. Third, despite its specification, the study can capture the on-going trends of the world steel industry dynamics, AD actions and the issue of protectionism under international trade. Lastly, its conclusion and implications could suggest timely policies to curb the situation at industrial and national level.

1.4. Research question and methodology

The main question of this research is whether overcapacity significantly motivates more AD actions against China in the steel sector. Accordingly, the research starts at studying factors influencing AD filing in the steel industry which have been conducted by previous studies, and proceeds to include a new factor that is steel excess capacity. Subsequently, an econometric model will be built to test the research's hypotheses. In this case, Panel data regression will be applied as an analysing tool after relevant data are collected. In short, the study aims to analysing 3 hypotheses:

H1: An increase overcapacity leads to more AD actions against China in the steel industry.

H2: This relationship is more observable in developing countries than in developed countries.

H3: Free trade agreement (FTA) between China and its partner countries would reduce this effect.

1.5. Structure of the paper

The following chapter provides an overview of the development of the steel production capacity in the world and in China. Chapter III briefly presents the AD under the WTO. Chapter IV reviews existing literature about steel overcapacity as well as protectionism in the steel industry. Chapter V explains econometric models and empirical results. Finally, chapter VI closes my study with a conclusion and policy implications.

Chapter 2. Capacity development in steel industry

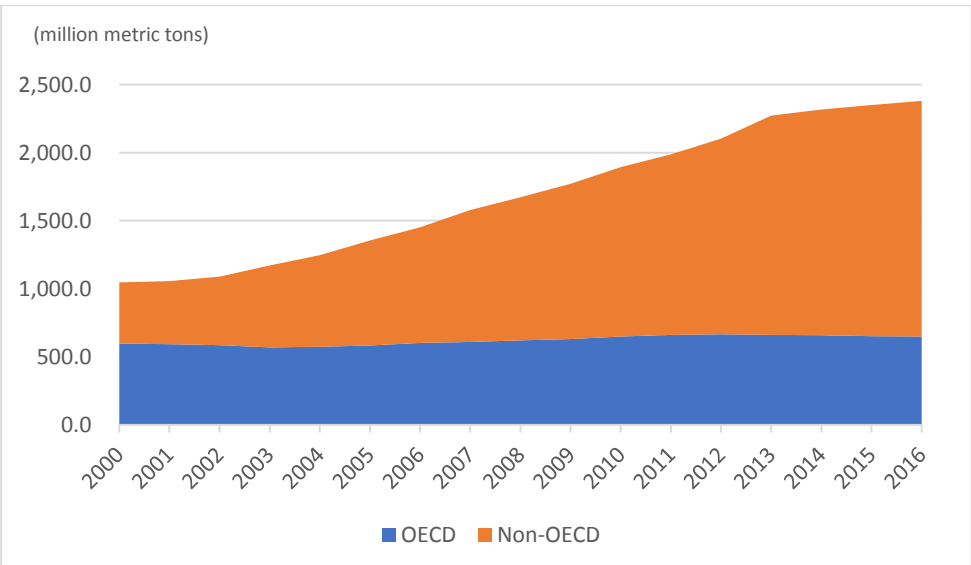
2.1 Steelmaking capacity development in the world

According to the World Steel Association (WSA), steel became increasingly popular since nineteenth century when industrial revolution happened in Europe and North America. However, steelmaking production has been practiced long time ago. China and India ancient people are said to be one of the first steel makers. Nevertheless, it is not until the past 200 years that science paved the ways for extraordinary technological improvements and made large -scale production possible. By the end of the early 20th century, steel became the core material to build the modern world. While mini mills were emerging in the US and Europe, Asia saw enormous innovations in production scale. For example, Japan pursued galloped growth in the 1960s and 1970s, closely followed by South Korea, gradually developed massive modern steelmaking facilities. They generated flat products from coils to coated and galvanized sheets with high quality, supplied for sectors such as automotive and manufacturing. Recently, the domination in the steel industry belongs to major players from emerging economies who need a great amount of steel for urbanization and industrialization. This changes completely the picture of the 1960s when the US, western European countries and Japan made up more than haft of the total steel production in the world. By 2000, it went down to around 43.8 percent. This trend has been vigorously furthered since the 2000s by the wave of China and from 2011 by emerging countries who currently take a share of more than 70 percent of steel use and production. The involvement of new

players such as India and ASEAN member countries and the Middle East and North African economies is expected to strengthen the tendency.

In this part, I attempt to provide some key facts about capacity developments in the world steel industry, which are intensively studied in the recent report conducted by Secretariat of the OECD Steel Committee. Probably, the most striking fact is that during the last 15 years, the global steel industry's capacity has increased more than doubled, from 1.05 billion metric tonnes in 2000 to 2.39 billion metric tonnes in 2016. Most of the increase is exclusively originated from non-OECD countries (figure 2.1). More importantly, despite the shrinking world's steel demand started since 2015, it is predicted that the world steel-making capacity will keep expanding in coming years. Particularly, the expected

Figure 2. 1 World crude steelmaking capacity



Source: Author computed from OECD database and WSA

steelmaking capacity additions will go up to reach 40 million metric tonnes during the three-year period of 2017-19. This increase is due to new investment projects in some regions such as the Middle East and some Asian economies.

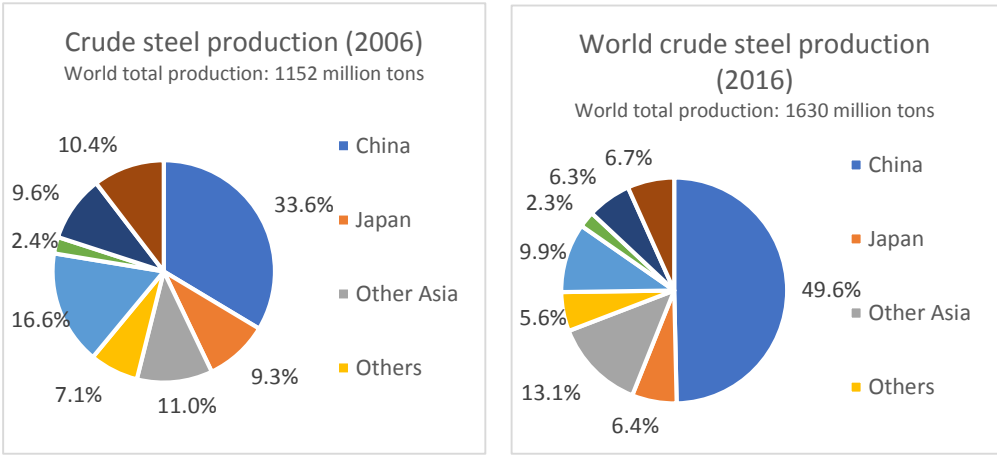
In the Middle East, the steelmaking capacity of the region is forecast to surge in the next five years. That is mainly caused by the huge demand of the region with investments in steelworks and greenfield steelmaking facilities. On the other side, in Asia, the picture is slightly different. While the steelmaking capacity has been mostly driven by China in the past, other emerging producers will play a bigger role in expanding this region's industry. The reason is that Chinese government has imposed some policies aiming to reduce steelmaking capacity that results in some permanent closures and a halt in future investment. By contrast, India and ASEAN become the game changers. Steelmaking capacity in India has increased by the rate of 56 million tonnes per year over past ten years to reach a much higher rate in recent years, especially 125.8 million tonnes per year in 2016. Most of this addition is from brownfield projects, expanding on the existing steelmaking facilities. In comparison, ASEAN region experiences more humble growth with a space of 56.7 tonnes per year in 2016. Other regions are less expansive with the rate of 35.3 million tonnes in 2016 as in Africa, or just 0.6 million tonnes per year in NAFTA and no capacity addition or even showing a declining steelmaking capacity as in European Union.

In short, in terms of the regional distribution of capacity increase, Asia makes up 70 percent of the growth. India is currently the largest contributor, followed by China. Regarding the rate of the increase, the Middle East is noticeable at 31.2 percent, followed by India with 28.5 percent. Moreover, India and the Middle East are rising

in capital investment, while large-scale construction projects in China and ASEAN are also conducted but with a less intensive rate.

China is a striking case worth mentioning about the country distribution of steel production (Figure 2.2). The country's crude steel production increased dramatically during the last decade, maintaining its leadership in this sector. For example, in 2006 it counted for around 34 percent of the world total production. This number is, however, surged to almost half of the world production (49.6 percent) in 2016. The unprecedented surge in Chinese steelmaking capacity results from gigantic government ownership and control over the steel industry. According to the OECD, China's government has ownerships of 18 out of 20 largest Chinese steel producers.

Figure 2. 2 World crude steel production distribution (2006, 2016)



Source: World Steel Association

2.2 Steelmaking capacity in China

The steel industry symbolizes traditional industrialization. It has been acknowledged to play a crucial role in promoting the developments of major economies. Dozens of countries have tried to nurture this strategic industry to build their world-class

economy. It has been a backbone industry which is essential for industrialization process such as building infrastructure, making vital tools and machines. In China, the economic reform and opening-up policy started in 1978 turned its history into a new page of economic proliferation. According to Ligang Song and Haimin Liu (2009), China's steel industry experienced three major periods of development.

The first stage of economic reform and open- up from 1978 to 1992. The key feature of this early stage is the gradual shift to market economy. Before that Chinese government embraced a strong centralization economy with significant dominance of state owned enterprises (SOEs). This move paved the way for experiments on enterprise autonomy, especially in the steel industry. As a result, more efficient business practices such as responsible management and profit contracts were established. The new system enabled firms and workers to play more active roles in the sector. Consequently, the firm's productivity was enhanced rapidly. For instance, during this time, more than 90 percent of key enterprises applied the new style of business practice. Moreover, the new market-oriented regulations with greater flexibility also allowed steel enterprises to have more autonomy over their own business such as the right to purchase raw materials in the market. They were able to earn more profit by selling excess steel production which was permitted by the new policies. Furthermore, in 1992, the proportion of compulsory planned factories reduced to just 20 percent. As a result, these radical measures further promoted steel production in the country. More importantly, steel firms were also able to finance themselves through different channels such as self-raising, bank loans and foreign capital and undertake technical innovations. At the end of this stage, despite

considerable accomplishments in output and greater autonomy granted to enterprises, China's steel enterprises were still relatively dependent on the government.

The second stage (1993-2000) was defined as the beginning period of forming a socialist market economy. The primary purpose of Chinese government in this period was to establish and foster the market system. It aimed to build a complete modern enterprises system which could dissolve government intervene as the owner of state-owned enterprises (SOEs). The ultimate goal was to stimulate steel enterprise to drive for their own gains and losses. Hence, the government can be gradually independent from firms' activities. The achievements in this time were stunning. In 1993, mandatory plans for production and sales and the dual-track price system were abolished. Steel enterprises made their own decision on production and sales based on market demand. At the same time, a new financial channel for Chinese steel firms was set up by the development of the securities markets, transforming into a joint-stock company and listing on the stock markets. This provided substantial investment fund for development and more subsequently enhanced companies' economic performance and managerial capability. Besides, the Chinese government also offered supporting policies and financial aids to promote technological innovation which eventually boosted the country to become the world's largest steel producer in 1996. In 2000, the steel production tremendously increased to 128 million tonnes, a surge of roughly 60 percent from 1992.

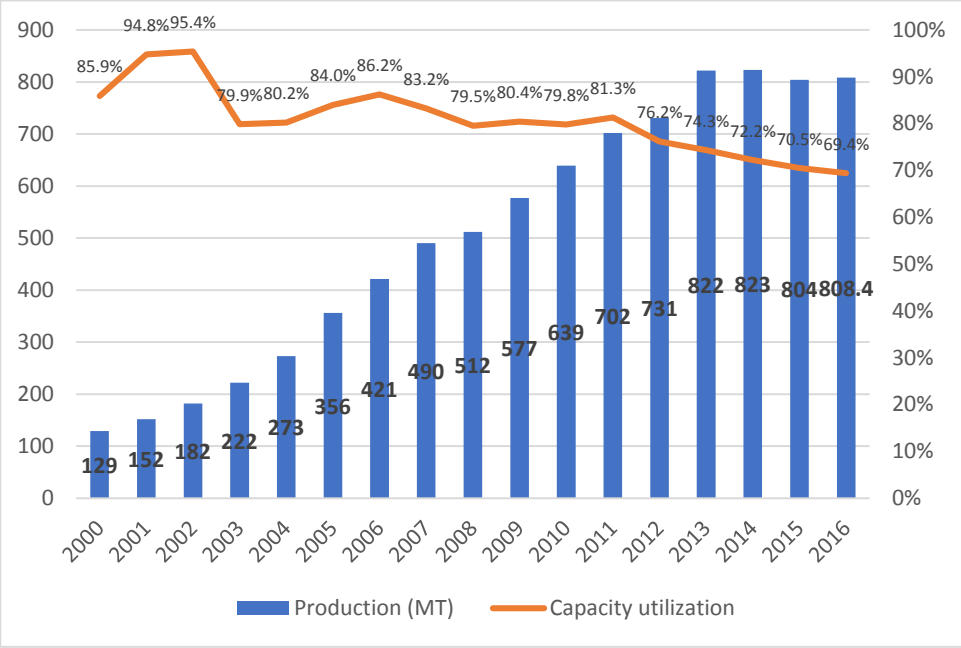
The third stage began in 2001 and was characterized by the deepening of reform and rapid economic growth. The Chinese iron and steel industries entered to a new era of significant and influential external developments. One remarkable achievement was

the China's participation in the World Trade Organization (WTO) in 2001 when market laws and regulations truly helped to integrate its steel industry into the international market. Since then China's manufacturing share grew considerably from about 5 percent in a decade ago to over 17 percent of the world's total manufacturing in 2010, creating a large-scale urbanization. These factors strongly accelerated the investment in housing and infrastructure. At the same time, huge demand from domestic market was also rapidly escalated. Moreover, trade liberalization, on the other hand, has brought the steel enterprises to the fierce international competition. Chinese steel enterprises advantageously carried out further reform of diversifying ownership structures. Private steel enterprises also increased quickly. In 2010, private enterprises acquired the share of about 45 percent of the total production of the industry. Reorganizing and mergers and acquisitions (M&As) have also been strongly impacted in the transforming process. The steel industry was further booming in the stage of globalization. Finally, one thing should be noticed in the case of China is that after the global economic recession causing the world steel demand to shrink, China keeps pouring its state capital into steel industry for the sake of preserving industry's employment and ensuring social stability.

The present Chinese steel industry can be described with three main features, all are not very optimistic, including the decline in capacity utilization rates, the slow demand growth rate and the continuing increase in capacity (Figure 2.3). The key factor that leads to this persistent overcapacity is the political intervention of the state over the steel industry. Particularly, by the year of 2009, 80 percent of largest Chinese steel

groups were completely owned and controlled by the state. In the top 20 steel groups, more than 95 percent of the production subjects to some government ownership.

Figure 2. 3 China's steel production and nominal capacity utilization rate (2000-2015)



Source: Author derived and updated from Brun (2016)

Besides, the Chinese government also exercises extensive authority over the steel industry through various policy instruments, which ensures the government's influence to shape the growth and promote evolution of the industry. Recently, China has been under several conversation rounds with other countries, especially the US to bring its practice in line with the market rules as well as its commitment under the WTO. However, it is widely known that there has not been any significant achievement obtained regarding curbing its capacity expansion in the steel sector. This figure reveals that China's steel production constantly increased from 2000 to 2013 and then gradually declined with a slower rate compared to the previous rise. The capacity utilization remained very high at the

beginning of the period up to 95 percent in 2001-2002, yet decreased over time and reached a well-below the world average in recent years, especially after 2011 with a steady decline to just around 70 percent in 2015-2016. This implies that China finally experienced the negative impact of its capacity expansion through a noticeable fall in capacity utilization and production decrease.

Chapter 3. An overview of AD actions under the WTO

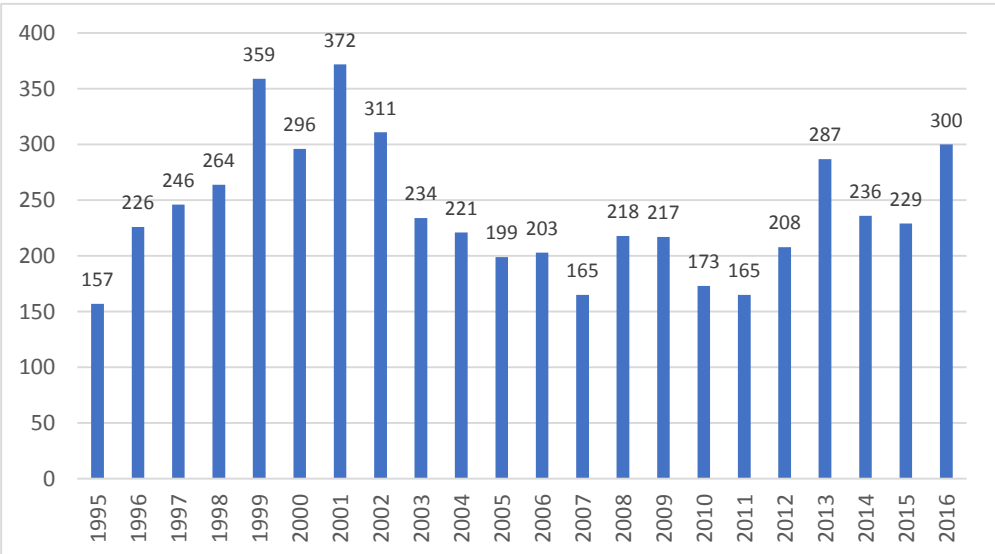
3.1 AD actions and recent trends

Generally, dumping action is said to be exist when a company sell its product in a foreign market with an unjustified lower price than its domestic price. The WTO antidumping agreement stipulates AD actions of how contracting parties can or cannot react to dumping. Broadly speaking, AD laws help to prevent monopolies that can be obtained by engulfing enormous market share through selling products at an unfairly low price. It also protects vulnerable industries from being ousted by deceiving practice of foreign firms, eventually preserves jobs and employment of a country. However, it can be a barrier against free trade concept and hindrance economic growth, preventing competition, causing distortion to the market and eventually hurting consumers. Therefore, the action should be cautiously taken and examined at case by case basis as its effect is ambiguous but can be tremendous to an industry.

This chapter reviews current trend in AD actions. Firstly, AD action or initiation is by far the most popular trade remedy employed by member countries under the WTO, far outstrips safeguard and countervailing duty. While the number of AD actions shows a strong fluctuation over time (Figure 3.1), there is a noticeable trend of more active involvement of developing countries embracing AD actions. For instance, China is currently the leading target of AD initiation in terms of export countries followed by South Korea, Taipei, US and so on (Figure 3.2). Similarly, in terms of AD initiation

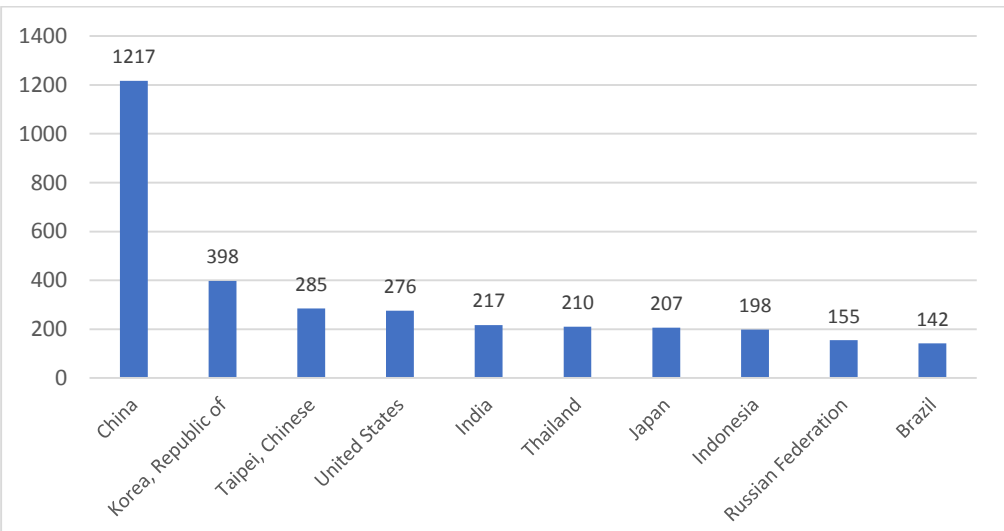
by importing country, India surpassed US, EU, and other developed countries to become the leading user (Figure 3.3).

Figure 3. 1 Anti-dumping Initiations by year from 1995.1.1 - 2016.12.31



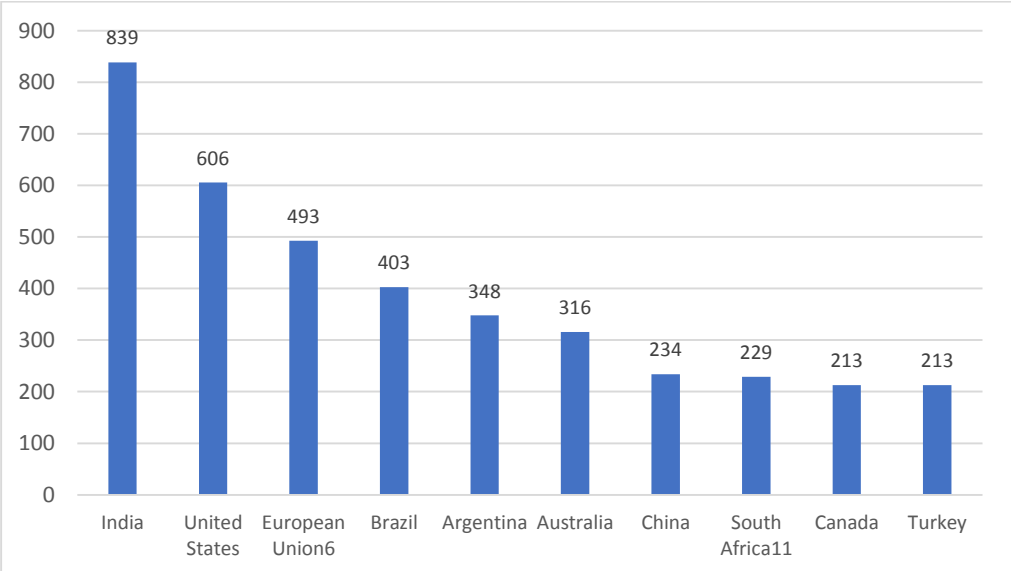
Source: author composed from WTO data

Figure 3. 2 AD initiations by Exporter 1995.1.1 – 2016.12.31



Source: Author composed from WTO data

Figure 3. 3 AD initiations by reporting member 1995.1.1-2016.12.31

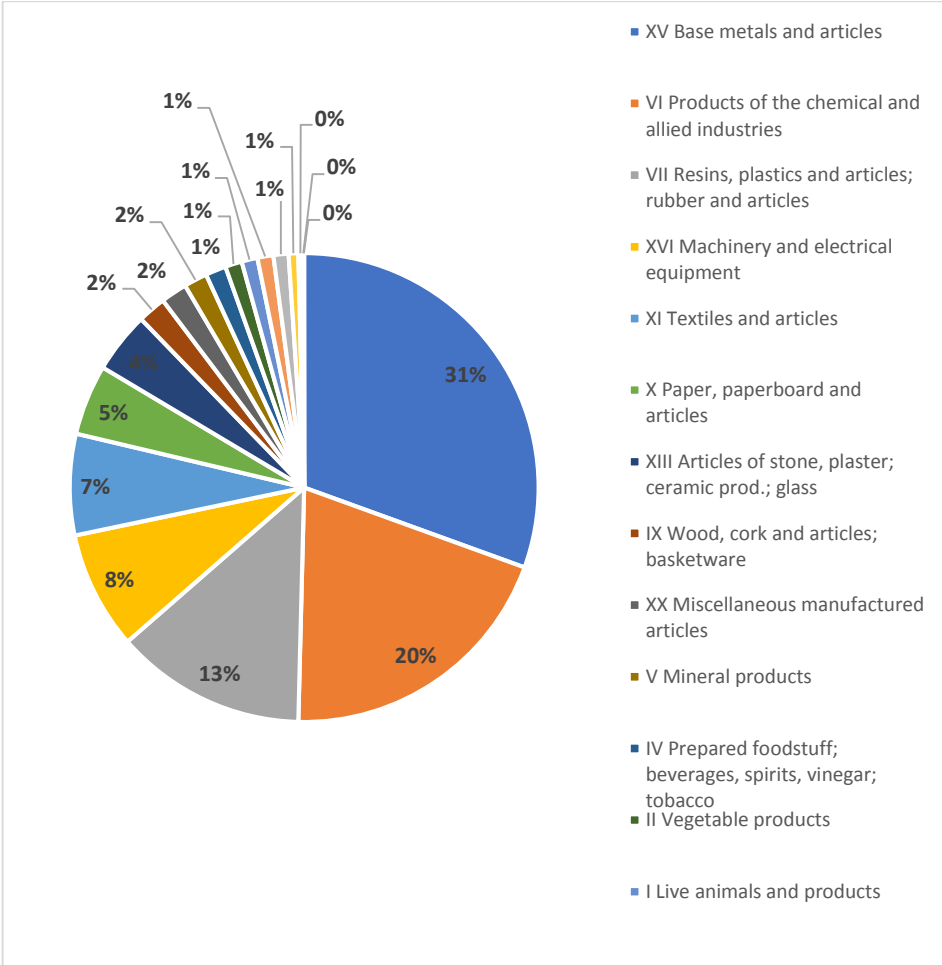


Source: Author computed from WTO data

What is more, a closer look at products subjected to AD actions shows that base metals and articles, which include steel products, account for the largest share of the total number of AD actions. One possible explanation can be the fierce competition in this industry as well as its economic and pollical importance to most the nations.

Figure 10 shows AD actions in the steel industry, focusing on China's case. Despite a relatively fluctuated trend, the AD action in steel industry demonstrates an upward trend over the last 15 years, especially right before and after the global financial crisis. Particularly, the AD in steel accounts for roughly 18 percent of the total AD actions it has, ranging from the lowest share of 5.8 percent in 2006 to the highest point of 33.3 percent in 2015. Moreover, the pattern of AD in steel sector does not closely follow the pattern of total AD actions of the country. For example, while the total AD actions experienced a strong decline in 2006 and in 2013, AD actions in steel kept going up.

Figure 3. 4 AD initiations by sector 1995.1.1 – 2016.12.31



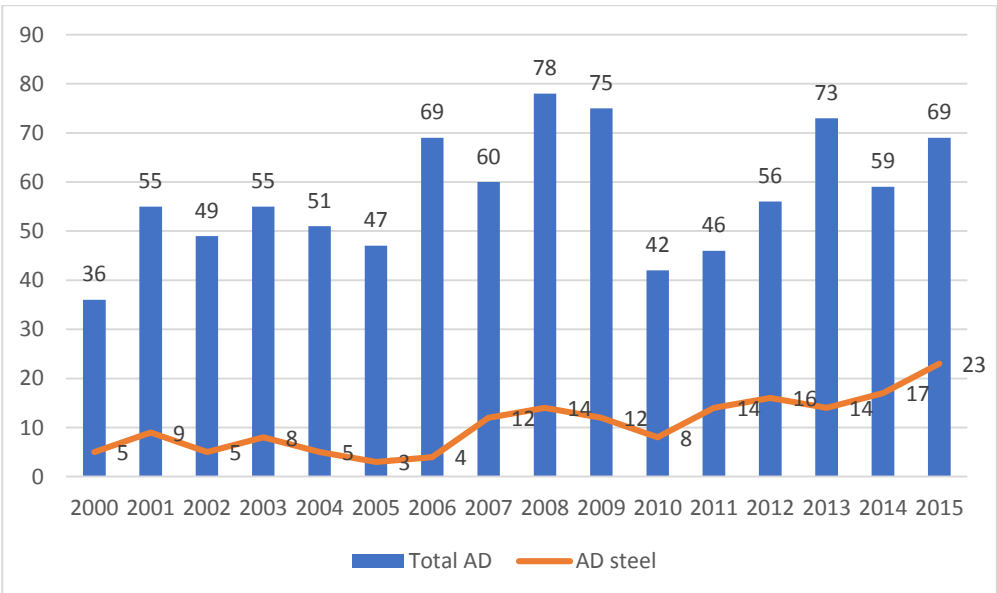
Author computed from WTO data

In addition, it shows a less fluctuation as opposed to the total AD actions. It implies that the steel industry can possess some distinct features from the general trend.

Beside these numerically-reflected trends in the AD, some scholars point out another important tendency of the current AD actions which is directly linked to the protectionism in international trade. For example, Prusa (2005) stated that current AD actions have nothing to do with ensuring fair trade or condemning unfair practice, it is

a clever form of protection. It means, many countries, especially developed countries are at the fear of huge waves of importation as well as technological catch-up ability from developing countries, so they have deployed AD actions to protect their domestic industries. This case is applicable to the case of the steel industry, which can be further explained in later parts. Similarly, Mustphata (2008) provided that the abuse of AD actions is more for protecting domestic industry rather than ensure fair competition, which is not an intended objective of WTO rules.

Figure 3. 5 AD actions in steel over total AD, China case



Source: Author composed from the World Bank anti-dumping database

3.2 AD procedure

Article VI of GATT (1947) provides regulations dealing with anti-dumping and countervailing duties in international trade. According to this article, dumping is "condemned'' when a member country practices selling its products with lower price

compared to their normal values. This dumping action is perceived to threaten domestic industry due to unfair competition and lead to material injury domestic sector. Actually, dumping action is not clearly defined to be illegal under WTO but it is discouraged and should be reprimanded by other member countries who are allowed to take antidumping action to counteract that unfair practice. Hence, the suffering country should fulfil three major criteria to prove that it is dumped including dumping action, material injury or threat thereof, and causality. The interpretation of legal terms involving in the antidumping agreement is a significant issue when considering apply this agreement in real case. For instance, "Injury" represents not only the current damage existing at the time of the dumping action occurring but also the potential risk or loss that it may cause to the domestic industry in the future. Therefore, it is necessary to understand and closely follow the interpretations of legal texts provided by the ADA in order to successfully make an argument under the WTO.

Article VI of GATT (1947) also provides that when domestic price is not available to make a comparison, the complaint party is allowed to use the price sold in the third market or "construct price" with reasonable calculation, or they can also compare the "like product" with the product under disputes. Besides, due allowance can also be made to include the differences in shall be made in each case for differences in conditions and terms of sale, for differences business environment, taxing system and other factors that having impact to the price incomparability. The following parts will explain more a brief description of each requirement.

Article 2, Determination of Dumping, the most crucial part of GATT Article VI, provides several key elements need to be considered to confirm that dumping action

has been existed. Among them, the criteria of the “like product” should be defined. Article 2.6 stipulates that “the term "like product" shall be interpreted to mean a product which is identical, i.e. alike in all respects to the product under consideration, or in the absence of such a product, another product which has characteristics closely resembling those of the product under consideration.” Besides, there are several typical ways applied to identify a product include descriptive language, technical standard or the most reliable one is probably the harmonized system (HS) code. Moreover, the concept of normal value and export price are also well-explained in this article.

Injury

Required procedures to determine injury are set out in article 3 and 4 of the ADA. There are several major steps to take such as defining the like product, domestic industry, material injury and causal link between dumped products and the material injury. Regarding the material injury, it encompasses the existing and forthcoming loss or damage to domestic sector, and categorizes them into different kinds (see article 3.7 and footnote 9 of the ADA). Definition of domestic industry is tackled by Article 4 (Definition of Domestic Industry). Importantly, the ADA also makes clear that the determination of injury under Article VI should be not only objective but also based on positive intention (see Article 3.1).

Causality

Finally, Article 3.5 stipulates how to examine the causal relationship between the dumped imports and the injury suffered by the domestic industry. This session requires the evaluation of all relevant evidences. However, some factors are exemplified such as the volume and prices of imports not sold at dumping prices and so forth. Therefore,

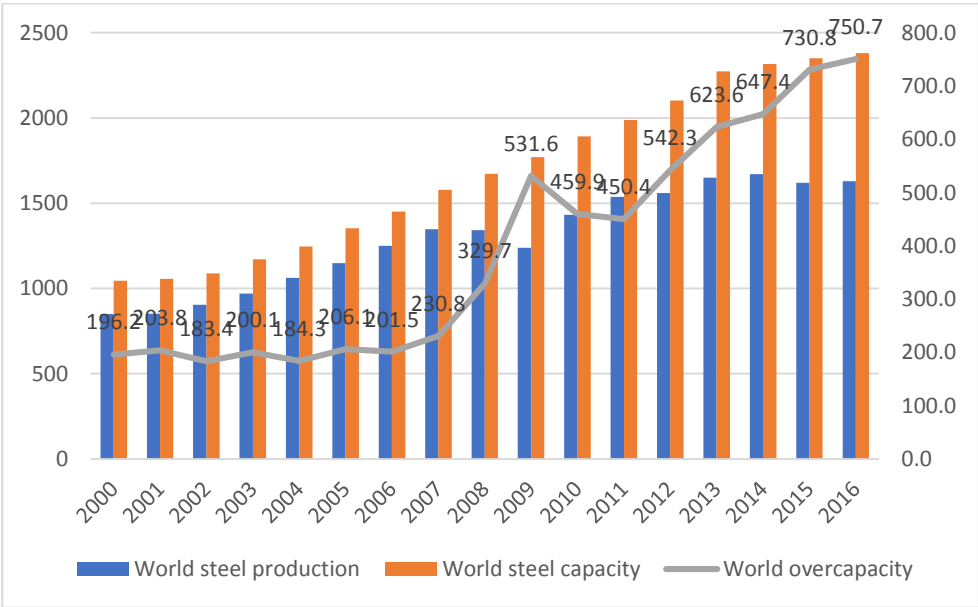
it is crucial for the investigating authorities to apply appropriate analytical methods for determining what evidence might or might not be relevant in an individual case in consideration with other potential factors.

Chapter 4. Overcapacity and protectionism in the steel industry

4.1 Excess capacity causes and consequences

According to OECD (2015), overcapacity or excess capacity is defined as the difference between production capacity and demand. Additionally, Brun (2016) stated that overcapacity is industrial capacity not utilized by production. This author calculated the amount of overcapacity in the world and in each region by subtracting existing production volume from maximum production capacity. These definitions imply that excess capacity can be generated because of an increase in steelmaking capacity caused by huge investment, or a result of

Figure 4. 1 Overcapacity in steel industry



Source: author composed from OECD steel database, World Steel Association

decrease in demand. The first explanation seems to fit the current issue in the world steel industry as production capacity or nominal capacity has dramatically enlarged (Figure 4.1).

It is acknowledged that the world nominal steelmaking capacity went up rapidly since 2000 after a long period of remaining stable over the previous two decades. Generally, figure 4.1 illustrates that the world steelmaking capacity keeps going up constantly until 2015 whereas the world steel production could not catch up with that rate and the gap was increasingly significant after 2008. As a result, world overcapacity in the steel industry has an upward trend, except the period during the global financial crisis and a plateau appeared since 2015. For example, from 2000 to 2015 the global steelmaking capacity additions were at an average of 82 metric tonnes per year. This amount is said to be approximately equivalent to total annual U.S. steel production. Noticeably, most of the addition located in China. It can also be said that the production generally caught up with the expansion of global capacity until 2009 when the financial crisis diminished global demand for steel, and overcapacity unprecedentedly exceeded 500 metric tonnes. Since then the world overcapacity constantly increased with the pace of 750 metric tonnes per year compared to just 242 metric tonnes in 2000-2007. This huge amount is equal to the aggregate crude steel production of the top 30 producers (exclude China) the year 2015, including the traditional powerhouse of global steel production such as the United States, European Union (EU), Japan, South Korea and Russia.

As mentioned in the earlier session that the increase of excess capacity was a direct result of the greater expansion in steelmaking capacity, mostly caused by non-OECD

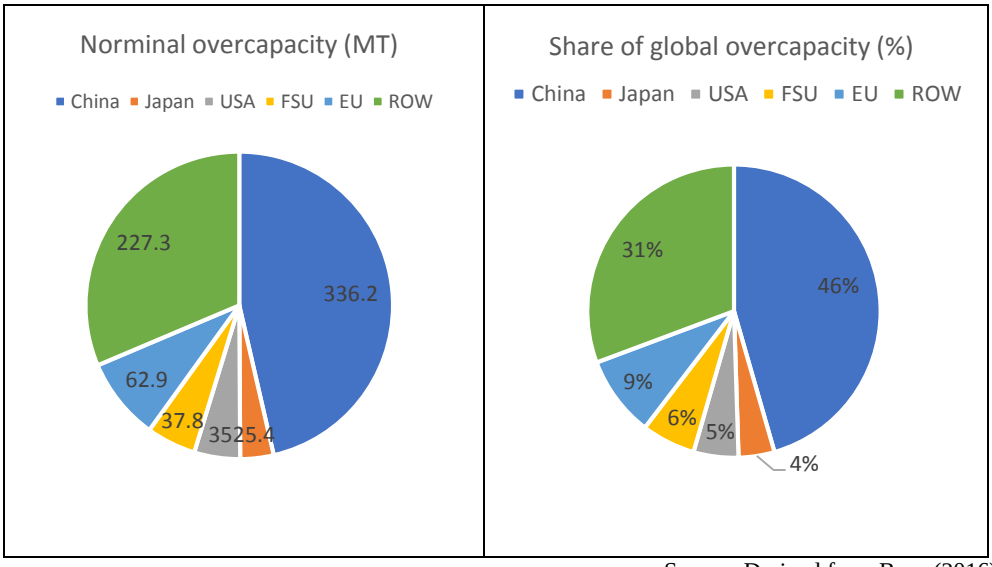
economies. According to OECD's data, the capacity addition from 2000 to 2013 was roughly 1.165 billion tons in non-OECD economies, as opposed to just 62 million tons in OECD economies. The share of China alone accounts for roughly 957 million tons. The report contends that even considering possible errors, 70–80 percent of the increase of capacity was attributable to China. Therefore, it is safe to say that the enormous expansion of China's steel production capacity has been a major cause of the increase in the world steel overcapacity.

It would be incomprehensive if just accusing only China of causing the world steel overcapacity, albeit its immense capacity production expansion. Other Asian countries such as India, the Middle East and ASEAN countries are expanding their capacity at a much more vigorous rate compared to China in recent years. It is worth acknowledging that Asia is currently a home the world largest volume of both steel steelmaking capacity and overcapacity with the share of 67.0 percent and 63.7 percent, respectively. There are two existing issues of the regions including an enormous expansion in steel production and the huge amount of excess capacity. This fact indicates an unreasonable development trajectory in this area. At the same, excess capacity is also common in some other countries of the European OECD members, members of NAFTA and the Commonwealth of Independent States (CIS), although the combination of overcapacity of all these countries are less than half of Asia. Moreover, one important fact is that it does not always mean where there is huge absolute volume of overcapacity, it should have high utilized rate. For example, Asia holds a huge absolute amount of excess capacity, its utilization rate is 73.3 percent, which is well-above the world average. The world's average rate of production facilities utilization

in metal sector is around 68.3 percent, the worst figure since 2000. In short, Asia is a home of the world largest steel production and utilization. Plus, the rapid expansion in steelmaking capacity resulted in a huge amount of the world unutilized production in the region.

Besides, overcapacity in the steel industry is also widely popular in other countries and regions, which can be demonstrated by the figure 4.2.

Figure 4. 2 Regional distribution of world steel overcapacity in 2015



Source: Derived from Brun (2016)

The figure shows that traditional power plants including the US, Japan, and FSU account for a humble share of the world steel overcapacity, approximately 24 percent. By contrast, China and other regions are respectively make up 46 and 31 percent.

Then, what can be accountable for such an enormous increase in excess capacity in the world steel industry? Brun (2016) believes that this phenomenon can be explained by two dimensions, demand and supply. Firstly, it is caused by variability in demand

which is called cyclical overcapacity. This situation is more likely to happen when there are economic downturns occurring when the existing demand falls below the factories' productive capacity. Secondly, in terms of supply- side overinvestment in industrial steelmaking facilities is the main reason causing the so-called structural overcapacity. What happened in China steel industry can be mostly explained by the latter cause. As mentioned in the previous part, China's "state capitalism" model designates the steel industry as the "pillar" and "strategic" industry for special growth targets and financial incentives at the country's stage of industrialization. This overinvestment undoubtedly generated more supply than the existing demand can absorb. The enormous expansion in steelmaking capacity in China is motivated by favourable and incentive policies from its governments such as subsidized energy and other inputs, access to cheap finance, and national versus subnational government dynamics, or the financial and tax incentives of provincial and local government. As a result, steelmaking capacity in China has significantly increased since the 2000s.

Despite the tremendous scale in overcapacity, it is not the first time the world experienced steel capacity crisis. Brun (2016) suggested that there have been six periods of steelmaking capacity fluctuation being observed since 1980. The first period was resulted from the oil crisis in 1970s, which led to the 1980s steel crisis with the dramatic fall in the world steel production. The next crisis is a direct outcome from the first crisis where the capacity utilization rates dramatically increased during the 1980s. The third period was in the 1990s when the world witnessed the crumble of Soviet Union that led to its member countries underwent high rate unutilized capacity. The situation in this period was worsen by the Asian financial crisis. The fourth crisis was

when China become the major producer of the steel production and a large consumer of the steel since 2000, which made the world capacity utilized rate significantly improved. Similar to the Asian financial crisis, the 2008 global financial crisis also dampened the steel industry, but with a more severe impact that is believed to be no fully recovered yet. The most current crisis was when China and other emerging countries increasingly expand their steelmaking capacity that leads to the even lower utilization rate compared to the previous crisis. Although this classification might not be the solely way for categorizing, it provides a general picture of global steel dynamics over the past three decades.

Overcapacity affects an economy at various levels. At steel producing firms, it reduces the profitability of companies in the sector since the factories cannot fully operate its existing capacity to produce at economically sustainable levels, which is around 80 percent capacity utilization in most of the plants. This reduction in company profitability, in turn, discourages the motives of companies to invest to improve their efficiency, which eventually deteriorates the competitiveness of the sector, and dampens the employment rate in the sector. For example, it has been recorded that in the United States, a considerable number of workers have been laid off due to the economic situation of steel sector. At an international level, overcapacity caused trade friction among countries, especially under the WTO where government subsidies are deemed as unfair trade. Affected countries then conduct trade remedy measure, notably is AD action or imposing tariff to counteract those unfair practices. This will be considerably costly and hamper the benefits and efficiency of international free

trade. All in all, long-term overcapacity poses threats at different levels including workers, firms, nations and the sustainability of the global trading system.

4.2 Protectionism in the steel industry

Regarding protectionism in the steel sector, it should be noticed that due to its economic and political importance, the steel industry has long been protected by governments in both developing and developed countries. For example, Anthony P.D' Costa (1999) hold that surplus capacity can be strategically employed to take political and economic actions, especially against foreign competitors. Government will seek measures to protect its domestic industry. Moreover, he stated that excess capacity can also be deployed to pre-empt competition. For instance, the US sought to protect its producers against foreign firms, especially Japan who was vigorously embracing technology and innovation. As a result, US government had imposed different protectionist measure such as Voluntary Restraint Agreement (VRAs) to restrict the amount of steel importation from other countries and the Trigger Price mechanism (TPM) which aimed to prevent the dumping action by setting floor prices for imports. However, those measures had reverse effects when the restriction and protection motivated domestic consumers to find other cheap resources that were available in the international market. As a result, the steel imports during this period was unexpected to increase. The author further explained why steel industry is granted that privilege protection from many governments. It begins with the state-led industrialization in the case of Japan and Korea. The governments of two countries enthusiastically poured capital into the steel industry to promote economic development and transformation.

Japanese government was determined to give development priority to the steel sector with the strong belief that it would escalate the industrialization process. Hence, the state virtually managed the supply of steel as if it was controlling all manufacturing sectors as steel is an essential intermediate material. In the state of Meiji (1868-1912) the priority to further develop steel industry were maintained together with fostering communication and transportation sectors. One noticeable feature of Japanese steel industry during this period it was the great effort of the government to seek for best technology and efficient practices to promote further growth for the steel industry. However, in Japan, government ownership of the industry was abandoned since 1950 while the giant Korean government has remained its intervention into the sector since the establishment of it in 1968. In Korean case, the major objective was to build a modern steel industry by nurturing giant state-owned firms utilizing economic of scales to enhance efficiency and gain competitiveness over the global market, by successfully mobilized foreign aid from Japan, POSCO was established boosting the development of the country, especially Heavy and Chemical industries. Similarly, other emerging economies, such as Brazil and India, attempted to nurture this strategic industry to promote national industrial developments. The countries aim to provide a critical immediate industrial input, which was to be further used in different downstream activities, such as construction, automobiles, shipbuilding, and appliances. Other authors, Thomas R. Howell *et.al* in the book Steel and the State (1998), stated that protectionism of the home market is a necessary condition for dumping to occur. The author explicates that protection can provide a sufficient market size and price level to cover fixed production costs, with export prices being required to cover only

marginal costs of production. Dumping occurs as firms try to maintain high operating rates in the face of falling domestic demand by shipping the steel overseas at whatever price is necessary to move it. Under theoretically normal market conditions, low- cost producers should displace high- cost producers in the world steel market. However, because of the changing economic effects of such factors as operating rates (economic growth) or exchange rate (fiscal and monetary policy), continual swings can occur in the location of low- cost producers in the world economy. More importantly, national governments have not been open to let normal market forces operate in the world steel industry. As a result, it has not been uncommon for low- cost producers to be displaced by higher cost producers with government supports, a phenomenon which is observable within a number of countries as well as across national borders.

Jose Lima in his book of Restructuring the U.S. Steel industry (1998) also stated that what countries react to the current overcapacity is restricting steel imports, including the US and EEC to deal with the effect of worldwide excess capacity on their domestic steel industries. However, import restrictions can raise domestic prices above free market levels and allow inefficient firms to produce. Protection thus harms the consumers and the exporters of final products that contain steel. As a result, the protection neither restored profitability nor produced the modernization that protection was supposed to facilitate.

Recently, people also talk about the US' claim on national security: "steel industry is vital to national security" when president Donald J. Trump made his justification for imposing 25 percent tariff on imported steel. There are some interesting points to review from this occasion where the role of steel industry can be more

comprehensively understood. Probably, the most straightforward meaning of it is that steel is the bedrock material for the country's defence industrial base. To some countries, especially the US, exporting military weapons and equipment contributes significantly to their economy. Therefore, it is reasonable to protect this strategic industry and avoid relying too much on the importation of steel materials. Furthermore, national security argument also includes U.S vital infrastructure sectors including transportation systems, the electric power grid, water systems, and energy generation systems. These are central to the essential operations of the U.S. economy and government. Another argument is weakening internal economy can impair national security. The obvious results can include increasing unemployment, reducing the economic welfare of individual domestic industries, shrinking government revenues, etc. It can be seen since that from past to recent, the role of the steel industry has never been underestimated for almost all countries ranging from developing to developed economies.

Moreover, the Chinese government is well-known for maintaining a strong and intervenes deeply in the operations of steel companies. It is said that this significant involvement in has contributed to enormous expansion in steelmaking capacity while discouraging the closure of unproductive factories. For decades, the state conducted both direct and indirect supports to the industry through different favourable policies and aids such grants, preferential loans, and restrictions on foreign investment. As consequences, many older, low-technology Chinese mills, which could have not efficiently operated in a purely market-based environment, continue to operate and intensify the global oversupply.

Similarly, the Indian government has been the main actor fostering its steel industry for the sake of modernization. The state holds at least 80 percent of the country's largest steel company, Steel Authority of India Ltd. Beside the ownership, Indian government has intervened the steel market by motivating and assisting low-performance enterprises with various financial aids such as loans, loan guarantees, and tax breaks. There are also other types of indirect supports which target to discourage importation from foreign exporters.

Recently, Turkey resembles the direction of China and India when its government is enthusiastic in providing a lot of incentives to promote growth for steel industry. As a result, the country was now ranked in the 7th largest exporter of iron and steel in 2012 where it stood just 17th position in the 2000.

The issue is common among governments of other countries, especially emerging economies. Steel enterprises in Vietnam, Argentina, Ecuador, Peru and Bolivia, all are, in some ways, backed by governments. The governments of Indonesia, Libya, Venezuela, Pakistan, Saudi Arabia and the United Arab Emirates also involved in nurturing such large scales firms producing steel, hence being accused for causing huge capacity expansion. Obviously, protectionism has been persistent in the steel industry. This practice has facilitated world steel capacity crises and induced such numerous AD actions in the sector.

Chapter 5. Empirical study on the relationship between overcapacity and AD actions against China

5.1 Description of econometric model

Firstly, it is important to review some factors motivating AD actions that have been studied by previous research. In terms of macro-factors, the pioneering paper written by R. Feinberg (1989) examined the how the fluctuation of the U.S. dollar has effect on antidumping filings in the US. Hence, he applied Tobit model to study the relationship between real exchange rate and AD actions in the US over the period of 1982-1987. He found that weakness of the U.S. dollar increased AD procedures against the US. Additionally, he also pointed out that there is negative correlation between GDP growth rate and the number of AD investigations. However, his following study, Feinberg (2003), had a different conclusion that AD filings against the US increased with the increasing value (appreciation) of the U.S. dollar. Subsequently, Knetter and Prusa (2003) conducted a similar study establishing that a poor economic growth of importing country motivated more AD actions against foreign firms. That is because of the worse performance of domestic companies makes them more responsive to the importation from other country. It is also all "a slump economy hypothesis which can be interpreted that a weak economy in importing country can stimulate exporting countries to sell their products with less expensive price to maintain the market share. This provides more chances for dumping to happen. Hence, GDP growth rate (GDPGR) of importing countries should be included as another controlled variable. Moreover, the scholars also maintained that an appreciation of the RER resulted in a more of AD initiations was also observed in their

data. In addition, under the WTO rules, the filing country is obligated to material damage or injury existed in domestic sector. This means the country will not be successful in raising the case if there is no injury caused by imports found. At this point, it is commonly believed that domestic industry would be more likely to experience material injury when the country underwent downturns in macroeconomics as well as exchange-rate appreciations.

Base on those justifications, my research selects macro factors including GDP growth rate and RER of importing countries as controlled variables. Taking a same approach to the study of Reynolds (2009), I also include GDPGR of China as an independent variable. I expect to see a positive relationship of China GDPGR on the number of AD actions against this country in steel industry. The rationale can be the higher China's GDPGR has, the more exportation it does, hence becoming more vulnerable to AD filings.

Furthermore, according to Ahn and Shin study (2011), bilateral trade volumes were selected as independent variables since AD activities are directly influenced by reciprocal trade relation. This selection approach is also similar to the study of Kara M. Reynolds (2009). They further explained that while the surge in the import volume increases the possibility of initiating AD filings, export volume, one the other hand, reduces this incentive. This is because of the fear of trade friction or losing big market share from an important partner. Based on this rationale, I take import and export share of steel in the total export and import volume of China to its partner countries as the next independent variables. Besides, this study also takes the total AD actions as an indicator for the vulnerability of the country in AD action. This variable helps to

include other factors directly and indirectly affect AD actions against China such as non-market economy status, business relationship in a particulate sector, dumping and AD experience in a relevant industry, and the like. However, in case of the steel industry, I will replace this variable by the total AD actions against China excluding steel AD actions to point out the vulnerability of China in terms of AD actions in general.

Regarding the relationship between steel overcapacity and AD actions, there have been some studies mentioned about the causality. This is because the former can be a factor to fulfil certain conditions of injury determination in AD investigation. For instance, Kara M. Reynolds (2009) stated that under WTO rules, a wide range of factors should be thoughtfully considered during the investigation to calculate the extent to which domestic industry is being injured such as actual and potential decline on sales, profits, outputs, market share, productivity, investment and capacity utilization. Hence, capacity utilization is acknowledged to be a determinant of AD actions. Moreover, Article 3.7 of the anti-dumping agreement under the WTO implies that the significant increase in the exporter's capacity is one of the factors that should be examined. Also, Brun (2016) mentions about overcapacity in steel sector has induced trade friction among countries, especially trade remedy action against China when this country's expansion in steelmaking capacity causes many troubles to other countries. Therefore, there has been a strong belief that that excess capacity in steel will lead to more AD actions. Subsequently, in this study I will include overcapacity as a new variable in the integration with other variables mentioned above.

5.2 Description of variables

This research aims at studying the effect of overcapacity in steel industry on the number of AD actions in this sector, focusing on China as an AD target. In other words, I hypothesize that those countries who have been dealing with steel overcapacity issue would be more likely to raise AD actions against China. Therefore, the independent variable of interest is the amount of steel excess capacity in China's trading partners, which is calculated by deducting the maximum capacity to the real production on annual basis from 2000 to 2015. This method of calculation is same to Brun (2016) when he measured overcapacity in steel. Besides, other independent variables are selected after a thorough review on previous studies regarding to factors affecting antidumping actions mentioned above.

Importantly, it should be noticed that AD actions are usually taken after a certain time of reviewing procedure which can last up to 3 years in the U.S. system or a half year in European system. To capture this fact, I will take a similar approach to prior studies by taking an average of 3-year-basis for GDP growth rate, one-year-lag for RER as well as steel export and import share in total export and import volume of China's trading partner. On the other hand, the amount of steel capacity is measured without lag year because my argument is that the existing of excess capacity is persistent and would pose immediate and direct motivation for domestic producers to urge their government to raise AD case against China.

In short, variable description will be briefly summarized in the following table:

Table 5. 1 Summaries of variables

Variable name	Explanation	Remarks	Source
ADsteel	Steel AD actions against China	Dependent variable (Y)	Global Antidumping database
ADexsteel	Total AD actions against China in year t, excluding steel case	Independent variable (X_1)	Global Antidumping database
RERi	Real exchange rate of importing countries	Independent variable (X_2) One-year lag (t-1)	Bruegel dataset
GDPGRi	Average GDP growth rate of importing countries	Independent variable (X_3), an average of 3-year-prior AD action ($t_{t-2, t-1, t0}$)	World Development Indicator
GDPGRCHI	Average GDP growth rate of China	Independent variable (X_4), an average of 3-year-prior AD action ($t_{t-2, t-1, t0}$)	World Development Indicator
CHIEXS	China's steel export share in its export	Independent variable (X_5), one-year lag (t-1)	UN Comtrade
CHIIMS	China's steel import share in its total import	Independent variable (X_6), one-year lag (t-1)	UN Comtrade
OVERCAP	The amount of excess capacity of China trading partner	Independent variable (X_7), in year t	OECD steel database and World steel association (WSA)

5.3 Data collection and statistical tool

Relevant data are collected through different global databases. As the matter of data availability, there are 28 countries are included in my research, ranging from both developing and developed economies. The observing period will be from 2000 to 2015, up to the most updated data available. This will create a panel data with totally 448 observations and strongly balanced model with no any missing data. Table 5 demonstrates a list of included countries.

Table 5. 2 Selected countries list

1	Argentina	8	EU27	15	New Zealand	22	Thailand
2	Australia	9	India	16	Pakistan	23	Turkey
3	Brazil	10	Indonesia	17	Paraguay	24	Ukraine
4	Canada	11	Japan	18	Peru	25	United States
5	Chile	12	Korea, Rep.	19	Philippines	26	Uruguay
6	Colombia	13	Malaysia	20	Russian	27	Venezuela
7	Ecuador	14	Mexico	21	South Africa	28	Vietnam

For calculating excessive capacity, I closely follow the method provoked by OECD (2015) and Brun (2016) to measure this volume by subtracting the actual production from the maximum capacity a country has. Accordingly, I use steelmaking capacity data from OECD steel database and use steelmaking production data derived from World Steel Association (WSA) on annual basis and calculate for every of 28 countries. It is interesting that in few cases, overcapacity volume appears to be negative. At theoretical level, it is abnormal, yet it can happen in certain periods of time. The reason

can be that in the OECD steel database, capacity data represents nominal or rated and nameplate capacity. This is, in fact, the maximum theoretical equipment capacity. Therefore, the record steelmaking capacity does not capture other practical factors and equipment and facility conditions in actual steelworks. This means that it is theoretically possible for production to exceed nominal capacity in plant because of learning, modernisation of maintenance practices, and other productivity increases (commonly referred to as "capacity creep").

The study would be impossibly conducted without the World Bank database on Antidumping (2015) or so-called the Global Antidumping database from which I can get detailed data on AD actions at national and industrial level. Based on this database, I select total AD actions and AD actions on steel products a country has each year in order to fill out the data for the two variables of total AD actions excluding steel AD actions and AD action in steel only.

The steel export and import share of China to its trading partner are computed by data downloaded from UN Comtrade comprising the aggregate bilateral trade and trade in steel. The latter data is specified by a group of harmonized system (HS) code – 072 which includes iron and steel. Then, the proportion of the share will be calculated through these collected data.

Finally, RER are derived from Bruegel data and GDPGR of China and its trading partners are collected through the World Development Indicator database.

Regarding statistical tool, although some previous studies studying about factors affects antidumping actions applied OLS regression (Niels *at.el*, 2006), M. Feinberg (1989) with Tobit model, negative binomial model M. Feinberg (2003), Knetter and

Prusa (2003), panel regression is used in my study for some reasons. Firstly, with observations that span both time (from 2000 to 2015) and individuals in across-section (28 countries dealing with steel overcapacity issues), Panel data allows more information to be gathered, giving more better generalization. Moreover, the use of panel data can conduct empirical test for a set of different hypotheses, it can also control individual heterogeneity which is unobserved or unmeasurable and vary across individuals but do not vary over time. Importantly, regarding panel regression, it is crucial to decide an appropriate model with either random or fixed effect. The distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model. While the random effect model allows us to include time invariant variables which are supposed to have effects on dependent variable, the fixed effect model controls for all time-invariant differences between the individuals are designed to study the causes of changes within an entity. So, the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics such as culture, religion, gender, race, etc. In this case, I will apply Hausman test to determine which model is most suitable in my research.

The equation for the fixed effects model is:

$$Yit = \beta 1Xit + \alpha i + uit$$

Where

αi (i=1…n) is the unknown intercept for each entity (n entity-specific intercepts).

Yit is the dependent variable (DV) where i = entity and t = time.

Xit represents one independent variable (IV),

β1 is the coefficient for that IV,

uit is the error term

The equation for random effects model is:

$$Yit = \beta Xit + \alpha + uit + \varepsilon it$$

Where

uit is between-entity error; εit is within-entity error

Finally, the econometric model in my study supposed to be:

$$ADsteel_t = \alpha + \beta 1 ADexsteel_{(t)} + \beta 2 RERi_{(t-1)} + \beta 3 GDPGRi_{(\bar{t})} + \beta 4 GDPGRCHI_{(\bar{t})} + \beta 5 CHIEXS_{(t-1)} + \beta 6 CHIIMS_{(t-1)} + \beta 7 OVERCAP_{(t)} + uit + (\varepsilon it)$$

Table below summarizes data collected for regression model.

Table 5. 3 Summary of data

Variable	Obs	Mean	Std.Dev	Max	Min
Steel AD	448	0.377	0.807	5.000	0.000
ADexsteel	448	1.676	2.779	15.000	0.000
CHI-EXS	448	0.055	0.036	0.223	0.004
CHI-IMS	448	0.050	0.120	0.872	0.000
GDPGRi	448	3.648	2.572	12.826	-5.451
RERi	448	100.864	19.492	234.382	51.066
OVERCAP	448	6886.846	11808.009	101544.000	369.000

Chapter 6. Empirical results

6.1 The effect of overcapacity on AD actions against China (H1)

Table 6. 1 Regression result (1)

Regression I (aggerate) Dependent variable AD action against China in steel industry	**Coef.**
ADexsteel	0.0767791***
	(3.95)
CHIEXS	1.674455
	(1.25)
CHIIMS	-0.5815011
	(-1.52)
GDPGRCHI	-0.0472343**
	(-2.05)
GDPGRi	0.034965**
	(2.12)
RERi	0.0005815
	(0.28)
OVERCAP	0.0000168***
	(2.77)
_cons	0.3378762
	(1.07)
Number of observation	448
R-square (overall)	0.1382

Note: ** significant at 5% level, *** significant at 1% level, number in the parenthesis is t-statistics

The Hausman test result suggests that fixed-effect model is more appropriate for this study. The regression result is presented in table 6.1. It shows that there is a positive and significant effect (1% level) of excess capacity on steel AD actions against China. According to interpretation of panel data regression, we can understand that for a given country, as overcapacity increase across time by one thousand metric tons, the number of AD action filed against China in steel industry will increase by 1.7x10-5 AD investigation each year. Put it in other way, increase of roughly 59 523 thousand metric tons in steel overcapacity in a country will motivate it to conduct an AD investigation against China. This outcome generally agrees with an empirical study by Leidy (1997) which finds that the decrease in the industrial capacity utilization and the increase of unemployment rate significantly promotes more antidumping and countervailing duty filings in the US. Accordingly, the study's main hypothesis (H1) is successfully confirmed. It proves that overcapacity in steel industry has significantly contributed to current trend in AD actions against China during the last two decades.

In terms of macroeconomic factors, the effect of RER is this study is positive but insignificant, while being counter to some previous studies, it agrees with some others. In fact, the ambiguous impact of RER on AD action has been observed by Prusa (2003). His study provides that the RER fluctuation can affect the firms' response in some ways that some AD requirements will be fulfilled. Therefore, the number of AD actions increases. In other words, RER appreciation or depreciation can theoretically impact the AD filing either in positive or negative way, depending on which AD test was being applied for the investigation and its sensitivity to changes in price. However, there is still a gap between the common belief within the business world and the

empirical literature regarding which effect is more reliable. Besides, Prusa's study (2005) is also very informative, when he notices the distinct characteristics and considerable share of steel in an economy so that he excluded steel from his analysis. As a result, when he discounted steel from the database, he found that business cycle appeared to have stronger effect on AD filings in steel compared to exchange rates. This might imply the political importance of steel industry in a country. Regarding to fluctuations in economic activity, the result once again confirms some of previous conclusions that GDP growth rate of both importing country and the exporting have significant impact on filing decisions.

Interestingly, a slump in economic activity assumption does not work in my study when we see a significant and positive effect of importing country GDP growth rate on AD actions. This is opposite to previous research. By contrast, the result shows that the better the importing country's GDPGR, the more AD actions it will file against China in steel sector. Although the explanation of a slump economy is relatively compelling, the unexpected outcome of this study can evoke an important insight and shed light on the political and economic importance of steel industry. As mentioned in the section III steel industry has played a crucial role in industrialization and economic development of countries. For developing countries, it is a backbone industry providing essential materials for many other downstream sectors and strategically escalates the pace of industrialization. That is why many industrializing countries used to nurture and foster this vital industry. In developed countries, protectionism in steel is still necessary because of its high entry barrier and great employment it offers to domestic workers. Therefore, protection for steel industry is persistent in almost any

time and can goes along with the economic growth of every country. More important, the unexpected statistical outcome also captures the increasing trend of protectionism which has been arisen recently. That is some economies tend to doubt about the merits of free trade. The pressure from domestic producers and workers urges its government to gradually condemn free trade. On the other hand, GDPGR of China reflects a positive effect with significant level of 5 percent level which illustrates that the increase in China's GDPGR will make the country more vulnerable to AD actions. This result is strongly supported by the fact when over the last two decades, China has constantly undergone a strong economic growth and simultaneously suffered an increasing AD cases from other countries. The research's outcome once again reminds us of the subtle but ongoing impact of protectionism against free trade has been consistently existed, at least in steel industry. Like Prusa (2005) said "Ironically, one of the most basic lessons that one must learn is that modern AD has nothing to do with what microeconomics says is harmful pricing behaviour. AD is not about restraining an economically harmful dumping. It is just a clever form of protectionism".

Next, the effect of bilateral trade volume share of steel on AD actions against China follows my expectation, yet at insignificant level. Not surprisingly, this result complies with previous study when exporter's import share and exporter's export share of steel in the total exporting and importing volume do not account for a significant effect to the AD investigations. Despite its insignificance, they at least do not rebut the general understanding of while the increase in share of China's export stimulate more AD actions, the rise in share of China's import reduce this possibility. Finally, the total AD excluding steel has a positive and significant effect to the AD actions in steel sector.

This is plausible when this indicator demonstrates the vulnerability of China's steel export to other partner countries in terms of AD actions. The more vulnerable China is to AD actions, the more AD actions in steel being taken against China occur, especially when steel also makes up a considerable share in total cases.

6.2 The effect of overcapacity on AD actions against China in developed and developing country group (H2)

I attempt to extent my research into examining the effect of overcapacity in steel industry on AD actions against China for the case of developing and developed countries group separately. As the literature has shown that steel overcapacity does not evenly distribute but mostly concentrated in developing countries whereas this amount of developed countries is comparatively minimal. Moreover, to industrializing countries, steel industry might play a more critical role compared to advanced countries. For the former group, it can be more sensitive to protect this backbone sector for the sake of fostering their economic development. In developed countries, their economy structure can be more diverse and flexible than developing counterparts, even though to some countries, it is still important to maintain this sector for social stability and national security. These factors might impact on the extent to which overcapacity can influence the motivation for AD filing against China. Therefore, the incentive for developing countries to protect this sector is supposed to be more obvious than their developed country group. To test this hypothesis, I conduct a modified regression model based on the basic dataset in previous session. In this case, I will apply the same econometric model but divide the data set into two groups. Group 1

Table 6. 2 Regression result (2)

Dependent variable AD action against China in steel industry	**Regression II** (Developed country group) Coef.	**Regression III** (Developing country group) Coef.
ADexsteel	- 0.0595358	0.111994***
	(-1.22)	(5.48)
CHIEXS	-2.244142	1.046816
	(-0.43)	(0.78)
CHIIMS	-11.33815	-0.3910977
	(-1.4)	(-1.05)
GDPGRCHI	0.0251629	-0.0396756
	(0.41)	(-1.53)
GDPGRi	0.0588321	0.0372472**
	(0.75)	(2.26)
RERi	-0.0029845	0.0005557
	(-0.43)	(0.26)
OVERCAP	9.80 e-06	0.000047***
	(1.12)	(3.29)
_cons	0.973899	0.087556
	(1.11)	(0.26)
Number of observation	112	336
R-square	0.0686	0.1266

Note** significant at 5% level, *** significant at 1% level, the numbers in parenthesis are t-statistics

consists of developed countries of 6 economies (Australia, Canada, EU (27), Japan, South Korea and the US). Group 2 comprises the rest of countries (22 countries). Similarly, panel regression is applied. Empirical results are shown in table 6.2. The result confirms my assumption, there a significant effect (1% level) of overcapacity in steel on AD action against China in developing country group whereas this effect is not significant in the case of developed countries. This outcome also agrees with the current trend of AD actions with the increasing involvement of developing countries in taking AD actions. For developing countries, it is showed that the more they are dealing with overcapacity, the more AD actions case they raise against China. This can be generally explained by the threats from competition in the world market between these new rising producers with China as well as the current and potential risk that China can pose to their domestic sector. One thing to notice is that there is no significant indicator in the group of developed countries. Despite that fact, overcapacity shows a positive relationship with AD actions, albeit insignificance. This can be attributed to a small size of sample. Hopefully, it can be improved by future research. A closer look at the group of developing country shows that it shows similar results to the Regression I, except the effect of China's GDPGR on AD actions turns to be insignificant. Probably, the larger proportion of number of developing countries affects the aggregate result. It suggests that a more balanced data collection should also be collected in further study.

6.3 The effect of overcapacity on AD actions against China combined with the effect of FTA (H3)

Another issue that I attempt to study is the impact of free trade agreement (FTA) on the relationship of overcapacity in steel on AD actions in this case. In other words, this idea is motivated by the study of Ahn and Shin (2011) which concluded that countries conducted fewer AD actions against their FTA partners regardless of the increase in imported volume resulted from the agreement. Then, it would be intriguing to combine the FTA effect into studying the study of overcapacity in steel on AD actions against of China. Consequently, I divided the data set into 2 groups including China's non-FTA partner (17 countries) and China's FTA partner comprising 11 countries. According to official website of China FTA network (fta.mofcom.gov.cn), up to the point of this writing China has completely formed FTA with 16 countries and regions. Within dataset of this study there are six countries including Australia, South Korea, Peru, New Zealand, Chile and Pakistan and one region, ASEAN are FTA partners of China. The rest including 17 countries are China's non-FTA partners.

My expectation is that when FTA reduces the motivation for AD actions in general, it will also abate the attempt to raise AD actions in steel industry. Therefore, the effect of overcapacity in steel together with other factors would become less significant on AD action in steel sector in a sample of China's FTA partners compared to that of China's non-FTA partners. It means despite the issue of excess capacity in steel, a country is discouraged to file AD action against its FTA-partner, especially China – a large market for the sake of avoiding retaliation or unwanted friction in trade between the two countries. One the other hand, those countries who have no FTA with China

will be more likely to take AD actions, especially to counteract the it's rampant capacity expansion. Panel regression and econometric model with fixed effect are once again applied to analyse this hypothesis. The result is shown in table below:

Table 6. 3 Regression result (3)

Dependent variable AD action against China in steel industry	**Regression IV** (Non-FTA partner countries) Coef.	**Regression V** (FTA partner countries) Coef.
ADexsteel	0.0729967***	0.0496933
	(3.01)	(0.98)
CHIEXS	2.282921	-0.2320095
	(1.16)	(-0.17)
CHIIMS	-0.5491354	-6.199133
	(-1.33)	(-1.09)
GDPGRCHI	-0.0248676	-0.0571323*
	(-0.80)	(-1.95)
GDPGRi	0.0289308	0.0489205*
	(0.97)	(1.65)
RERi	-0.002152	0.0052148
	(-0.87)	(1.19)
OVERCAP	0.0000135**	0.0000346
	(2.01)	(1.36)
_cons	0.4986854	0.00404
	(1.23)	(0.01)
Number of observation	272	176
R-square	0.1485	0.0890

Note: * means significant at 10% level, ** significant at 5% level, *** significant at 1% level, the numbers in parenthesis are t-statistics

The empirical result shows a compliance with my expectation. The effect of OVERCAP is stronger in non-FTA partner country group (5 percent significant level) compared to FTA partner group (insignificant level). Particularly, in China's FTA partner group, there is only GDPGR of those countries and China's GDPGR have significant impact (but only 10 percent level). On the other hand, the group of China's non-FTA partners show positive and significant effects of OVERCAP and total ADexsteel (at 5 and 1 percent level respectively). Interestingly, the effect of GDPGR in this sample becomes insignificant. This evokes the fact that for FTA partner countries, AD in the steel sector are more influenced by macro-factors such as GDPGR while non-FTA partner countries are more sensitive to such factors of OVERCAP and China's vulnerability to AD actions. The result generally agrees with the study of Ahn and Shin (2011) when FTA-partner group shows less vigorous attempt to litigate AD action against China compared to that of non-FTA partner group include the steel sector. However, the division of the data into sub-groups can make the result become less statistically significant compared to the aggregate one's (Regression I) as the number of observation are reduced. Therefore, it evokes that a larger data set for each group should be used. Yet, it is difficult now due to unavailability of data.

Chapter 7. Conclusion policy implication

7.1 Conclusion

My study has shown that overcapacity in steel induces more AD actions against China since the time this country significantly expanded its steelmaking capacity in the 2000s. Along with excessive capacity, other factors including GDP growth rate of China and its trading partners also have significant effect on the AD filings against this leading steelmaker. On the other hand, bilateral trade in steel and real exchange rate of importing countries have insignificant impact on motivating AD case against China. This pattern demonstrates two important issues. Firstly, steel industry inherits its own characteristics different from other sectors. This is explained through some opposite results my study in comparison with previous studies. This is due to its economic and political importance of steel industry to almost every country. Hence, it is always necessary and reasonable to protect this strategic sector. Secondly, the result of this study also strongly reflects protectionism in steel and further epitomize the current trend in international trade where the golden era of free trade seems to be savaged by the increasingly popular of trade remedy measures, particularly AD actions.

Different dimensions of the relationship of steel overcapacity and AD action against China are also analysed. The effect of level of development shows that developing country group shows more vigorous attempt to counteract China steel capacity expansion through initiating more AD actions compared to developed country group. The impact of FTA also presents an interesting result that FTA partners are less likely

to raise AD actions against China despite experiencing a certain level of excess capacity in their home countries. However, non-FTA partners seem to not be bound by this outcome.

7.2 Policy implication

Then how to cope with the situation of steel overcapacity. My point is that we should address both the excess capacity and the effectiveness of AD measure on combating this issue. For curbing the overcapacity in steel industry, we could start from the root cause of the problem, China's rampant steelmaking capacity. At this point, China has long been recognizing its own issue and exerting several efforts to resolve it. However, the actual accomplishments have not shown any significant progress, but being widely dubbed as "broken promises". The core theme of its attempts is strong commitments to structural reforms. At outbound level, the most noticeable approach is initiating bilateral talks with the US. Under the pressure from the US and other countries, China involved in many rounds of bilateral U.S-China Strategic and Economic Dialogue (S&ED) with plausible promises to reduce its steelmaking capacity. Even so, China's capacity keeps expanding after those dialogues. The main cause to be blamed is the strong resistance from local authorities who desire to keep the industry to provide employment and social stability of their regions, and eventually to maintain their power and enhance their political influence. Among the China proposed policies, there are some important approaches that can evoke good implication for future solutions although it cannot be fully applicable now. First, deepening China's economic reforms to let the market plays a decisive role in the allocation of resources such as inputs, land

and energy. Only by doing so can steelmaking capacity be appropriately adjusted to acquire normal level. Second, the country also strives to further reform its SOEs in terms of making them more efficient through diversified ownership and recruiting more qualified managerial personnel. It will hopefully improve efficiency of steel industry. Third, opening and attracting foreign direct investment (FDI) in steel sector is another effort to solve the problem of overcapacity in steel. In domestic policies, one striking attempt is to consolidate its steel industry. As compared to other countries such as US and EU, China's steel industry is relatively fragmented when its top three producers account for only 18 percent of the Chinese market, compared to 66 percent and 42 percent for Japan and Europe respectively. In this case, the Chinese government is in favour of merger and acquisition (M&A). However, there are some obstacles that can interfere this process such as long transportation distances, resistance from local government and financial restraints to the consolidation. These are all plausible solutions embraced by the Chinese government but they are still far to reach any remarkable achievement.

In my opinion, thing would not change if there are no external influences. As being presented in the earlier parts of my study, taking AD actions against China is now what the world has reacted to the country. Though it is by no mean the best solution, it does directly send a warning signal to Chinese steel producers to watch out their current practices. The side effects of this measure include hurting consumers and deterring free trade. It is also worth noticing that under WTO in order to succeed in an AD case, the complaint party should be able to fulfil some conditions of proving evidences of dumping, which is burdensome or even sometimes impossible for many countries who

actually encounter the damage from China's export. Therefore, one idea is the shifting burden of proof to the respondent party can be a potential measure in this case. Besides, the idea suggested by Brun (2016) is also plausible. He suggested that enhancing the enforcement of multilateral environmental agreements can help to eliminate Chinese enterprises that have been taken unfair advantages at heavily pollute environment. Through this mechanism, we can promote environmentally responsible practice but at the time limit the Chinese rampant steelmaking capacity by excluding inefficient and irresponsible enterprises. Moreover, other countries should also take the current issue into account when making development plans such modernization program and restructuring steel industries.

References

Ahn, Dukgeun, and Shin, Wonkyu. 2011. “Analysis of Antidumping Use in Free Trade Agreements”. *Journal of World Trade* 45(2): 431–456.

Anthony P.D’s Costa. 1999. *The global restructuring of the steel industry: Innovations, institutions and industrial change*. Published by Routledge.

Badi H.Baltagi. 1995. *Econometric analysis of Panel data*. Published by Wiley.

Benjamin H. Liebman. 2006. “Safeguards, China, and the Price of Steel.” *Review of World Economics.* 142:354 http://doi.org/10.1007/s10290-006-0071-y

Bown, Chad P. 2016. "Global Antidumping Database,” The World Bank, June, available at http://econ.worldbank.org/ttbd/gad/

Center on Globalization, Governance & Competitiveness. 2016. “Overcapacity in steel, the role of China’s in global problem”. Duke University

United Steelworkers. “Chinese steel overcapacity. A legacy of broken promises.” (USITC press)

Feinberg, R .1989. “Exchange rates and “unfair trade”. *Review of Economics Statistics*, 71(4), 704-707. http://dx.doi.org/10.2307/1928116

Feinberg, R .2003. “U.S. Antidumping Enforcement and Macroeconomic Indicators Revisited: Do Petitioners Learn?” *2005 Kiel Institute for World Economics*. DOI: 10.1007/s10290-005-0047-3

GM. Grossman. 1986. “Import as a cause of injury: The case of the US steel industry”, *Journal of International Economics* 20 (1986) 201-223. North-Holland

Greg Mastel. 1999. *The U.S. Steel Industry and Antidumping Law*. 42:3, 84-94, DOI: 10.1080/-05775132.1999.11472101. Routledge publisher.

Jose Guilherme de Heraclito Lima. 1991. *Restructuring the U.S steel industry: Semi-Finished Steel imports, international integration, and U.S adaptation*. Published by Westview.

Kara M. Reynolds. 2009. “From Agreement to Application: An Analysis of Determinations under the WTO Antidumping Agreement.” *Review of International Economics*. Volume 17, issue 5. 879-1097.

KAWABATA Nozomu. 2017. “Where is the Excess Capacity in the World Iron and Steel Industry? –A focus on East Asia and China.” RIETI Discussion Paper Series 17-E-026.

Knetter, M.M., Prusa, T.J. 2000. “Macroeconomic factors and antidumping filings: Evidence from four countries.” *NBER Working Paper* No. 8010.

Knetter, Michael M. & T.J. Prusa. 2003. “Macroeconomic Factors and Antidumping Filings: Evidence from Four Countries”. *Journal of International Economics* 61, no. 1 (2003):1–17.

Leidy, M. P. (1997). “Macroeconomic Conditions and Pressures for Protection under Antidumping and Countervailing Duty Laws: Empirical Evidence from the United States.” *International Monetary Fund Staff Papers* 44 (1): 132–144.

Ligang Song & Haimin Liu. 2012. “Steel industry development and transformation in China: an overview”. In *The Chinese Steel Industry’s Transformation*, edited by Ligang Song and Haimin Liu, 1-17. Edward Elgar Publishing.

Mustapha Sadni Jallab, Monnet Gbakou, Ren_e Sandretto. 2008. “Antidumping Procedures and Macroeconomic Factors: A Comparison between the United States and the European Union.” *Global Economy Journal*, The Berkeley Electronic Press, 2008, 3 (article 5), s.p. <halshs-00359850>.

Mustapha Sadni Jallab, Monnet Gbakou, Ren_e Sandretto. “Antidumping Procedures and Macroeconomic Factors: A Comparison between the United States and the European Union.*” Global Economy Journal*, The Berkeley Electronic Press, 2008, 3 (article 5), s.p. <halshs- 00359850>.

OECD. 2015. “Capacity Developments in the World Steel Industry” DSTI/SU/SC (2015)8/FINAL, 23

OECD. 2015. “Excess Capacity in the Global Steel Industry and the Implications of New Investment Projects”, *OECD Science, Technology and Industry Policy Papers,* No. 18, OECD Publishing, Paris. http://dx.doi.org/10.1787/5js65x46nxhj-en.

OECD. 2016. “Steel trade policies: recent measures, disputes and trade distortions in the steel sector.” DSTI/SU/SC (2015)4 78th Steel Committee Meeting Paris.

Prusa, Thomas J. 2005. “Anti-Dumping: A Growing Problem in International Trade.” *World Economy* 28 (5):683–700.

Robert W. Staiger. 1994. “Measuring Industry Specific Protection: Antidumping in the United States” *NBER Working Paper* No. 4696.

Tang, R. 2010. “China’s steel industry and its impact on the United States: Issues for Congress. Washington, DC”. *Congressional Research Service*.

Thomas R. Howell, William A. Noellert, Jesse G.Kreier, and Alan Wm. Wolff. *Steel and the state: Government intervention and steel’s structural crisis*. Boulder: Westview press, 1988.

World Steel Association.2017. “*Steel statistical year book 2017*”.

World Steel Association. 2012. “*The White book of steel*”.

Websites:

WTO. 2017. “Concerns grow about slippage in subsidy notifications”.

Accessed by January 22, 2018.
https://www.wto.org/english/news_e/news17_e/scm_25apr17_e.htm.

WTO. 2016. “Problems in steel sector prompting rise in trade remedy measures, WTO members told”.

Accessed by January 20, 2018.
https://www.wto.org/english/news_e/news16_e/anti_29apr16_e.htm.

China FTA Network. “China Free Trade Agreements”.

Accessed by January 22, 2018. http://fta.mofcom.gov.cn/english/index.shtml.

Industry today. 2011. “China deploys state power to dominate global steel industry”.

Accessed by January 22, 2018. https://industrytoday.com/article/state-sponsored-overcapacity-the-looming-crisis-in-the-global-steel-industry.