

ASAN REPORT

Using Modified Anti-Dumping Mechanisms for Sustainable Development:

The Case of the Chinese Iron and Steel Industry

CHOI HYEONJUNG, LEE SOO-HYUN

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The Asan Institute for Policy Studies

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List of Abbreviations

AD-CVD	Anti-Dumping and Countervailing Duties	INDC	Intended Nationally Determined Contribution
ADA	Anti-Dumping Agreement (i.e., Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade 1994)	KgCe/t-coke	Kilograms of Coal equivalent per tonne of coke produced
		KgCO ₂ /t-s	Kilograms of CO ₂ emissions per tonne of crude steel cast
ADM	Anti-Dumping Measure	LTFV	Less than Fair Value
BAU	Business-as-Usual	MEA	Multilateral Environmental Agreement
BF-BOF	Blast Furnace-Basic Oxygen Furnace	MES	Market Economy Status
Carbon-adjusted DM	tCO _{2e} /t-s Adjusted Dumping Margin (i.e., tonnes of CO ₂ equivalent emissions per tonne of steel output adjusted Dumping Margin)	MFN	Most Favored Nation
		MMT	Million Metric Tonnes
CNY	China Renminbi	MtCe	Metric Tonnes Coal equivalent
COP21	21 st Conference of the Parties (2015)	NAMA	Nationally Appropriate Mitigation Target
CISI	Chinese Iron and Steel Industry	NME	Non-Market Economy
CVD	Countervailing Duties	OECD	Organisation for Economic Co-operation and Development
DCR	Domestic Content Requirement	SD	Sustainable Development
DM	Dumping Margin	SDG	(United Nations) Sustainable Development Goal
DSB	(World Trade Organization) Dispute Settlement Body	SDT	Special and Differential Treatment
EAF	Electric-Arc Furnace	SETC	State Economic and Trade Commission (China)
ETS	Emissions Trading Scheme	SOE	State-Owned Enterprise
FYP	Five-Year Plan (China)	TBT	Technical Barrier to Trade
GATT	General Agreement on Tariffs and Trade	TFP	Total Factor Productivity
GHG	Greenhouse Gas	TRIMs	Trade-Related Investment Measures
GSP	Generalized System of Preferences	UNFCCC	United Nations Framework Convention on Climate Change
		USD	US Dollar
		WTO	World Trade Organization

Executive Summary

The world's collective efforts to advance the goals of sustainable development are failing to produce results at the rate that they needed to prevent devastating levels of greenhouse gas emissions. In spite of our declarations of renewed cooperation with the Paris Agreement on Climate Change in December 2015, the countries in line to be the next biggest polluter are becoming more numerous. The current titleholder is China, whose rapid economic growth resulted in a 100-fold increase of total greenhouse gas emissions in just 60 years. The manufacturing of such commodities as iron and steel is regarded as the primary source of emissions, accounting for 47% of the country's total emissions.

As explored in Chapter 2, the impact of the Chinese iron and steel industry (CISI) on the environment demonstrates that the combination of production overcapacity and high emissions production methods present a serious threat to its own sustainability. Despite efforts by the Chinese government through the 13th Five Year Plan (2016–2020) to put its industries on track with sustainable development, industrialists have found ways to elude regulation and their provincial governments have been willingly ignoring such transgressions in the name of regional prosperity.

The sustainable development challenges of the CISI are not contained within its borders: the industry controls approximately half of the global market for steel products as the lowest-price supplier. As Chapter 3 explores, the firms in this industry eventually became large enough to operate autonomously from the central government, sustaining themselves through assistance from provincial governments and direct trade with foreign markets. Beijing lost control over the CISI during periods of decentralization as provincial governments pursued their own regional growth strategies centered on steel and iron production. The result was unprecedented production overcapacity and deeply embedded structural hurdles to state-led attempts at controlling production and reducing carbon emissions.

This report examines the viability of using external measures to realign the CISI and industries of similar characteristics with sustainability in Chapter 4. While a range of global regulatory instruments are viable candidates for this investigation, anti-dumping is an ideal instrument for this study due to its proven firm-level impacts, the extent of

its usage, and its broad applicability through the World Trade Organization (WTO). While anti-dumping measures (ADMs) as an external regulatory mechanism are certain to have an impact on CISI, their conventional application remains insufficient. Thus, the modification proposed in this report targets both material injuries to importing economies' industries and irresponsible production methods that cut costs by means of egregious environmental degradation. As such, this report provides the basis for a modified approach to ADMs entitled the "tCO₂e/t-s Adjusted Dumping Margin" or simply the "Carbon-adjusted Dumping Margin (Carbon-adjusted DM)." The importance of the Carbon-adjusted DM to both China and international society is that it provides a means to apply the Polluter Pays Principle to the CISI, an industry that has been able to gain from freely emitting greenhouse gases into the atmosphere. In the context of the Anthropocene, this paper is one attempt to find a fair price for the products of high emissions manufacturers by more stringently considering their costs in public goods. This paper proposes the Carbon-adjusted DM as a means to charge that fair price.

The search for an agreeable proposal for the creation of a carbon pricing mechanism is building momentum in both research and policy spheres. Emission trading schemes like that in Europe and efforts to create a smart green tax to account for greenhouse gas emissions are attracting attention and being experimented with around the world, including China. Intended nationally determined contributions (INDCs) and nationally appropriate mitigation actions (NAMAs) represent insightful efforts in helping countries find a pathway to sustainable development appropriate to their respective national context. However, sustained change comes from unified, global enterprise. As such, reforming international regulatory systems like ADMs to encourage sustainable development cannot be done solely within borders, but only across them.

Chapter 4 explains the value of implementing a carbon-adjustment to the anti-dumping calculation. Generally, implementation of the Carbon-adjusted DM is significant for three reasons. The first is that the domestic steel industries of CISI product importing markets will not have to find alternative ways to compete, such as closing steel plants and laying off workers. The second is that exporting steel and iron firms will be more compelled to make changes to their production processes that promote sustainability, such as transitioning their technologies to low-emissions output. Lastly, modifications will enhance the accuracy of legal mechanisms as well as better represent existing realities such as global warming. They will also preserve the efficacy and relevance of

those mechanisms not only in international trade, but also in global sustainable development. To contribute to these efforts, this report introduces an ambitious yet necessary idea to ongoing research and development in global carbon pricing mechanisms.

The projected impacts of adopting and implementing the Carbon-adjusted DM are further explored in Chapter 5. This research shows that a mechanism of this kind not only makes international regulatory mechanisms in trade more effective, but also strengthens their capacities to contribute to global sustainable development. A business-as-usual scenario is also explored in Chapter 5, which shows that without change, economic conditions for the iron and steel industry, including the CISI, will continue to worsen and world regulatory systems like that of the WTO may suffer from a diminished rule of law.

While this report looked specifically at the case of the Chinese iron and steel industry, the findings in this report present implications beyond this isolated application. Manufacturing industries of advanced economies promoting sustainability and investing in low emissions production are instead being penalized for unfair trade. The immense gap between the amount of steel produced and actually demanded continues to expand, resulting in long-run fears of unloading stockpiled steels at low prices. Sluggish demand for energy efficient and low-emissions production technology encumbers innovation and diffusion. Less developed countries look to emulate the CISI-type production as a panacea to their development challenges. These trends confirm the fact that without change to regulatory institutions, these threats of tomorrow will very soon become the challenges of today.

Chapter 1. Introduction

In 2015, the Chinese iron and steel industry (CISI) churned out half of the world's steel – 803 million tonnes out of 1.62 billion tonnes. While this represents the first drop in output by the CISI in 34 years, it is a scale of undeniable enormity – 3.25 times greater than the combined steel production of the United States and European Union. Domestic laborers in these countries emptied out of their steel plants at the influx of

CISI's products, unable to compete against such inexpensive imports. They called upon their governments to protect them against such unfair competition. Meanwhile, imperial plumes of smog continue to flood the skies as Chinese steel plants adamantly adhere to highly polluting forms of production.

While this report primarily considers the Chinese iron and steel industry, it also serves as a partial representation of China's intricate public policy involvement in shared challenges like climate change mitigation and global sustainable development. For a country known to largely follow a hardline position that puts its economic convergence first, this study serves to measure the direction and extent of change in China's policy approach. More specifically, has China's institutional approach to multilateral standards and systems changed with the times? This question becomes especially salient when considering the active participation by China's leadership in submitting an Intended Nationally Determined Contribution leading up to the 21st Conference of the Parties at the end of 2015 and the ratification of the Paris Agreement on Climate Change during the 2016 G20 Hangzhou Summit in 2016. During the Summit, Xi Jinping in a widely circulated statement referred to a Chinese proverb calling for the need of new methods: “when the old path no longer takes us far.” Is China prepared to leave this proverbial old path? This may certainly be the case: the country experimented with an emissions trading system (ETS) in seven of its provinces and aims for national implementation. This would account for 4 billion tonnes of carbon, making it the world's largest nationwide ETS.¹ While an exciting step forward in the effort towards a carbon pricing mechanism, China has yet to have shown as much resolve outside its borders, in the global effort toward sustainable development.

In order to shed some light on this issue, this report addresses one of China's oldest industrial sectors, iron and steel, and examines how the country has been interacting

1. Widge, V. “March forward: China is creating the world's largest market-based carbon pricing system.” *Development in a Changing Climate: Making our future sustainable*. World Bank. 2015 September 29. Web. Accessed 2016 September 5. Available at: [<http://blogs.worldbank.org/climatechange/marching-forward-china-creating-world-s-largest-market-based-carbon-pricing-system>].

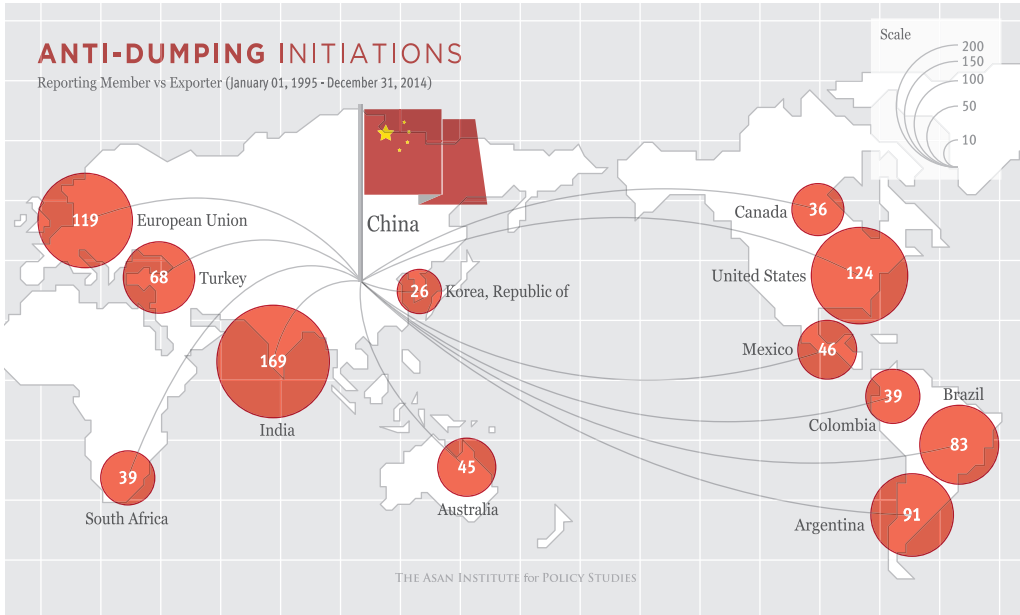
Bo, Z. “Should the World Be Worried About China's Economy?” *The Diplomat*. 2015 September 7. Web. Accessed 2015 November 27. Available at: [<http://thediplomat.com/2015/09/should-the-world-be-worried-about-chinas-economy/>].

with one of the oldest international trade dispute settlement mechanisms in international law: anti-dumping. While the focus of this study is the CISI, it presents profound implications for most if not all areas of trade with China, as well as with those industrial sectors of other economies with similar characteristics. As a matter of methodology, by addressing the economic and environmental problems posed by the CISI, this report provides the analysis to propose an alternative, more comprehensive approach to anti-dumping measures (ADMs) that can directly confront those challenges on the firm-level. This alternative approach is significant in its expediency, in that it bypasses the limitations of the central government, which has been obstructed by a lack of commitment, provincial governments' plans for regional development, and institutional limitations in the current practice of ADMs. Furthermore, this approach also bears significance to international economic law as an institution, since more jurisprudential encounters between international trade and sustainable development would bring these two largely estranged fields into a more predictable and meaningful union. The alternative approach to ADM suggested in this report is for the inclusion of a hypothetical modification to the dumping margin calculation that includes costs of greenhouse gas (GHG) emissions as a variable, which is labeled the "tCO₂e/t-s Adjusted Dumping Margin"² (hereinafter "Carbon-adjusted DM").

This report identifies ADM with the Carbon-adjusted DM as an ideal tool for addressing the sustainable development challenges of the CISI, not only because of its proven macroeconomic and firm-level influences on export-oriented firms that benefited from industrial policy, but also because ADM applies external pressure to CISI firms. Since China became a World Trade Organization (WTO) Member State in 2001 after years of expansion of the CISI, threatened economies turned to the WTO for resolution. They called for investigations by the WTO, claiming that Chinese steel products were being sold at prices far less than the fair value (LTFV), or, in other words, were being dumped. Investigations in anti-dumping and countervailing duties (CVDs)³ began and soon turned into trade disputes administered by the WTO Dispute Settlement Body (DSB). Figure 1 illustrates the scale of initiated anti-dumping investigations targeted against the CISI's unfair steel prices.

2. To be read as the "tonnes of CO₂ equivalent emissions per tonne of steel output adjusted dumping margin."

Figure 1. ADM initiations against Chinese Steel Producers



Source: Infographic by Choi Sunghan based on data from the WTO Anti-Dumping Database.

The lack of a market economy in China made attempts to calculate "normal value" difficult, which is an essential step in imposing an ADM. In its WTO Accession Document, China claimed "Non-market Economy (NME)" status to last until December 2016, when the country would receive "Market Economy Status (MES)."⁴ If China's MES is recognized, it will become more difficult to justify the use of a surrogate state to measure price comparability of CISI steel, thereby making it difficult to successfully impose an ADM.

Right from the start of 2016, the EU, the United States, Canada, several countries in

3. Investigations in countervailing duties are conducted when a subsidy being provided domestically in one industry between two trading countries is deemed a trade distortion, thereby allowing the country that initiated the investigation to apply a subsidy in their domestic market in order to level competition. For the purposes of this report, ADMs and CVDs are addressed as a single regime of international economic law and thus identified as one.

Africa and the CIS, Mongolia, Turkey, India and Japan chose not to recognize the MES of China on the basis of paragraph 15(a)(i) and (iii) of China's Accession Protocol, which states that it must clear that "market economy conditions prevail" in "manufacture, production and sale". As such, those Member-States that reject China's MES have chosen to continue to employ a "methodology that is not based on a strict comparison with domestic prices or costs in China."⁵ Rejection of Chinese domestic price and cost data and the use of alternative methodologies to calculate the DM for nonmarket economies essentially neutralize the MES status that China believed should have been granted automatically 15 years after its accession to the WTO. China responded by lambasting what it perceived to be a double standard⁶ and that recalcitrant states were in violation of international obligations as Member-States of the WTO.⁷

Of the many issues that the WTO will have to contemplate as the world undergoes such epochal change like the rise of China, this report focuses on the impact of the CISI on internal and external markets, as well as global sustainable development. The

4. The NME status of China when it became a signatory to the WTO made it a frequent target of anti-dumping investigations. The lack of market economy status was largely due to the fact that many countries viewed Chinese industrial policy as being contrary to Article 9(1) of its Accession Document to the WTO. This stated that "China shall [...] allow prices for traded goods and services in every sector to be determined by market forces, and multi-tier pricing practices for such goods and services shall be eliminated." According to WTO law, nonmarket economy status means that rather than using the domestic value as the normal value, anti-dumping investigations employ the value of similar products in a proxy (surrogate) country to determine whether the product in question is being sold at LTFV and thus being dumped, or construct a normal value using alternative means.

5. World Trade Organization (WTO). "Accession Protocols, page a0." *Repertory of Appellate Body Reports*. Web. Accessed 2017 March 3. Available at: [https://www.wto.org/english/tratop_e/dispu_e/repertory_e/a0_e.html].

6. "China sees scant progress in battle for market economy status." *South China Morning Post*. Web. 2016 December 11. Accessed 2017 March 3. Available at: [<https://www.forbes.com/sites/douglasbulloch/2016/12/12/china-doesnt-deserve-its-market-economy-status-by-wto/#1347c3edb937>].

7. Nan, Z. and Jing, F. "EU 'has obligation' to recognize MES." *China Daily Asia*. Web. 2016 May 14. Accessed 2017 March 3. Available at: [http://www.chinadailyasia.com/nation/2016-05/14/content_15432790.html].

Carbon-adjusted DM serves as a countermeasure to both of these issues, thereby keeping trade defense and dispute settlement mechanisms like ADMs both relevant and effective.

Chapter 2. CISI and Its Threat to Sustainable Development

Government intervention in designing and planning the steel industry is a long established practice. This originates in the developmentalist belief that state intervention to achieve economies of scale can lead to macroeconomic take-off.⁸ This has been a common trend in the industrialization periods of now high-income Asian economies such as Japan, Singapore, and South Korea and continues today in China and Vietnam.⁹ The rapid growth of China and the CISI along with unprecedented scales of industry has shown to pose considerable challenges to not only the global economy (see Appendix A), but also the joint effort in achieving sustainable development.

The reduction of production costs through the use of environmentally destructive methods of production, both in the use of ecosystem services and high levels of emissions, is at the core of CISI's threat to sustainable development. The rapid expansion in steel production in China from 100 million tonnes in 1996 to 822.7 million tonnes in 2014-2015 was largely in iron-ore-based new steel production rather than recycled scrap steel, which constitutes only about 11% of China's total production. This is in contrast to steel scrap usage in the EU-28 (53.9% of total production), USA (70.3%), Japan (33.3%), Republic of Korea (45.6%), and Turkey (82.9%).¹⁰ As a result, one tonne

8. See, for instance, Woo-Cumings, M, ed., *The Developmental State* (Cornell University Press, 1999).

9. Organization of Economic Cooperation and Development (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: pp 7-8.

10. Bureau of International Recycling, Ferrous Division. 2015. "World Steel Recycling in Figures, 2010-2014: Steel Scrap - a Raw Material for Steelmaking." *BIR Global Facts & Figures*, BIR, pp 16-24.

of CO₂ emissions per tonne of crude steel cast (tCO₂/t-s) through the blast furnace-basic oxygen furnace (BF-BOF) process in China has been higher¹¹ than the 1.7 to 1.8 tCO₂/t-s intensity world average,¹² with approximately 3.5 tCO₂/t-s in 2000 falling to around 2 tCO₂/t-s by 2012.¹³ For the sake of comparison, the CO₂ emissions intensity of the OECD Member States dropped to about 1 tCO₂/t-s by 2012.¹⁴

The high tCO₂/t-s of China can be attributed to a number of nested factors. The largest factor is the lack of endogenous technological advancement, or capital deepening, in two primary processes: transitioning to the use of electric-arc furnaces (EAF) and implementing more energy efficient technologies in coke production. Regarding the former, EAF skips not only the preparation of raw materials, but also the ironmaking process in casting steel via the BF-BOF route. EAF involves melting down scrap steel for the creation of crude steel, skipping the raw material and iron-making processes and thus saving more than 1,400 kg of iron ore, 740 kg of coal, and 120 kg of limestone for each tonne of scrap steel used.¹⁵ Chinese data from 2009 shows that 56% of the CO₂ emissions from steel casting originates from the raw material preparation (10%) and iron-making (46%) involved in the BF-BOF process.¹⁶ Skipping the iron-making process is particularly helpful in cutting down the CO₂ emission content of steel production as it bypasses the need to create coking coal, or metallurgical coal, which

11. Gao, C.; Wang, D.; Zhao, B.; *et al.* 2015. “Analyzing and forecasting CO₂ emission reduction in China’s steel industry.” *Frontier Earth Science* 9(1), p 106.

12. Carpenter, A. 2012. “Profiles: CO₂ abatement in the iron and steel industry.” *Profiles* No 12/1, IEA Clean Coal Centre, p 1. Available at: [http://www.iea-coal.org.uk/documents/82861/8363/CO₂-abatement-in-the-iron-and-steel-industry,-CCC/193].

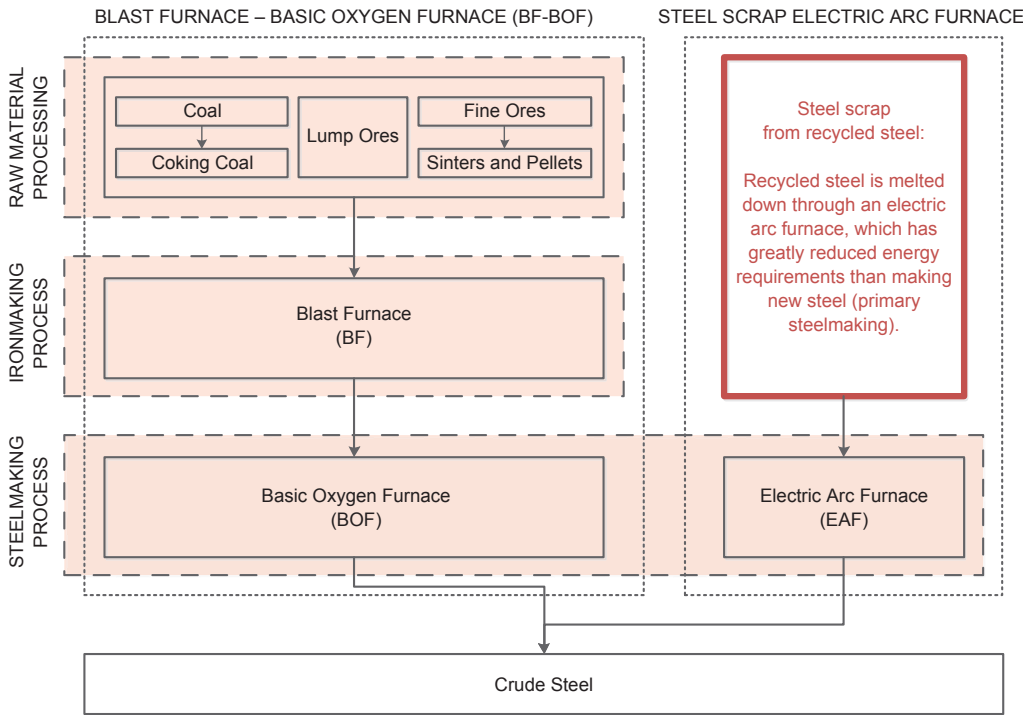
13. Han, Y. 2011. “Research on carbon dioxide emission of Chinese iron & steel industry” (in Chinese). *Journal of Nanjing University of Information Science and Technology: Natural Science Edition* 3(1), p 53-57.

14. West, K. “Energy Technology Perspective 2015: Iron & Steel Findings.” *OECD Steel Committee meeting*, 12 May 2015. International Energy Agency (IEA). Available at: [http://www.oecd.org/sti/ind/Item%208b%20-%20IEA_ETP2015_OECD%20Steel%20Committee_final.pdf].

15. World Steel Association. “Resource Efficiency.” *Environmental Sustainability, Steel by Topic*. Web. Accessed 28 January 2016. Available at: [https://www.worldsteel.org/steel-by-topic/sustainable-steel/environmental/efficient-use.html].

16. Zhang, CX. “Effecting on carbon dioxide emission from steel enterprise and from process structure.” *Report on Steel Enterprise Conference*. September 2009 via Gao (2015).

Figure 2. Steel Production Routes



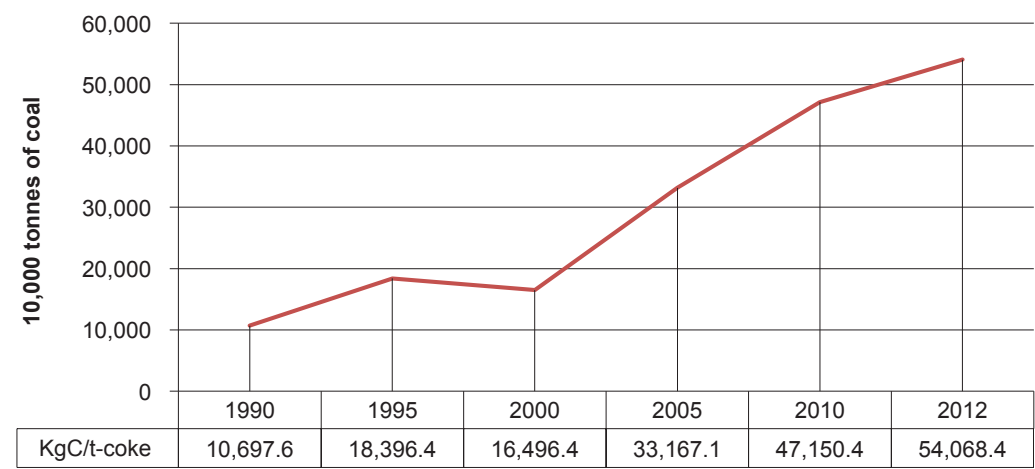
Source: Author’s illustration.

is a product of coal necessary for iron production. Figure 2 helps visualize the steel production process and compare the creation of steel from iron to that of using recycled steel via the EAF process.

There are technologies in coke production that can greatly reduce its environmental impact, but only 40% of the CISI uses such clean coking processes.¹⁷ Considering scale is again crucial here; China is the largest steel producer at approximately 89% BF-BOF with increasing marginal steel production capacity. China is also the largest coking coal producer in the world, having recorded 60% of global production in 2010. Thus, improving technologies in coking coal production is only one step in the process of reducing the environmental impact of the CISI. Coking coal production in China has

17. *Ibid.*, Gao at p 107.

Figure 3. Coking Coal, China, 1990 to 2012



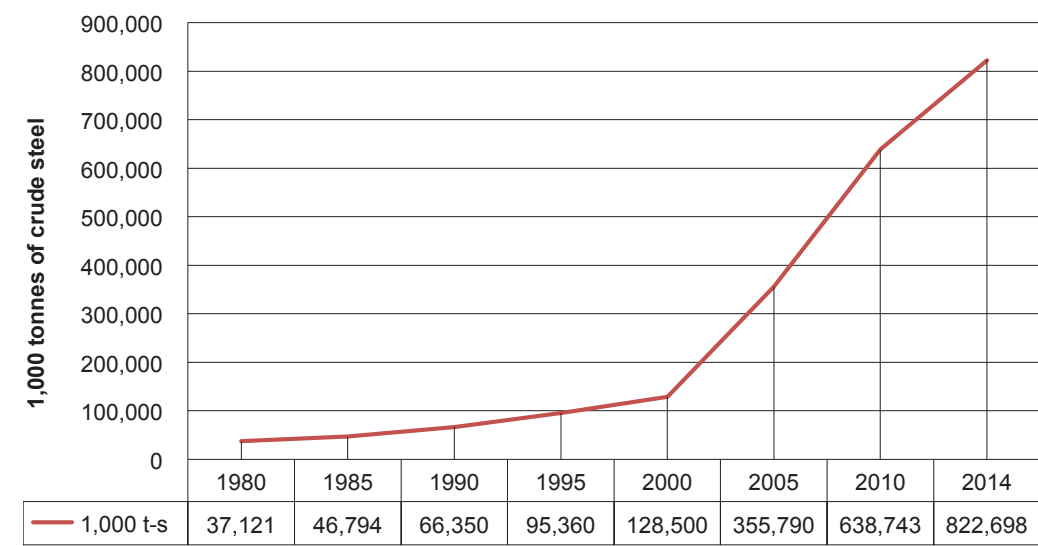
Source: China Statistical Yearbook 2014.

similar origins as that of steel, with government-backed massive expansions in scale within a short period of time. In 2000, China was producing 122 million metric tonnes (MMT) of coking coal, which nearly quadrupled by 2011 to 428 MMT in response to both global demand and domestic iron and steel production. While China achieved a 47% reduction of energy consumption in coke production processes, from 217 kilograms of coal equivalent per tonne of coke produced (KgCe/t-coke) to 114 KgCe/t-coke in 2010, coal consumption for coking increased at a logarithmic rate from approximately 10 MMT of coal in 1980 to 45 MMT in 2010.¹⁸

Notable here is that coal consumption for coking was relatively stagnant at around 10 MMT per year from 1980 to 1990, but from 2000 onward marginal coal consumption increased exponentially at a rate of about 2 MMT per year, as shown in Figure 3. This corresponds with the dramatic increase in steel production, which is graphically represented in Figure 4. This clearly demonstrates that, while technologies that reduce environmental impact are important, a significant part of the problem is the sheer scale of China's production.

18. Huo, H.; Lei, Y.; Zhang, Q.; *et al.* 2012. "China's coke industry: Recent policies, technology shift, and implication for energy and the environment." *Energy Policy* 51, pp 397-404.

Figure 4. Crude Steel Production, China, 1980 to 2014



Source: World Steel Association.

In addition to coking coal, the amount of energy consumed by the CISI increased by 3.52 times its value in 2000, at 167.82 MtCe, to 588.97 MtCe in 2011.¹⁹ Should China successfully transition technologically, Gao (2015) estimates that by 2020, China can reduce its kilograms of CO₂ emissions per tonne of crude steel cast (KgCO₂/t-s) by 280 KgCO₂/t-s. The above mitigation strategies for the Chinese iron and steel industry represent only a small sampling of the extensive treatment that this topic receives in the literature.²⁰

19. Lin, B. and Wang, X. 2015. "Carbon emissions from energy intensive industry in China: Evidence from the iron & steel industry." *Renewable and Sustainable Energy Reviews* 47, p 747.

20. Pan (2015), for instance, suggest an approach through emergy, which attempts to give a "more complete evaluation than other methods because it considers all systems to be networks of energy flows and [...] assigns the correct value to ecological and economic products and services based upon a theory of energy flow in system ecology." The emergy approach, for instance, takes into account disaggregated inputs (renewable and nonrenewable) as well as material flows. (Pan, H.; Zhang, X.; Wu, J.; Peng, H. 2015. "Sustainability evaluation of a steel production system in China based on emergy." *Journal of Cleaner Production* XXX, pp 1-12.)

The Chinese government recognized the environmental challenge posed by its industrial sector and has been mounting a policy response with the 13th Five-Year Plan (FYP) from 2016, which continues the emphasis placed on environmental protection from the 12th FYP. The 13th FYP includes such tools as oversight mechanisms for environmental conditions, GHG emission permits, commercial deforestation bans, agriculture modernization, ambitious plans for an emissions trading system (ETS) and other measures for decoupling carbon emissions with economic growth.²¹ President Xi Jinping spoke to these goals with specific reference to the CISI during the 2015 China International Metal Recycling Conference by indicating that the new role of the government would be to make the industry more environmentally sustainable by setting up financial penalties for violating industries.²²

However, increasing the amount of regulation and extent of enforcement is a second-order solution to one of the most important causal factors: federalism, Chinese style, between the central and provincial governments. This notion refers to the structural overhang in China's privatization and decentralization regime, namely a misalignment of motives between the central and provincial governments. Jin, Qian, and Weingast (2005) in their study of impacts of fiscal incentives during decentralization showed that local governments are essential in enforcing nationwide policies of the central government, but are not always incentivized to do so dependent on such factors as the level of tax revenue retention.²³ In addition to a misalignment in Chinese-style federalism, CISI firms and regulatory bodies remain at odds. Provincial governments privatized unprofitable state-owned enterprises in the 1980s to the 1990s so as to curtail losses of these highly indebted firms.²⁴ By doing so, these firms faced fewer administrative barriers and restrictions in contrast to their state-owned peers. This

report identifies the combination of these two aspects of misalignment as structural fragmentation, which this report further maintains as a primary obstacle to reform.

Evidence of such structural fragmentation can be seen in national policy attempts to increase energy efficiency and reduce GHG emissions in steel production²⁵ by creating minimum standards in production methods. These measures met limited success due to a lack of uniformity in approach between provincial governments and effectiveness in influencing firm-level behavior towards the implementation of low CO₂ emission production.²⁶ The central government has been known to take a coercive approach through regulatory pressure surrounding energy efficiency and conservation, but in testing a range of independent variables in statistical regressions, Zhang, Wang, Yin, *et al.* (2012) showed that regulatory pressures had little influence on firms implementing CO₂ reduction strategies. Legal pressures have instead forced smaller steelmakers to close down and led others to improve their competitiveness by increasing scale rather than investing in R&D and technological transition towards sustainability.²⁷

Ma, Chen, Xu, *et al.* (2015) identified further barriers to wider implementation in addition to limited access to capital investment, such as an aversion to risk due to uncertainty regarding technological shifting and "inertia" caused by opponents to change.²⁸ Small- and medium-sized steel producers are the more central opponents to change, as they are either unable or unwilling to undergo necessary capital upgrades given the large opportunity costs of transitioning away from low-cost production based on iron-ore. Furthermore, the gap in the energy efficiency between large state-owned enterprises and the smaller regional mills was considerable, at 1.5 times the energy

21. McGregor, J. "The 13th Five-Year Plan: Xi Jinping Reiterates his Vision for China." APCO Worldwide. 2015 November 13. Accessed 2015 November 30. Available at: [<http://www.apcoworldwide.com/blog/detail/apcoforum/2015/11/13/the-13th-five-year-plan-xi-jinping-reiterates-his-vision-for-china>].

22. Minter, A. "China Decides Big steel is too Big." *Bloomberg View*, 2015 May 14. Web. Accessed 2015 November 17. Available at: [<http://www.bloombergvew.com/articles/2015-05-14/china-decides-big-steel-is-too-big>].

23. Jin, H.; Qian, Y.; and Weingast, BR. 2005. "Regional decentralization and fiscal incentives: Federalism, Chinese style." *Journal of Public Economics* 89, pp 1725-1726.

24. Cao, Y.; Qian, Y. and Weingast, BR. "From federalism, Chinese style, to privatization, Chinese style." *Economics of Transition* 7(1), pp 122-123.

25. Weston, J., ed. 2012. "Chinese steel producers face heightened credit risk." Risk Management Institute Weekly Credit Brief, National University of Singapore, pp 1-2.

26. Zhang, B.; Wang, Z.; Yin, J.; *et al.* 2012. "CO₂ Emission Reduction within Chinese Iron & Steel Industry: Practices, Determinants and Performance." *Journal of Cleaner Production* 33, 168-169.

27. *Ibid.*, p 176.

28. Ma, D.; Chen, W.; and Xu, T. 2015. "Quantify the energy and environmental benefits of implementing energy-efficiency measures in China's iron and steel production." *Future Cities and Environment* 1(7), p 10.

requirement.²⁹ In order to avoid incurring monetary penalties resulting from being unable to satisfy government-mandated renovation requirements, smaller firms intentionally underreported their energy consumption and production outputs. This lack of endogenous technological upgrading was symptomatic of not only the small- and medium-sized steelmakers, but also the key producers.³⁰ Larger firms were more capable of shouldering the increased costs partly due to the fact that they received significantly higher production subsidies from the government.

Subsidization, debt financing, and expanding production capacity continues in China, despite the two challenges posed by the CISI introduced above. In terms of subsidization, a CVD investigation by the International Trade Administration of the United States Department of Commerce in 2015 on corrosion-resistant steel products determined that the CISI firms received a 26.26% production subsidy, though this excluded some of the largest producers like Baosteel. The investigation projected that these large producers received up to 235.66% subsidization, “based on adverse facts available, following the Commerce’s preliminary determination that the companies had not cooperated in the investigation.”³¹ Reuters projected that such subsidies were equal to 22% of total profits in 2013 and “four-fifths of the profits reported [in] the first half of [2014],” amounting to approximately USD 5.24 billion.³² The same investigation made subsidy determinations for India at 5.28%, Italy at 13.06%, and South Korea at 1.37%.³³ Through debt financing used to expand production, the CISI reached a debt-to-asset ratio of 70% with total industry debt estimated to be USD 600 billion.³⁴ Lacking

profitability continued to persist according to Bloomberg Business, which reported that “medium- and large-sized mills incurred losses of CNY 28.1 billion (USD 4.4 billion) in the first nine months of [2015].” Lastly, in terms of expanded production, minerals and metals giants BHP Billiton and Rio Tinto projected the CISI to reach peak steel at 985 million to 1 billion tonnes by 2030,³⁵ which corresponds with the government’s plans to reach its GHG emissions ceiling by 2030 according to its INDC submitted to the United Nations Framework Convention on Climate Change (UNFCCC).³⁶ To put 1 billion tonnes of steel in perspective, one may consider the fact that steel production in Asia at the end of 2015 was at 1.1 billion tonnes and world production at 1.6 billion tonnes according to the World Steel Association statistics.

Chapter 3. Production Overcapacity and Sectoral Fragmentation as Causal Factors

The CISI poses consequences not only for importing economies, but also within China as well. These internal economic challenges are important to note for two reasons. The first is that they provide crucial information for understanding not only the necessity of external mechanisms like ADM, but also their limitations, as shown by the year-on-year increased crude steel production since 2001, despite an equally increasing number of ADM initiations.³⁷ The second reason is that the fragmentation of CISI between different provinces within China has obstructed progress by the central government to

29. Guo, ZC. and Fu, ZX. 2010. “Current situation of energy consumption and measures taken for energy saving in the iron and steel industry in China.” *Energy* 35, pp 4359-4360.

30. Chen, W.; Yin, X.; and Ma, D. 2014. “A bottom-up analysis of China’s iron and steel industrial energy consumption and CO₂ emissions.” *Applied Energy* 136, p 1182.

31. International Trade Administration (ITA), US Department of Commerce. 2015. “Fact Sheet: Commerce Preliminary Finds Countervailable Subsidization of Imports of Corrosion-Resistant Steel Products from China, India, Italy, and Korea and No Countervailable Subsidization of Imports from Taiwan.” Web. Accessed 2016 January 15. Available at: [http://enforcement.trade.gov/download/factsheets/factsheet-multiple-corrosion-resistant-steel-cvd-prelim-110315.pdf].

32. Wong, F. “Steel industry on subsidy life-support as China economy slows.” *Reuters Economy*. 2014 September 18. Web. Accessed 2015 November 27. Available at: [http://www.reuters.com/article/2014/09/19/us-china-economy-steel-idUSKBN0HD2LC20140919].

33. *Ibid.*, #31.

34. Bermingham, F. “All the steel in China.” *Global Trade Review*. Web. 2016 July 15. Accessed 2017 March 3. Available at: [http://www.gtreview.com/magazine/volume-14issue-6/all-the-steel-in-china/].

35. Gray, David. “What’s 40 million tonnes of Chinese steel between friends?” *Reuters*. 2015 September 11. Web. Accessed 2016 June 30. Available at: [http://www.reuters.com/article/us-china-steel-at-home-idUSKCN0RB20I20150911].

36. Fu, S.; Zou, J.; and Liu, L. *An Analysis of China’s INDC Report*. International Review, China National Center for Climate Change Strategy and International Cooperation (NCSC). 2015 July 2. Web. Accessed 2016 June 30. Available at: [http://www.ncsc.org.cn/article/yxgc/ir/201507/2015070001490.shtml].

manage the industry. As such, the external pressures posed by an ADM may in fact be necessary to influence individual agents within the CISI to apply needed modifications to their manufacturing. This finds further explanation below.

A brief summary of the CISI's development would begin with the earlier stages of Chinese economic take-off at the latter half of the 20th century. During this period, steel and petrochemicals were, according to Abrami and Zheng (2011), the two “pillar industries,” identified as the “key sources of economic growth – industries that are strategic to competitiveness and therefore equally worth of protection.”³⁸ At least until the mid-1990s, steel and petrochemical firms had access to government support and considerable debt financing options that were used to expand scale. By 1996, China became the largest steel producer in the world, and the industry was propelled by added domestic demand for the steel needed for infrastructure during the country's rapid growth phase.

Throughout the 1990s and early 2000s, control over many of these steelmakers moved from the “super ministries” like the State Economic and Trade Commission (SETC) to the local governments.³⁹ Yet as these firms came under local administration, attempts by the central government to implement interprovincial consolidation of the CISI were obstructed, and fragmentation occurred. Employment opportunities led to communities created around and dependent on regional steel production, eventually exacerbating production overcapacity. Between 1997 and 2006, “steel production quadrupled and outstripped demand.”⁴⁰

Baosteel, which continues to be a state-owned enterprise (SOE) and the largest steel producer in the country, attempted to acquire or merge with other steel firms in order

to consolidate production in an attempt to control output. Such mergers and acquisitions, however, did not always end well for all parties involved. For instance, the merger between Baosteel and Wuhan Iron and Steel Group, the sixth largest producer of steel, was expected to result in the laying off of 50,000 employees at Wuhan Steel in order to increase “production per capita” and partially ease the financial burden of a dwindling market.⁴¹ Thus, it is not difficult to understand why provincial governments and regional steel firms have been determined to prevent such attempts to reduce capacity: there would be nothing to compensate for the loss in employment and potential tax revenues.

As attempts to consolidate the market failed, the central government attempted to restrict trade and investment from 2004 to 2007. Consequently, provincial governments assisted their regional steelmakers engage in foreign trade directly.⁴² Steelmakers continued expanding through debt financing in response to reduced government backing. Credit and business climate analyses by *Atradius* in 2014 showed that because these provincial governments were unable to provide the financial support needed to keep their regional steel producers afloat, firms turned to commercial banks for lending. This resulted in the accumulation of CNY 3 trillion (USD 456 billion) in debt, representing a debt-to-asset ratio of 70% across both large and medium-sized firms. Of that liability, CNY 1.3 trillion (USD 197.6 billion) was outstanding as of June 2013. While banks have increased underwriting requirements and reduced lending to steelmakers, global demand for imported steel has been decreasing while production capacities continue to increase disproportionately.⁴³ As more firms find themselves with no access to finance, widespread insolvency threatens domestic employment. A fragmented financial market with limited legitimate financing options is a beckoning call for shadow banking, which continues to threaten the economic stability of the country.⁴⁴

37. Ministry of Economy, Trade and Industry (METI), “Tekkō-gyō no genjō to kadai” [Current situation and problems of the steel industry]. Kenkyūkai. Web. Accessed 2015 April 21. Available at: [http://www.meti.go.jp/committee/kenkyukai/sansei/kaseguchikara/pdf/010_s03_02_03_01.pdf].

38. Abrami, R. and Zheng, Y. 2011. “The New Face of Chinese Industrial Policy: Making Sense of Anti-Dumping Cases in the Petrochemical and Steel Industries.” *Journal of East Asian Studies* 11, p 374.

39. *Ibid.*, pp 378-380.

40. *Ibid.*, p 392.

41. Yingge, S. “Steel shares halted pending merger.” *Shanghai Daily*. 2016 June 28. Accessed 2016 June 28. Available at: [http://www.shanghaidaily.com/business/manufacturing/Steel-shares-halted-pending-merger/shdaily.shtml].

42. *Ibid.*, p 394.

43. Atradius, “Focus on the steel Industry – China,” *Market Monitor* (2014), [https://group.atradius.com/reports-and-advice/market-monitor-steel-china-2014.html#].

In addition to the combination of pushing mergers and acquisitions through its state-owned enterprises and cutting off industrial support policies, the government has attempted to address the country’s production overcapacity issue directly—though with limited success. For example, the “Guidelines to Resolve Serious Overcapacity” released in 2013 sets reduction targets for overcapacities in several sectors, including steel (80 million tonnes by 2017).⁴⁵ Yet government efforts to control this overcapacity have been unsuccessful because finding a new way forward for the CISI has proven to be difficult, not only due to the considerable fragmentation that has already taken place, but also because of the lack of alternatives for regions that depend on the tax revenues and employment created by steel production.

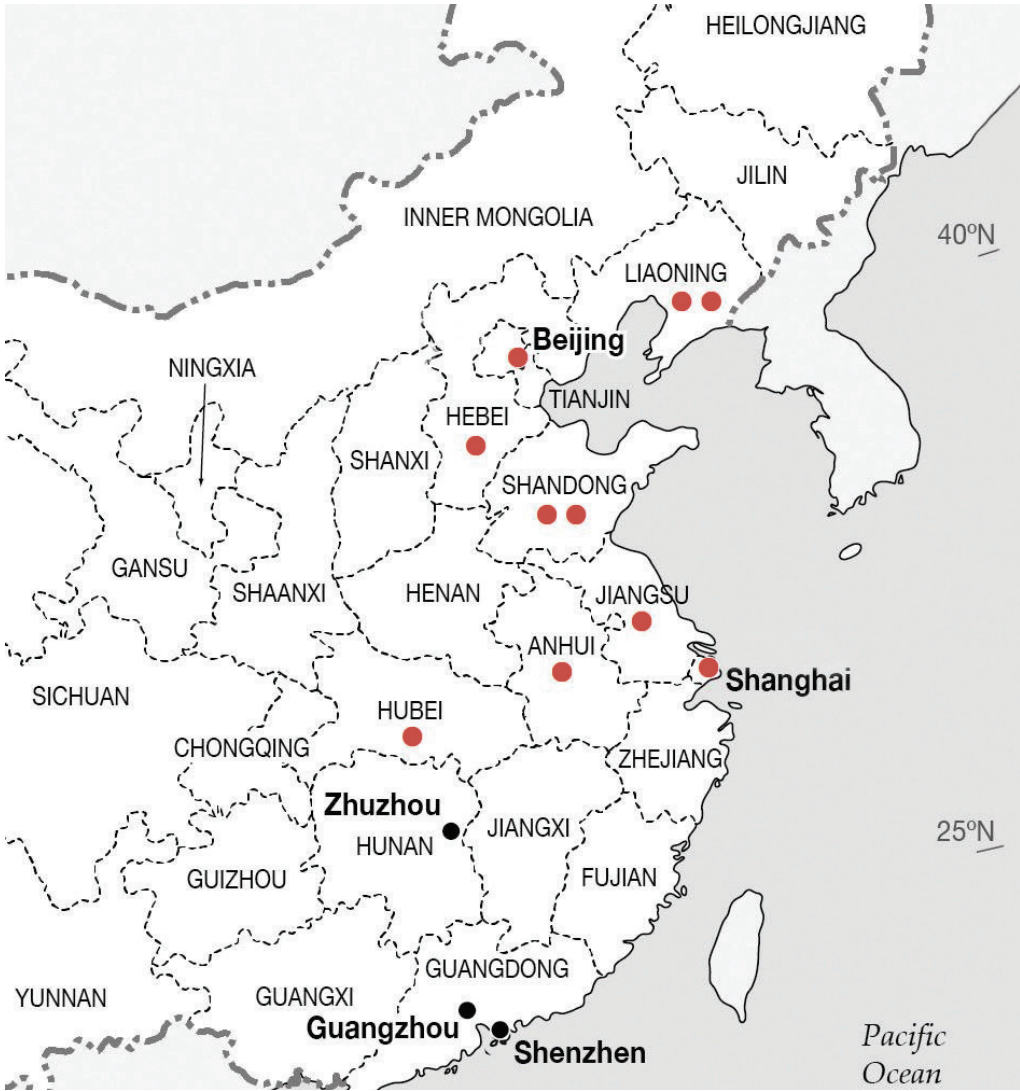
As a result, the expansionary trend in the CISI continued and competition within the industry became more intense with increasing fragmentation, resulting in 35 steelmakers accounting for total production, of which 10 major producers constituted 50% of total output. The ten top producers are shown in Figure 5, which illustrates the distribution of steel producers throughout economic centers in China. Should a steel firm in, for example, Hubei or Shandong enter an anti-dumping investigation individually and found to have been dumping, the dumping tariff would be applied to that firm’s steel exports upon entry into the importing economy.

Therein lays the importance of the external nature of ADMs. While internal resolution through the use of national policy levers is important, they require persistent effort to which neither the central nor provincial governments are prepared to commit. Pursuing a complete turnover of fixed capital through government subsidization would be a costly process, not only financially, but also from the unemployment arising from structural adjustment. External pressure through ADMs can provide a more direct and effective solution when used in combination with a compliant government, at the very least as an interim measure on the road to more comprehensively enforced policy reform. The remainder of this report lays out how ADMs can provide such external pressure, not only for its proven impact on firm-level behavior, but also their potential

44. Alloway, T. “Four Fresh Worries about China’s Shadow Banking System.” *Bloomberg Markets*. 2016 September 7. Web. Accessed 2017 March 3. Available at: [https://www.bloomberg.com/news/articles/2016-09-07/four-fresh-worries-about-china-s-shadow-banking-system].

45. *Ibid.*, #9, pp 14-15.

Figure 5. Top 10 Steel Producers



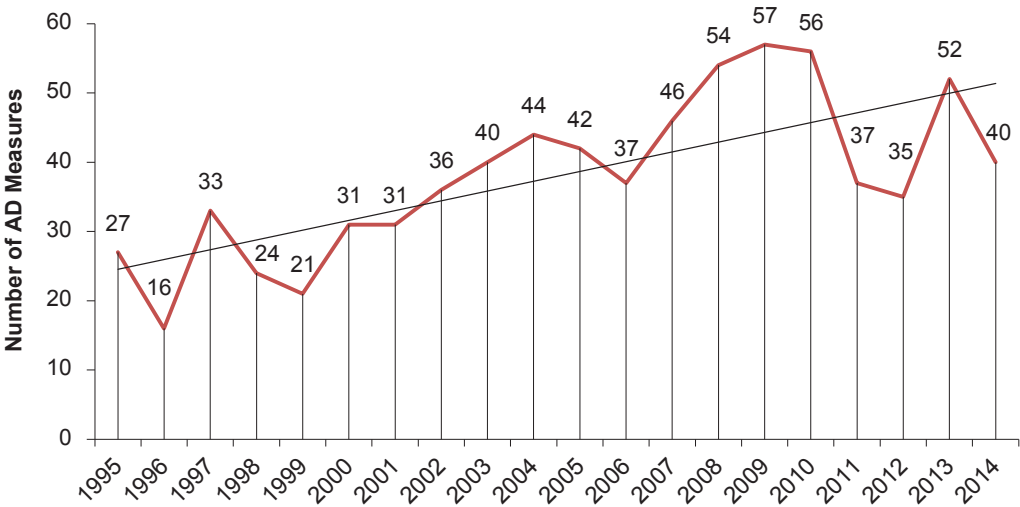
Source: Author’s Illustrations on Map from CartoGIS, College of Asia and the Pacific, The Australian National University.

to address environmental issues. ADMs on their own have little precedence in dealing with sustainable development, which is why an alternative approach to ADM, the Carbon-adjusted DM, is necessary to more comprehensively address both challenges associated with the CISI.

Chapter 4. Go for the Firms: Anti-Dumping Measures and Firm-Level Pressure with the Carbon-Adjusted Dumping Margin

The firm-level and trade impact of ADMs in general is well established and a growing body of literature exists on those impacts in application to Chinese firms.⁴⁶ In terms of the extent of China’s involvement with ADMs, this report showed earlier that the country became the most involved WTO Member State. As shown in Figure 6, between 1995 and 2014, there have been between 742 and 759 anti-dumping measures targeting Chinese products, which is more than triple the number of cases brought against any other country. Approximately 192 of those ADMs involving China were related to steel products,⁴⁷ corresponding with the country’s rapidly increasing global market share: 24 million tonnes of steel exported in 2009 to 61.5 million tonnes in

Figure 6. Number of ADMs against China



Source: WTO Anti-Dumping Statistics.

46. See, for instance, Li, Yan, and Sun (2014); Konings and Vandenbussche (2013); Vandenbussche and Zanardi (2010); Prusa and Blonigen (2003); and Prusa (2001).

2013.⁴⁸ China’s share just in the European steel market, for example, went up by 180% from 2010, which represents a 200% increase in the total volume entering the market.

Regarding the firm-level impact of those measures, when exported products of a particular firm are targeted by the importing country for anti-dumping investigations, there is a chilling effect. Exporting firms de-risk by either reducing the quantity of exports going to the importing country (trade depression or dampening) or choose to focus their exports to another market (trade deflection) even before any material injury to the domestic market is actually identified.⁴⁹ These impacts find statistical evidence in Park (2009).⁵⁰ Trade depression occurs as firms experience losses due to restrictions placed on the export market, a result of the increase in transaction cost placed by administrative barriers, namely anti-dumping duties. This chilling effect on exporting firms’ total factor productivity (TFP) was shown by Chandra and Long (2013)⁵¹ and

47. Ministry of Economy, Trade and Industry (METI) of Japan. “Anchidanpingu sochi o meguru saikin no jōkyō nitsuite” [Recent trends in Anti-dumping Mechanisms]. *Kenkyuu Siryou* 3-1. Web. Accessed 2016 January 1. Available at: [http://www.meti.go.jp/committee/summary/0002465/pdf/022_03_01.pdf].

48. World Trade Organization (WTO). “Anti-dumping measures: by exporting country.” *Statistics on anti-dumping*. Web. Available at: [https://www.wto.org/english/tratop_e/adp_e/AD_MeasuresByExpCty.xls].

49. The importing country may initiate an anti-dumping investigation against the exporting industry of the other country. Should mediation efforts be unsuccessful, the case goes to dispute by the WTO Dispute Settlement Body (DSB), which examines whether there has been provable material injury to the domestic industry as a result of a dumped foreign product. For example, the provision of a subsidy by the exporting country to its firms that reduce prices below what is considered fair value based on the normal prices of the domestic country in the ordinary course of trade is a common cause for anti-dumping measures. The initiating country will calculate the “dumping margin” in order to find out how much of a duty to levy in order to push the price of the imported product up to a fair value so that its domestic industries can compete in the domestic market.

50. Park, SC. 2009. “The trade depressing and trade diversion effects of anti-dumping actions: The case of China.” *China Economic Review* 20(3), pp 542-548.

51. They found that anti-dumping duties caused a reduction in total factor productivity (TFP) of Chinese firms by 12% or more (Chandra, P. and Long, C. 2013. “Anti-dumping Duties and their Impact on Exporters: Firm Level Evidence from China.” *World Development* 51, pp 169-171).

is in agreement with the heterogeneous response to trade protection hypothesis posed by Konings and Vandenbussche (2008).⁵² Such a reduction in TFP would result in diminished marginal returns derived from economies of scale during periods of rapid capital accumulation as those firms seek out markets to which they may export their products. These findings make intuitive sense, especially in application to industries with high export intensity in WTO classifications like steel or stainless steel. Should large importers of Chinese steel initiate anti-dumping investigations, the impact on those firms would be pronounced.

Lu, Tao, and Zhang (2013) identify two characteristics of the CISI that reduced a firm's capacity for trade deflection in the incidence of ADMs⁵³ due to the relatively large number of exporting firms with similar price schemes. A reduction in productivity of one firm as a result of ADMs can easily be compensated for by a competing firm in the same or another market, meaning that rather than trade deflection, the second firm would absorb the trade depression. The second characteristic is that firms with a focus on a single product in multiple markets as direct exporters, such as makers of crude steel, were more sensitive to ADMs than intermediary exporters, which typically have multiple products.⁵⁴

Given the proven firm-level impacts of ADMs, employing them as a measure to promote sustainable development in the CISI appears viable. However, there has been little precedent of the use of ADMs for such purposes as those of the Carbon-adjusted DM. This does not mean, however, that it is not technically possible within the legal framework of the WTO. Generally, the Carbon-adjusted DM attempts to more accurately value costs in the CISI for the manufacture, production and sale of steel products by factoring in discounting effects from high emissions production. This can be done by evaluating the value of that discount and reapplying it as a weight in calculating a dumping margin for the CISI. This would mean that rather than a normal value, one would establish a constructed normal value "at a level of trade equivalent to

the level of trade of the constructed export price," which would then leave space for the tCO₂e/t-s adjustment. (Appendix B features a more detailed explanation of the tCO₂e/t-s adjustment and its legal technicalities.)

While this report suggests the viability and utility of a Carbon-adjusted DM, there is great merit in developing an exact mechanism for quantitative assessment as well as a closer examination of existing decisions by the WTO DSB in order to better understand the role of environmental standards in assessing material injury within the context of international trade law. The importance of this mechanism is that the Carbon-adjusted DM helps to reverse a rather discouraging trend of a state being penalized for attempting to subsidize their transition to more sustainable industry by anti-dumping investigations. Two representative cases include *China – Countervailing and Anti-dumping Duties on Grain Oriented Flat-Rolled Electrical Steel from the United States (China – GOES, WT/DS414/R)*⁵⁵ and *India – Certain Measures Relating to Solar Cells and Solar Modules (India – Solar Cells, WT/DS456/R)*.⁵⁶ In both cases, attempts by the government to mitigate the climate impact of their respective economies have been interpreted as warranting ADM or CVD action.

55. In *China – GOES*, China, the initiating country, argued that a three-year extension (1982 to 1985) of a deadline set for US steelmakers to meet the environmental standards advanced by the Clean Air Act amounted to the "provision of income or price support to the industry through delaying an obligation to invest in clean air technology." Estimations by China put savings by the US steel industry over this three-year grace period at USD 3.7 billion, which they argued that the savings in costs essentially resulted in a benefit that acted as a countervailable subsidy. While the Panel ultimately dismissed this argument on the basis that it was approximately 30 years before the initiation, the implications of this kind of argument should be taken into consideration within the topics raised in this exposition. The implication of this ruling is that should public funds used to help firms lower their environmental impact be recognized by the Panel as a countervailable subsidy or warrant anti-dumping investigations, then the very practice of ADM would depart from its potential role *de lege ferenda* of helping to promote the Carbon-adjusted DM as further described in Chapter 1 above. On this basis, the great long-term importance of such mechanisms as the Carbon-adjusted DM and its expedited application to WTO dispute settlement *mutatis mutandis* to the interpretation and implementation of ADM is clear. Panel Report on *China – Countervailing and Anti-Dumping Duties on Grain Oriented Flat-Rolled Electrical Steel from the United States ("China-GOES")*, WT/DS414/R, adopted 15 June 2012, para. 7.37.

52. Konings, J. and Vandenbussche, H. 2008. "Heterogeneous response of firms to trade protection." *Journal of International Economics* 76(2), pp 371-383.

53. Lu, Y; Tao, Z; and Zhang, Y. 2013. "How do exporters respond to anti-dumping investigations?" *Journal of International Economics* 91, p 297.

54. *Ibid.*, p 300.

These cases show that national measures to ensure sustainable development become targets of penalty rather than encouragement. Such efforts are being limited by the imposition of administrative barriers in trade standards, which may not be applicable to the tenets of environmental protection. A country's attempt to transform its energy profile into one that is sustainable and less environmentally damaging should be rewarded and receive international support, as was the conclusion at the 21st Conference

56. *India – Solar Cells* involves the increasing production and use of solar energy in national efforts for sustainable energy security and climate mitigation in India. By adopting its Jawaharlal Nehru National Solar Mission (“Solar Mission”), the Indian government attempted to reduce the costs of solar energy through the “rapid scale-up of capacity and technological innovation,” (Ministry of New and Renewable Energy, MNRE. “Jawaharlal Nehru National Solar Mission: Towards Building SOLAR INDIA.” Government of India. Web. Accessed 2016 April 07. Available at: [http://www.mnre.gov.in/solar-mission/jnnsnsm/mission-document-3/], p 1) and the use of incentive packages for “indigenous manufacturing of low temperature solar collectors.” (MNRE, p 5). These incentives are aimed to “set up integrated manufacturing plants” (MNRE, p 10) as well as establish solar power purchase obligations, representing domestic content requirements, or “DCR” (MNRE, p 8). In this particular case, the United States initiated investigations on whether the DCR component of Solar Mission violated WTO regulations (*India – Solar Cells*, para. 7.19), such as Article 2.1 of the Agreement on Trade-Related Investment Measures (TRIMs). The central point of this argument was that the mandatory nature DCR are not necessary to achieving the goals of Solar Mission (*India – Solar Cells*, paras. 7.55, 7.58).

Over the three phases of Solar Mission, it was found that the use of foreign photovoltaic (PV) cells and modules in the domestic market went from 50% to 0% over four years. India defended Solar Mission and its DCR component by arguing that these measures had to be viewed within the context of the country's objectives of attaining “energy security, ensuring ecologically sustainable growth, and ensuring sustainable development” (*India – Solar Cells*, para. 7.17) and that the application of TRIMs Article 2.1 cannot be read as a “stand-alone claim” (para. 7.44). They continued by stating that Solar Mission as well as its DCR component was part of India's endeavor to comply with international laws, namely the preamble of the WTO Agreement, the United Nations Framework Convention on Climate Change (UNFCCC), the Rio Declaration on Environment and Development, and the UN General Assembly Resolutions adopting Rio+20: *The Future We Want* (*India – Solar Cells*, paras. 7.269, 7.272). The WTO DSB Panel ultimately decided that DCR was not essential to accomplishing Solar Mission and that the international and national instruments that India cited did not have direct relevance to the application of such a requirement. Panel Report on *India – Certain Measures Relating to Solar Cells and Solar Modules* (“*India – Solar Cells*”), WT/DS456/R, adopted 24 February 2016.

of the Parties (COP21) in Paris. However, the inconvenient truth is that the trade system is working against this potential development as economies that attempt to do so are targeted for anti-dumping duties, countervailable subsidies, and other relevant WTO investigations.

The two cases identified above both demonstrate the singular importance of further developing mechanisms such as the Carbon-adjusted DM. This importance can be summarized in relation to the CISI through three points.

1. The low production cost of the CISI has already put its profits above those realized by other steel and iron exporters and producers, so even if an administrative cost is levied onto Chinese steel imports, only one of a considerably large value would render the adjusted dumping margin significant.
2. While the specific procedures for implementation are important to consider, at least on a legal basis the “reasonable method” test is further satisfied in consideration of both the TBT Agreement and the GATT. As mentioned earlier, the TBT Agreement identified the environment as being a legitimate objective for raising a technical barrier to trade. In terms of the GATT, the Chapeau listed both ecosystem health and the conservation of exhaustible natural resources as being relevant elements of consideration in implementing trade-restrictive measures.
3. Should international trade laws and legal mechanisms like ADMs and CVDs continue this pattern in relation to considerations of the environment, the very international legal regime can very well be in favor of inefficient and environmentally destructive production methods and production overcapacity.

Chapter 5. Projected Impacts of the Carbon-Adjusted Dumping Margin

In terms of the anticipated benefits for the CISI, one finds that should the proposed Carbon-adjusted DM be applied, the resultant AD duty imposed on the CISI's steelmakers using high tCO₂e/t-s BF-BOF steel casting processes will increase the

ex-factory price⁵⁷ up to the extent that it deviates unfairly from the average price of BF-BOF. This lays the road for more ambitious goals, such as minimum environmental standards of steel production set by the importing country imposed by ADMs. Matching the average normal value of BF-BOF steel is important because when calculating the dumping margin, prices are “netted back” to ex-factory price so as to assess the difference between normal value and the CISI export price.

With a higher ex-factory price, exporting firms in the CISI will have narrower profit margins to the extent of the Carbon-adjusted DM. Should the anti-dumping duty appropriately reflect the material injury inflicted by both government intervention and production processes of a low environmental standard, those CISI firms most affected will have to reconsider whether there is continued value in maintaining the status quo. This becomes more effective if the Chinese government continues to enforce national policy measures to battle both production overcapacity and low environmental standards in industry. Furthermore, as steel industries around the world begin to transition away from BF-BOF into alternative forms of steel production such as EAF that have less environmental impact, the Carbon-adjusted DM can continuously adapt to transitioning world standards, thereby assisting in the prevention of relapse.

The impacts of Carbon-adjusted DM, however, depend on two factors: (1) whether the anti-dumping regulatory system adopts the practice and (2) the proposed adjustment has an appropriate and sufficient impact on the CISI. In order to exposit on these outcomes more thoroughly, this chapter provides an overview of the projected merits of adopting the Carbon-adjusted DM as well as the expected consequences of maintaining the status quo, or the business-as-usual (BAU) scenario. In short, the BAU scenario minimizes the maximum benefit for both CISI as well as the anti-dumping and countervailing duties (AD-CVD) regime. Conversely, adopting the Carbon-adjusted DM within the AD-CVD regime and correcting the challenges associated with CISI represents the scenario that minimizes the maximum regret, offering the greatest potential benefit.

57. The ex-factory price is the price out of the factory, thus not including taxes, transportation costs, or other charges that are applied after the production process.

Scenario 1: Business-As-Usual (BAU)

If the CISI maintains BAU, then there are at least five projected consequences.

1. The first is that the CISI will continue to internalize anti-dumping duties. This is especially the case for CISI firms that no longer receive support from the government or are at risk of facing national administrative penalties for deviating from central planning. These firms will most likely respond by further underreporting the characteristics of their production in order to dodge duties. Should individual CISI firms choose not to observe ADMs, this can have sectoral consequences for the CISI as importing markets choose to hedge risk causing reduced demand. Continued exacerbation of this behavior can impact multilateral trade negotiations involving CISI.
2. The second consequence is that ADMs used against the CISI increase, which amplifying the firm-level effects, namely trade dampening and diversion.
3. The third consequence is that steel industries in other countries seek to replicate the rapid growth of the CISI through the same arrangement of NME status, government intervention, and production methods of a low environmental standard. This would reduce the bottom line profits of the CISI as it faces new competitors that have yet to face the effects of ADMs, threatening its share of the global steel market.
4. The fourth consequence is the continuation of deteriorating environmental conditions as the CISI does not transition into cleaner forms of steel production or finds more destructive methods in order to further reduce costs. Worsening environmental conditions burdens both the government and society as a whole as they find ways to adapt and/or mitigate. For example, the state in response to threats to public health may need to increase public expenditures or enact other measures with similar opportunity costs to fund adaptation measures. Alternatively, society may find itself having to find ways to adapt to new environmental conditions through lifestyle modifications, such as staying in-doors when air quality conditions are especially deleterious.

In terms of the consequences of the BAU scenario to the AD-CVD regime, one can

expect three long-run consequences.

1. The first is that since the AD-CVD regime underwent no change and is unable to account for low environmental standards in production processes as a form of technical barrier to trade in rendering a constructed value, steel industries may enter similar arrangements as the CISI. This would exacerbate both market-related and sustainable development-related challenges posed by the CISI as a greater number of firms with similar characteristics enter the market.
2. Secondly, while the CISI may be attracting much attention in terms of ADMs, other sectors within the Chinese economy may seek, or be sought by Beijing's industrial planners, to replicate those results. Chinese industrial planning may very well replicate the process behind the CISI in a different sector with the same intention to take advantage of the country's large coal endowments. This would result in a repetition of both market-related and sustainable development-related challenges, only in a different sector.
3. Finally, the third consequence would be the lack of adaptation in the AD-CVD regime. As seen with *India – Solar Cells*, attempts by the government to enhance mitigation in its industrial sectors were shown to have been interpreted as subsidization warranting action by ADMs. Furthermore, if firms face no consequences for choosing production methods with low environmental standards, then they will be less likely to transition to cleaner alternatives.

Scenario 2: Adoption of the Carbon-adjusted DM

In this scenario, the AD-CVD regime adopts the Carbon-adjusted DM, preventing regressions on progress made after the CISI implements necessary adjustments. The Chinese government may be able to assist the CISI firms in implementing mitigation strategies while interacting with international regulatory systems like ADMs in an arrangement that has more predictable outcomes. The value of examining the outcomes of AD-CVD and the CISI in relation to the Carbon-adjusted DM in this manner is that it helps to show that this optimal arrangement is a symbiotic one. Without changes in AD-CVD, attempts by the Chinese government to reduce the environmental impact of the CISI while insulating vulnerable workers through interventionist policy may be obstructed by ADMs. Without changes in the CISI, no matter how much

methodological change occurs in the dumping margin calculations, creating a system that renders China as a persistent objector will be deeply limited in effectiveness.

In respect to adopting the Carbon-adjusted DM, there are several projected benefits for AD-CVD as an institution. The payoffs of this scenario are largely identical with the legal implications of the Carbon-adjusted DM. Primarily, this would be the increased accuracy of the dumping margin calculation insofar as that it can account for a discount rate afforded production processes of a low environmental standard. In doing so, ADMs can reflect the notion of a Polluter Pays Principle, effectively closing this loophole in trade defense. Furthermore, institutional change in this field would be the most sustained by virtue of its application to other steel-producing economies that may try to emulate the growth process of the CISI.

Most importantly, the dominant strategy for AD-CVD in responding to the challenges posed by the CISI and similar practices is to provide a framework that enables the formation of constructive case precedence. This framework must be able to assess dumping margins when interpreting below-cost sales or less than fair value after accounting for high-emissions production. Should AD-CVD follow this strategy of adopting the Carbon-adjusted DM, it would be a step towards a more concrete union between environmental and trade regulation with quantitative mechanisms in place that increase the accuracy of ADM investigations when accounting for issues related to sustainable development. Furthermore, increased predictability in the way that government subsidization is interpreted by ADMs will empower the state with more control over its industrial planning regime.

An alternative scenario may be that the CISI undertakes the changes necessary to avoid the *minimax* outcome of the BAU scenario through national policy without any alteration to sectoral attitudes towards ADMs. In this scenario, while not the optimal one, the suggestion proposed in this report is endogenous technological change as defined by Romer (1990)⁵⁸ to overcome the productivity losses resulting from ADMs. While Romer identifies the need for endogenous technological change to increase productivity as a means to overcome decreasing marginal productivity, here it is

58. Romer, PM. 1990. "Endogenous Technological Change." *Journal of Political Economy* 98(5-2), pp 71-102.

transitioning towards production processes more aligned with the technological transition to more sustainable modes of industrial production. In addition to endogenous technological change, the state would have to discontinue further subsidizing CISI production in order to avoid further ADM initiations.

The projected outcomes of this scenario would be that while moving from BF-BOF to EAF, for example, would increase costs, it allows the CISI to avoid the negative payoff of the BAU scenario as well as benefit in at least three ways.

1. The first and most obvious is that with reduced ADM as a result of discontinuing its subsidization of CISI firms, firm-level and sectoral burden would be reduced.
2. The second is that in addition to reducing such impacts, CISI products would be able to breach new markets for increased long-run competitiveness. Technological upgrading in the CISI would be more in line with existing and future regulatory climates, allowing for the sale of higher value-added steel products to advanced economies.
3. Finally, should the CISI undergo change, it would reduce the added cost imposed as a negative externality of production. A reduced environmental burden can allow the state to channel government expenditure elsewhere rather than funding adaptation measures.

Chapter 6. Conclusion

Steel production overcapacity, anti-dumping, and environmental degradation rarely occupy the same analytical space. They represent concepts from economics, law, and environmental policy that may occasionally interact, but are not often grouped into a single nexus. However, perhaps rarer is an economic, legal, and environmental phenomenon as all-encompassing as the rapid industrial growth of China. As economies converge into a single world market and increasingly share the world's common-pool resources, this report raises questions of sustainability and the sustained improvement of equitable terms of trade. In responding to these questions, this report takes what

works and puts it to work where it can have a large impact. Namely, the “tonnes of CO₂ equivalent emissions per tonne of steel output adjusted dumping margin,” or the Carbon-adjusted DM, takes market-based mechanisms to accomplish essentially nonmarket-based goals that are in the world's shared interest: sustainable development in the Anthropocene era.

While this study looked specifically at the Chinese iron and steel industry, the findings in this study present implications beyond this isolated application. Trade with industries in transitioning and less developed countries pose many of same challenges as the CISI: the national economic and industrial agenda of one country very rarely runs perfectly parallel with that of another country or globally set goals. One country's policy may give rise to policy challenges in other countries, whether by pressuring domestic labor markets or global environmental health. Yet these are not challenges that involve only a certain set of countries. Industrial planning may have varying degrees of government involvement, but is ubiquitous in economic policy deliberations across continents. As such, finding a way to reconcile these discordant national goals with the search for a fair and functioning global regulatory system is a challenge that requires a unified, systemic response. This report sought to contribute to that response through helpful modifications to the international anti-dumping and countervailing subsidy regime.

There is no doubt that anti-dumping measures will continue to play a central role in international trade dispute negotiations. Overtime, however, changing global circumstances will inevitably have a greater impact on the way that anti-dumping measures are approached. With the closer integration of economies, dawn of mega-regional trade agreements, and increasing trade dispute frequency, this reality may not be as far off into the future as one may expect. As this report sought to explain, not even China is immune to the internal and external influences of an exponential increase in trade disputes. Export-oriented economies like South Korea in particular must prepare themselves for the turbulence ahead.

This report provided the legal foundation to the creation of the Carbon-adjusted DM as well as insight into the benefits it can provide both economically and in contributing to a more responsive system of anti-dumping. Future research includes the quantitative design of the econometric engine that can drive the Carbon-adjusted DM into actual implementation. This will be no simple exercise as integrating environmental external

costs as macro-aggregates in economic models has always been riddled with assumptions and limitations. The Carbon-adjusted DM inquires as to how tonnes of CO₂ emissions can be factored into steel production costs in calculating the weighted normal value as part of a dumping margin used for anti-dumping investigations. Yet graduating this from theory to implementation will require empirical application, therefore warranting further study.

Regardless of how difficult the task, international legal mechanisms in trade dispute resolution must now more than ever take into consideration a wider range of interests that may very well complicate the pursuit of just and predictable resolution. Institutions such as these must continue to adapt as new conditions and variables present themselves, responding to cross-disciplinary iterations of justice such as environmental or socioeconomic justice between states. This report demonstrated that, through hypothetical modifications like the Carbon-adjusted DM, anti-dumping and countervailing duty mechanisms can adapt and remain impactful. Yet the stark truth of the matter is that while providing these essential updates to trade dispute resolution mechanisms provides the flexibility needed to balance conflicting national and individual interests, the true end-state goal is not needing these mechanisms at all. In specific relation to the CISI, long-term change will require China to find a solution that can inclusively meet its national interests while remaining thoughtful to the changes occurring outside of its borders.

Appendix A: Macroeconomic Challenges to Other Steel-Producing Countries

Considering that China alone controls 49.4% of global steel market shares⁵⁹ (by 2014 figures), amounting to 822.7 million tonnes,⁶⁰ the macroeconomic impacts are ubiquitous. Indian steel firm Tata Steel ended operations in the UK in 2016 as a result of the high costs of operation which were unable to compete with lower priced imports from China. These closures are projected to put 15,000 workers in Ireland out of a job.⁶¹ The ArcelorMittal steel plants at Point Lisas, Trinidad and Tobago, are cutting jobs by the hundreds for the same reason.⁶² 1,100 workers were laid off by US Steel's Fairfield Works Mill.⁶³ Empty factories put up for sale have become a more common sight in the steel capital of South Korea, Pohang, as small- and medium-sized steel firms end operations and steel giants like POSCO and Hyundai Steel undergo structural adjustments.⁶⁴

These examples illustrate that the widening gap between steel demand and production

59. Worldsteel Association, *World Steel in Figures 2015* (Brussels, 2015), pp 7-8, 15.

60. Lax reporting requirements in China allow steelmakers, particularly smaller scale ones, to submit inaccurate records. Bo (2015), for instance, calculated a 4.7 percent adjustment (36.32 megatonnes) in the official figures of steel production from 2013 to 2014. That margin itself is greater than the annual steel production of Turkey, which is the seventh largest producer in the world. (Bo, Zhiyue. "Should the World Be Worried About China's Economy?" *The Diplomat*. 2015 September 7. Web. Accessed 2015 November 27. Available at: [<http://thediplomat.com/2015/09/should-the-world-be-worried-about-chinas-economy/>].)

61. Hawkes, S. "Indian steel giant Tata set to sell its UK operations and could leave 15,000 Brits jobless." *The Sun*. 2016 March 29. Web. Accessed 2016 June 6. Available at: [<https://www.thesun.co.uk/archives/politics/1105761/indian-steel-giant-tata-set-to-sell-its-uk-operations-and-could-leave-15000-brits-jobless/>].

62. Felmine, K. "China steel takes toll on ArcelorMittal." *Trinidad & Tobago Guardian Online*. 2015 December 9. Web. Accessed 2016 June 29. Available at: [<http://www.guardian.co.tt/business/2015-12-09/china-steel-takes-toll-arcelormittal>].

63. Miller, JW. and Dulaney, C. "US Steel to Close Alabama Blast Furnace, Cut 1,100 Jobs." *The Wall Street Journal*. 2015 August 17. Web. Accessed 2016 June 29. Available at: [<http://www.wsj.com/articles/u-s-steel-to-close-some-alabama-steel-ops-cut-1-100-jobs-1439825105>].

in the CISI presents challenges to other countries as entire industries undergo structural adjustments to remain price competitive against the nonmarket-based price of Chinese steel products. This means that, unless all domestic steel exporters selling at market price received a subsidy to countervail the dumped Chinese steel, which has also been a source of dispute, they will be forced to cut costs by reducing labor force and minimizing welfare benefits, R&D investment, and corporate social responsibility. Since these are rather unwholesome outcomes, economies around the world have instead been embracing the tools provided by the WTO, namely trade defence. Thus, when China joined the WTO, it was natural that its state-led industrialization would attract much attention in the way of ADM initiations.

For example, the European Commission decided to levy a 25.2% anti-dumping duty on certain steel products from China in 2014 for “subsidizing the expansion of its stainless steel industry which is now flooding the global market and displacing trade flows.” On this topic, the Director General of the European Steel Association, Axel Eggert, stated that, “it is not admissible that our efforts be taken away by a surge of unfair imports,” referring to the “painful efforts to restructure” the EU stainless steel industry to “reduce over-capacities, to improve its performance and to maintain world benchmark competitiveness”⁶⁵ as well as reduce the environmental impact of European steel. The European Steel Association’s concerns are representative of the discouraging trend of firms sacrificing market competitiveness in order to align themselves with the principles of sustainable development.

64. Ha, TM. and Kim, JH. “Bulhwang-e nog seum cheolgang-gyeong-gi... ‘gujojojeong hanpa tto deopchina’ susim gadeug” [The Rusting Steel Market during Recession, “the Onset of Structural Adjustment” in Full Depth]. *The Korea Times*. 2016 January 13. Web. Accessed 2016 June 29. Available at: [http://www.hankookilbo.com/v/abd0fb89641a4b288c07db27473bbbf].

65. European Steel Association (EUROFER). “EUROFER welcomes EU anti-dumping measures against imports of stainless steel cold rolled flat products (SSCR) from China and Taiwan.” Press Release. 2015 March 25. Web. Accessed 2015 November 27. Available at: [http://www.eurofer.org/News%26Events/Press%20releases/EUROFER%20welcomes%20EU%20AD%20measure.fhtml].

Appendix B: The Legal Framework behind the Carbon-Adjusted Dumping Margin

The WTO and the General Agreement on Tariffs and Trade (GATT) have a fairly open-ended set of rules in relation to environmental preservation. The legal basis of the Carbon-adjusted DM is founded on two qualifying Provisions:

Provision 1: ADMs initiated on grounds of dumping caused by government subsidization and private cost discounted through the presence of an unaccounted external cost (negative externality) finds legal basis as a technical barrier to trade (TBT) in the TBT Agreement and GATT Article XX.

Provision 2: The external cost (negative externality) can be domestically assessed as a “tax” and then applied into the dumping margin. More specifically, high emissions of CO₂ and equivalent greenhouse gas emissions (tCO₂e) per tonne of steel produced (t-s) for BF-BOF crude steel production can be accounted into the dumping margin as a tCO₂e/t-s Adjusted Dumping Margin (Carbon-adjusted DM)⁶⁶ as an additional administrative cost (as part of an administrative, selling, and general cost) based on the national treatment principle (GATT Article III) and the most-favored nation principle (GATT Article I). In applying such a tax, the valuation of the weight added to the dumping margin finds legal premise in Anti-Dumping Agreement (ADA)⁶⁷ Article 2.4.

66. This report introduces the concept of the tCO₂e/t-s Adjusted Dumping Margin. Specific calculations of the margin, relevant case precedence, and other technical information is reserved for future research on this topic. The dumping margin goes into the determination of the material injury caused by the less than fair value price. This, according to Article 2.4.2 of the *Anti-Dumping Agreement*, requires the comparison of the weighted average normal value to the weighted average of all comparable export prices using the transaction-to-transaction method. However, should there be no comparable normal value in the ordinary course of trade then the normal value must be constructed.

67. *Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade 1994*.

In terms of Provision 1, ADM as a trade-restrictive measure can be applied on grounds of both pricing at less than fair value (LTFV) due to government subsidization as well as a distorted weighted average value resulting from a discounted cost through the use of low-technology steelmaking procedures that has a high impact on the environment. The application of a technical barrier to trade made possible by Article 2.2 of the TBT Agreement, which identifies “protection of human health or safety, animal or plant life or health, or the environment” as a legitimate objective for trade-restrictive action. Risk to this legitimate objective is satisfactorily established as a “relevant element of consideration” insofar as it is a “related processing technology.” Tests of arbitrariness or unjustifiable discrimination are satisfied by the chapeau of GATT Article XX (“General Exceptions”) subparagraphs (b) and (g). These are reproduced below:

[...] nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(b) Necessary to protect human, animal or plant life or health;

(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production and consumption

The TBT Agreement is particularly effective in responding to the provincial fragmentation of the CISI described earlier. Article 3 (“Preparation, Adoption and Application of Technical Regulations by Local Government Bodies and Non-Governmental Bodies”) expresses in 3.1 that central governments are expected to take reasonable measures to ensure compliance by provincial governments and non-government bodies. Articles 7 and 8 provide further explanations on procedures for the assessment of conformity of such bodies. Thus, as a Member State of the WTO, China and its provincial governments are party to the TBT Agreement. Thus, given that all conditions are satisfied, the hypothetical Carbon-adjusted DM would be applicable to Chinese firms to which an anti-dumping duty has been applied.

While the TBT Agreement has some promising applications to China, it is important to first identify if the country should be eligible to receive Special and Differential Treatment (SDT) as a developing country or if the country graduated from the Generalized System of Preferences (GSP). On the basis of its per capita income and poverty rate, China is still considered a developing economy, with 70.17 million people living on the country standard of CNY 2,300 per year at the end of 2014.⁶⁸ The question as to whether the application of the Carbon-adjusted DM or more broadly applying

stringent environmental production standards to the CISI would qualify as ignoring the special problems and needs of China as per Article 12 of the TBT Agreement⁶⁹ is a matter of contention not only to China, but also emerging economies like India and Brazil. However, SDT does not obligate importing states to withdraw their rights to employ technical barriers or engage in an anti-dumping measure. Furthermore, states initiating the anti-dumping investigation have no obligation to take into consideration the development impact of a technical barrier on CISI products. Article 15 of the ADA⁷⁰ states that “constructive remedies” must be explored before applying anti-dumping duties, such as a reduced anti-dumping duty or price undertakings.⁷¹ However, as the Panel deliberated in *European Communities – Anti-Dumping Duties on Imports of Cotton-Type Bed Linen from India (EC – Bed Linen)*, the way in which the application of an anti-dumping duty would impact the “special situation of the developing country Member” must be determined during the anti-dumping investigation. The Panel of *EC – Bed Linen* interpreted the requirement imposed by ADA Article 15 as “actively consider[ing], with an open mind, the possibility of applying a constructive remedy”⁷²

68. The World Bank. “China: Overview.” 2016 April 06. Web. Accessed 2016 April 11. Available at: [<http://www.worldbank.org/en/country/china/overview>].

69. For instance, Article 12.4 of the TBT Agreement reads:

Members recognize that, although international standards, guides or recommendations may exist in their particular technological and socio-economic conditions, developing country Members adopt certain technical regulations, standards, or conformity assessment procedures aimed at preserved indigenous technology and production methods and processes compatible with their development needs. Members therefore recognize that developing country Members should not be expected to use international standards as a basis for the technical regulations or standards, including test methods, which are not appropriate to their development, financial and trade needs.

70. Article 15 of the ADA reads:

It is recognized that special regard must be given by developed country Members to the special situation of developing country Members when considering the application of anti-dumping duties. Possibilities of constructive remedies provided for by this Agreement shall be explored before applying anti-dumping duties where they would affect the essential interests of developing country Members.

71. Price undertakings serve as an alternative to the imposition of an anti-dumping duty that provides the exporting state an opportunity to revise its export price or cease exports to the importing state after the incidence of dumping has been established.

and that since the European Community did not apply the anti-dumping duty, there was no violation of ADA Article 15. To apply the argument of this report, regardless of whether the anti-dumping duty is imposed or dumping CISI firms decide to withdraw their exports or seek price undertakings, the impacts of ADMs as a response to both economic and sustainable development challenges remain unsolved.

On the basis of Provision 2, the external cost added to the weighted average normal value or the weighted average constructed value as suggested by the Carbon-adjusted DM is proven to be legally viable. First, in determining whether dumping has occurred, the normal value in the ordinary course of trade must be derived in application to the Chinese context. Article 2.1 of the ADA states that this should be done by taking into account the domestic price of the product- in other words, the price of Chinese steel in China in the ordinary course of trade. However, ADA Article 2.1 is inapplicable in the case of the CISI for at least two reasons, which would then necessitate the application of ADA Article 2.2.⁷³

The first involves the “particular market situation” of the exporting country, as written in ADA Article 2.2. This means that if a country receives non-market economy (NME) treatment, then normal values are equated to constructed normal values based on a third, or surrogate, country. China agreed to receive NME treatment until December 2016, according to its WTO Accession document.⁷⁴ Based on this reading alone, ADA Article 2.2 applies insofar that China’s “particular market conditions” do not allow for a “proper comparison.” Once China’s NME treatment expires, application of ADA Article 2.2 would require the satisfaction of the second supplementary provision of Annex 1 to paragraph 1 of GATT 1947 Article VI (hereinafter “Annex I”).⁷⁵

Secondly, the argument can be made that exports from the CISI are being sold at

below-cost sales. This finds definition in ADA Article 2.2.1 as those sales that are made “within an extended period of time in substantial quantities and are at prices which do not provide for the recovery of all cost within a reasonable period of time.” Whether or not prices are below per unit cost is based on whether the weighted average selling price of the transaction is below the weighted average per unit cost. If the Carbon-adjusted DM is able to add to the weighted average per unit cost, ADA Article 2.2.1 would here be applicable even without NME treatment should it be found that Chinese steelmakers have been able to sell at prices lower than costs through (A) poor environmental standards of production (B) government assistance in violation of either NME status and/or Annex I. The 1930 Tariff Act of the United States, for instance, has in place similar below-cost provisions that rely on a “cost of production investigation” that can be initiated on reasonable grounds.⁷⁶ The same grounds can be established through the difference between Chinese steel and an open market value or price in, as the Marrakesh Agreement identified in its first recital, “a normal situation.”⁷⁷ Government’s participation in production has been on several cases identified as a condition that deviates from one such a normal situation.⁷⁸

75. Annex I, GATT 1948 Second Supplementary Provision to paragraph 1 of Article VI reads:

It is recognized that, in the case of imports from a country which has a complete or substantially complete monopoly of its trade and where all domestic prices are fixed by the state, special difficulties may exist in determining price comparability for the purposes of paragraph 1, and in such cases importing contracting parties may find it necessary to take into account the possibility that a strict comparison with domestic prices in such a country may not always be appropriate.

NME status and its effect on the calculation of normal value receive extensive treatment in Thorstensen, V.; Ramos, D.; Muller, C.; *et al.* 2013. “WTO – Market and Non-Market Economies: the hybrid case of China.” *Latin American Journal of International Trade Law* 1(2): pp 765-798.

76. US Senate. Committee on Finance, Committee on Agriculture, Nutrition, and Forestry; and Committee on Governmental Affairs. *Uruguay Round Agreements Act: Joint Report (to Accompany S.2467)*. (103 D Rpt 103-412).

77. O’Connor, B. 2015. “Constructing Normal Value in WTO Anti-Dumping Law, Giving Meaning to the Phrase Open, Market-oriented Policies in the Preamble to the Marrakesh Declaration.” NCTM Studio Legale Associato. Web. Accessed 2014 April 11. Available at: [http://www.nctm.it/en/news/articles/documents/anti-dumping-BOC-02.pdf], pp 4-5.

78. *Ibid.*, pp 9-11; see *US – Softwood Lumber VI* and *US – Definitive anti-dumping and countervailing duties on certain products from China*.

72. Panel Report on *European Communities – Anti-Dumping Duties on Imports of Cotton-type Bed Linen from India* (“EC – Bed Linen”), WT/DS141/RW, adopted 29 November 2002, para. 6.253.

73. Wu, M. 2012. “Anti-dumping in Asia’s Emerging Giants.” *Harvard International Law Journal* 53(1) and Graafsma, Folkert. 2013. “China’s Future Market Economy Status: Recent Developments.” *International Trade Regulation* Nov 2013. Holman, Fenwick, Willan.

74. Asian Development Bank and International Institute for Trade and Development. 2009. *Trade Remedies: A Tool Kit*. Mandaluyong City, Philippines: Asian Development Bank: p 23.

In the framework established above, this report suggests the Carbon-adjusted DM as being one aspect that “reasonabl[y] reflect[s] the costs associated with the production and sale of the product under consideration” in accordance with ADA Article 2.2.1.1. This can be established on the basis of Provision 1 above, where the environment is established as a legitimate objective.

After establishing the applicability of ADA Article 2.2 to the CISI, it then becomes important to establish the legal basis behind calculating the added weight of the Carbon-adjusted DM. First of all, the added weight in the Carbon-adjusted DM can be calculated, as are all costs, in accordance to the records of the exporter so long as generally accepted rules of accounting are employed. However, given the many challenges obstructing the formation and implementation of a universally accepted carbon pricing mechanism, applying any sort of local environmental tax or additional carbon price to the Carbon-adjusted DM would be a viable option in the interim. Within the regulations of the WTO and GATT, this is quite possible based on the national treatment principle on internal taxation and regulation (GATT Article III)⁷⁹, which provides that while the foreign firms are protected from regulatory discrimination, it is liable to the same internal regulations and tax as domestic firms. From this, applying the Most Favored Nation (MFN) clause (GATT Article I) would render the same domestic tax to other firms from other countries with similarly low efficiency, high emissions, and that passes the burden of any reduced private costs to society as negative welfare.

Once establishing that the application of one such a weight to the dumping margin is legally feasible, justifying the extent of the tCO₂e/t-s adjustment to the dumping margin of an anti-dumping investigation finds justification through ADA Article 2.4,

which lays out the conditions of price comparability. Specific to the case of the CISI, however, one finds that the fair comparison in price is difficult to assess for two reasons as was mentioned throughout this report: nonmarket distortions and high emission production methods. Furthermore, the combination of credit risk; government subsidization; low-cost, low-efficiency production; and difficulties regarding accurate data-collection based on official records all obfuscate finding a comparable price. As such, rather than a normal value, one would establish a constructed normal value “at a level of trade equivalent to the level of trade of the constructed export price,” which would then leave space for the tCO₂e/t-s adjustment.

Once the constructed normal value is produced, one can then find the determination of injury in the same manner that it is found in any investigation. The legal basis of this is in ADA Article 3.4, on the premise that the examined impact on the domestic industry can include *inter alia* negative effects on growth and the ability to raise capital and investment. Based on this, as well as the totality urged in ADA Article 3.7, the impact of Chinese steel dumping has and can be expected to continue to decrease the returns on investment as non-Chinese steelmakers make efforts to improve their efficiency by reducing the environmental impact of steel production. In other words, steelmakers attempting to improve the environmental sustainability of their production are enjoying reduced rates of return on their investment(s) because of dumped Chinese steel. However, the question then is whether the reduction in efforts to improve environmental sustainability can be classified as a negative effect on growth and a firm’s capacity to raise capital and investment. While literature in development studies and, to a great many, common sense would dictate that this is the case, to make a substantive legal argument one must turn to case precedence.

79. Article III (4) reads:

The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favorable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use. The provisions of this paragraph shall not prevent the application of differential internal transportation charges which are based exclusively on the economic operation of the means of transport and not on the nationality of the product.

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