IACEED2010

Study on How U.S. Imposing Carbon Tariffs will Influence China’s Export Trade and Its Countermeasure Strategy

Sun Ruihua, Jiao Yuanyuan*

SunRuihua, Economy and Management College of China University of Petroleum, Qingdao, 266555, China

Abstract

The United States, China’s biggest export market, is planning to impose a carbon tariff against countries without strict GHG emissions reduction standards, which will necessarily have immense influence on China’s export trade. In this dissertation, its background and imposing methods are initially discussed. Impact on China’s export trade volume, commodity prices, various industrial sectors, foreign investment manner, corporate operation modes and so forth are then analyzed explicitly. Lastly, the paper presents several policy suggestions in allusion to these impacts.

Keywords: the United States; carbon tariffs; export trade; impact; countermeasure

1. Introduction

Scholars from various countries have already done some research on carbon tariffs. Most western scholars choose to support the carbon tariff. The Chinese model is based on low wages, so companies with a high level of capital and less labor costs, which place those companies in an economy with high energy costs, and introduce a carbon tariff, consequently, the wage advantage disappears, say Benjamin Tal, a senior economist at CIBC World Markets, in the paper of The Carbon Tariff. Two Canadian economists, Thomas Courchene and John Allan, who write for the Institute for Research on Public Policy’s magazine, Policy Options, stated in the latest issue that “carbon tariffs” offer a solution to the inevitable “free rider” problems that will flow from national and local carbon tax regimes. In paper, Global Welfare Implications of Daniel Gros, director of the centre for European Policy Studies, presented a simple, basic model to compute the welfare consequences of the introduction of a tariff on the CO2 content of imported goods.

Till now, in China, this issue has also been extensively discussed, but few concentrate on the*

* Corresponding author. Tel.: 18765924621; E-mail address: jiaofayun259758@sina.com.
influences it will bring to our export trade, though almost all scholars agree its implications will be profound and wide-ranging. Hope through this thesis, related departments can make early preparations to ensure a health development of our economy in the future.

2. Background and Approach of United States’ Carbon Tariffs

Carbon tariffs refer to impose special tariffs of emissions on high energy-consuming products (including aluminum, steel, cement, fertilizer and some chemicals). It will be an equalizing force which will tax implicit subsidies on carbon contents of imports from non-compliant countries.

According to the United States Clean Energy Security Act, the States will make use of border tax adjustment mechanism to affect its import and export trade. This mechanism is that, complying countries, when exporting goods to non-signatory countries, will implement export tax rebates to achieve a fair competition. On the other hand, when import occurs, the country will impose a carbon tariff, to guard against external threats on domestic goods’ competitiveness.

Specifically, in export trade, the U.S. Clean Energy Security Act provides, from 2012 to 2025, exporters can get free carbon credits issued by the government. Nonetheless, the tax rebate system will gradually be abolished between 2025 and 2035. In import trade, the U.S. government imposes carbon tariffs through International Emission Reserves Scheme. Section 767 of the United States Clean Energy Security Act prescribes the system will start to establish from January 1st, 2018, and put into effect on January 1st, 2020. U.S. will face a serious problem then—who should be imposed. According to the plan, countries do not play by the same carbon standards will be the targets. While countries which have implemented carbon reduction measures in line with the U.S. standards, in other words, both of the two are state parties of an international agreement (i.e. a new agreement to succeed the Kyoto Protocol) which contains enforceable reduction commitments and obligations, at least consistent with the United States. Therefore, the carbon tariff will be imposed on imports from countries do not meet these standards.

3. Carbon Tariffs’ Influence on China’s Export

3.1 Carbon tariffs’ influence on China’s export volume

The United States is now China’s largest export market. According to statistics from the U.S. Department of Commerce, in 2009 the Sino-US bilateral trade arrived at 365.98 billion U.S. dollars, accounting for 16.58% of its total trade volume, which is $2,207,270,000,000. Among them, U.S. exported goods valued 69.58 billion dollars to China while import commodities with a total value of 296.4 billion dollars from China. In 2008, China exported 252.3 billion U.S. dollars goods to America, accounting for 17.66% of China’s total annual exports which was $1,428,550,000,000.

Assuming a $45 per ton cost of CO₂ in the US marketplace, the tariff would raise some $55 billion a year from Chinese exports to the US, which is also the equivalent of a 17% tariff on total Chinese exports. It is almost six times larger than the current 3% tariff rate. According to the World Bank, once comprehensively implemented, China could face an average tariff of 26%, and its exports may fell 21%. A research of Liu Xiaochuan, a professor of the Shanghai University of Finance shows that if the US imposed a carbon tariff of $30/ton of carbon, China’s total export volume will decrease 0.715%, nearly 1.7% of the export volume to U.S., while China’s GDP will be dragged down 0.021%. We presume carbon tariffs increase to $60/ton, then China’s total exports would fell 1.244 %, the decline of exports to U.S. would increase to 2.6% or more, and GDP will drop 0.037%.

3.2 Theoretical model of carbon tariffs’ influence on China’s export prices
Daniel Gros presented a calculating model of the carbon tariff's global welfare impact in paper—Global Welfare Implications of Carbon Border Taxes. By intercepting and modifying it, we propose a model to calculate carbon tariff's influence on our export prices. This section presents a simple partial equilibrium two-country model to study this problem. The world is divided into two actors: an importing country and an exporting country. The basic building blocks of the model are standard, basic utility and production functions:

With the total cost function as usual twice differentiable and convex (TC and TC" both strictly positive). For simplicity the total (private=social) cost of production is given by:

\[ TC = TC(q_s) \]  

Production in importing country is subject to potentially a different technology and cost function. But it has the same general property of increasing marginal costs.

\[ TC^* = TC(q_s^*) \]  

Consumption of the goods in question yields utility which is also twice differentiable and convex (U' strictly positive and U" strictly negative), given by:

\[ U = U(q_d) \]  

Households from importing country have the same preferences:

\[ U^* = U(q_d^*) \]  

Individual utility maximization implies that households determine consumption by equating marginal utility to the price they face in the market. Consumers from importing countries have to pay a price that is equal to the international price plus an import tariff. Denoting the international price by \( p \) and the import tariff by \( \beta \), this implies (for the individual consumer):

\[ p + \beta = U'(q_d^*) \]  

Exporting country consumers don’t face an import tariff. They will set a price equal to marginal utility.

\[ p = U'(q_d) \]  

Exporting country producers will set marginal cost equal to the price they face, this implies that:

\[ p = TC'(q_s) \]  

Producers of importing countries will also set supply to equal marginal cost to the price:

\[ P + \beta = TC'(q_s^*) \]  

The only other relationship relevant for the private sector is that global supply has to equal global demand for the (possibly composite) good in question.

\[ q_s + q_s^* = q_d + q_d^* \]  

The system of five equations (5) to (9) describes the market equilibrium

\[ d_p + d_\beta = U''(q_d^*) dq_d^* \]  

\[ d_p = U''(q_d) dq_d \]  

\[ d_p + d_\beta = TC''(q_s^*) dq_s^* \]  

\[ d_p = TC''(q_s) dq_s \]  

\[ dq_s + dq_s^* = dq_d + dq_d^* \]
Based on the above equations, we can deduce the following results:

$$d_p / d_C = [((U^*(q_d^*))^{-1} - (TC^*(q_s^*))^{-1})/[(TC^*(q_s^*))^{-1} + (TC^*(q_s^*))^{-1} - (U^*(q_d^*))^{-1} - (U^*(q_d^*))^{-1}]$$

The equation can be simplified as:

$$u = -1/U^*(q_d^*) \quad c = 1/TC^*(q_s^*)$$

$$d_p / d_C = (-u - c)/(c + c^* + u + u^*) = [-(u + c)]/(c + c^* + u + u^*)$$

Through this model we can conclude, as $d_p / d_C$ is negative, so the higher the carbon tariff is, the lower market prices will be. Yet, the impact is clearly partial. Since the absolute value of $d_p / d_C$ is less than 1, so the influence on prices depends on equation (17).

3.3 Carbon tariffs’ influence on China’s export sectors

China exports a huge amount of manufactures to America every year, most of which are high energy consumption and carbon intensive products, for instance, machinery, building materials, chemicals, iron and steel products. Carbon tariffs will especially depress exports of those energy-intensive sectors. Data from the United Nations COMTRADE shows, from 2006 to 2008, energy-intensive products import to the U.S. accounted for respectively 14.7%, 16.5% and 17.7% of its total imports. We can take 2008 for an example, among all those energy-intensive products, 44.8% of the cement, 32.6% of the iron and steel products and 27.3% of the glass products were from China.

Another important question is which industries will be mostly affected? It is indisputable sectors with high capital-to-labor ratios and energy emission intensity will be the first to bear the burnt. Chinese exporters of chemical products, with their astronomical energy intensity factor, will be the first to witness their businesses migrating back to the States. In fact, chemical exports from China to U.S. are already slowing down notably, with shipments in the past two years rising by only half the pace seen in the first half of the decade. Non-metallic mineral products (cement, glass, lime, etc), with energy intensity 130% higher than the Chinese industrial average, along with printing, primary metal manufacturing and machinery industries are other candidates for such realignment. Also based on Liu Xiaochuan’s research, carbon tariffs of $30/t will bring about a decline of 3.65% to glass manufacturing sector outputs, 3.29% to the fertilizer sector, while $60/t of carbon tariff will cause outputs of glass manufacturing sector decline 6.35%, and the fertilizer industry descend 5.89%. However, because of the substitution effects, non-energy intensive industry products may even have an increase in output, 0.13% if the tariff is $30/t, and 0.23% if the tariff increases to $60/t.

3.4 Carbon tariffs’ influence on China’s attraction to foreign investments

Currently, foreign invested enterprises have become the main form of China’s processing trade. 70% of China’s current exports to U.S. belong to the processing trade industry. That is because, with economic globalization and especially the strengthened fluidity of capital element, a country’s comparative cost advantage is no longer exclusive. The American WERNER International Spinning and Weaving Authoritative Statistics Bureau carried on an investigation on more than 40 country’s textile industries. According to different countries’ artificial expense data of textile industry in 2007, we can see China’s low labor costs.
Since the proposed carbon tariff system is destination based, it would ensure that producers located in complying nations would not suffer any competitive disadvantage when exporting non-complying nations. Confronted with the possible carbon tax, China's labor advantage can be offset to a large extent. From the investment aspect, global value chain participants will have to pay customs duties for both intermediate and final goods exported from China, which will significantly increase the production cost.

Meanwhile, multinational companies will take carbon risks into account when choosing where to manufacture. For instance, China has been relying a lot on cheap labor to attract foreign investment, but companies engaging in chemical, cement, glass manufacturing, and other capital-intensive rather than labor-intensive industry will likely to choose local manufacturing. That is to say, a carbon tariff imposed by U.S. on emissions embodied in Chinese exports would not only abolish the implicit subsidies on the carbon content currently enjoyed by Chinese exports, but also it would be large enough to start reversing current trade and off-shoring patterns. And for many energy-intensive industries that joined the exodus to the cheap labor markets of East Asia, imposing the carbon tariff means coming home. Wage advantages may no longer be as decisive in determining overall competitiveness for energy-intensive industries in today’s energy-starved world economy. [5]

3.5 Carbon tariffs’ influence on Chinese enterprise’s operation manner

Carbon tariffs mean competitiveness of economies with low efficiency, high energy consumption and backward production technique would naturally shrink. Conversely, competitiveness of high-efficient economies and their enterprises will strengthen immensely. Facing such grim situation, to survive means transition or upgrade.

Transition refers some Chinese enterprises dealing with high-energy exports, considering the possible weakness or even disappearances of their price advantage in overseas market would turn to yield commodities for home market. This is especially the case for some small or medium enterprises lack of financial support and advanced management. Even if, they have realized their price advantage is disappearing, still unable to take steps to reduce the GHG emissions. The only thing they can do is shifting to the domestic market. Meanwhile, carbon tariff would change relative production costs of different sectors, and thus corporate profitability and competitiveness is affected. Other conditions being equal, compared with non-energy intensive industries, energy-intensive production costs will increase and its international competitiveness will decline, while non-energy-intensive industries may even see an increase in export. Thus, transformation between industries will occur.

Upgrade indicates, to lessen carbon tariff’s shock and maintain competitiveness, corporations enhance their knowledge and management. This especially applies to large enterprises and multinational corporations, which are capable of investing and introducing new technology to improve energy efficiency while reduce GHG emissions. Hence, carbon tariffs would let enterprises pay more attention to energy saving, phrased differently stimulate enterprises to head for a low-carbon direction. So, carbon tariff would be an external force to compel domestic enterprises upgrade constantly, trying hard on energy saving and emission reduction. Longer term, carbon tariffs could induce changes in China’s own energy and carbon practices.

4. Policy Suggestions for China’s Dealing with Carbon Tariffs
While all the above problems will be severe, they are not insurmountable. We should see the underlying purposes, more importantly, pose corresponding measures at the same time.

- Firstly, expand domestic demand to reduce the carbon tariff's impact on the economic development. In 2007, China's dependence on export was up to 35.5%, five of our top seven export markets are developed countries, which accounted for 35.8% of our total exports. Therefore, the expansion of domestic demand is the fundamental countermeasure to deal with carbon tariffs. Confronted with various trade protectionism policies, relying more on domestic demand will give China's economic development larger room to maneuver, while enhancing the ability to resist economic risks meanwhile.

- Secondly, impose green taxes ahead of the carbon tariff to promote industrial structure changing towards low-carbon direction. Carbon tariff’s strike for the export-oriented economy is naturally obvious. Hence, China should take the lead in implementation of green taxes to guide industry development before the carbon tariff becoming realism. Studies show that green taxes can inhibit future energy demand significantly. At present, assuming tax rate of 50 Yuan / ton of standard coal, the energy demand will decline 6.13%, about 126 million tons of standard coal energy can be saved; to 2030, assuming tax rate of 120 Yuan / ton of standard coal, energy demand will drop by 16.2%, then about 4 million tones of coal energy can be stinted. [6]

- Thirdly, climb to the high-end of global value chain to reshape enterprises’ competitive advantages. Chinese corporations must implement high-end climbing on the global value chain, as its labor advantage in the future may be offset to a large extent. To achieve this, advanced equipments and technology are ought to be introduced and more technical experts be hired to drive enterprises core technology development. Attracting foreign direct investment is particularly significant, most of which are accompanied by some forms of technology transfer. Consequently, fragmented value segments are restructured in China, through which technological progress and industrial upgrading are realized.[7]

- Fourthly, use financial tools to achieve a win-win result both for GHG emissions reduction and economic development. Green finance, an innovative macro-economic policy, is protecting the ecological environment through financial instruments. Green finance includes green credit, green insurance, green securities policy, green venture capital and carbon emissions trading system. To some extent, green financial systems can help to solve financial problems for many domestic enterprises, especially the SMEs, which were once unable to upgrade even though having a wish to do so. Besides, the system can lead large enterprises towards low carbon direction. To avoid interest rate risk of green finance, environmental protection factors will be taken into consideration when enterprises try to realize their development. Green Finance will also encourage enterprises to become the mainstay of environmental protection technological innovation, and promote the upgrading of environmental protection equipments and technology. [8]

- Finally, introduce corporate carbon management to help enterprises transfer or upgrade. Carbon management is to minimize GHG emissions in production while provide low-carbon goods and services. Carbon management must control GHG emissions in the whole cycle, from parts procurement, manufacturing, transportation, distribution and consumption, to finally be abandoned. Under carbon dioxide regulation and the environment self-action plan, Europe, the United States and the Japanese government are trying to achieve effective management for the GHG emissions to actualize their reduction targets. Multinational companies of the three countries have begun requiring their suppliers and counterparty to provide the GHG emissions information and developed a series of appropriate international standards. GHG emissions information of the entire value chain (carbon footprint) will be made clear on the product, which will provide effective incentives for firms producing internationally traded goods to reduce their carbon footprints.

5 Concluding Remarks
As China's largest export market, carbon tariffs' influence will no doubt involve all aspects of China's export trade, such as: trade volume reduction, export price changes, the decline of high energy consumption industries, the decreasing attractiveness to foreign direct investment, export enterprises transformation and upgrading and so on.

The question that how to deal with the carbon tariffs has placed in front of China's government and companies. In short terms, we should argue against this trade protectionist measure through diplomatic means and negotiations. In the long run, expansion of domestic demand and the development of low-carbon economy are the fundamental response to carbon tariffs.

With China's continuous economic development and rising international status, assuming the responsibility to reduce emissions of greenhouse gases is only a matter of time. The government, corporate and society should work together to help China's economy develop towards a healthier and more stable direction.

Acknowledgements

We wish to thank Professor Liu Guangsheng of China University of Petroleum, who provides plenty of valuable materials and advice from the topic selecting to the final accomplishment. Also, we are thankful for the cooperation of our team members.

References

[1] Ken Schaeffer. Activated Carbon Market—Tariff Update or Duty is in the Eyes of the Beholder. Water Conditioning & Purification, 2007, 25(6): 2~4
[2] Jeff Rubin, Benjamin Tal. The Carbon Tariff. CIBC World Markets Inc., 2008, 13(5): 4~12
[3] Daniel Gros. Global Welfare Implications of Carbon Border Taxes. CEPS Working Document, 2009, 3(15): 3~6
[4] Xu Shiteng. Carbon Tariff and its Impact of China's Foreign Trade. Economic Research and Exploration, 2009, 22(2): 57~62 (in Chinese)
[5] Romana King. Carbon Crisis. AER, 2009, 6(10): 1
[6] Xing Ji. How China Develop on the Low-carbon Road. Environmental Economics, 2009, 8(67): 50-54
[7] Liu Xiaohong. Grazing at industrial upgrading in China from the distribution of benefits among different segments in the Global Value Chain. Economic Management, 2008, 30(10): 79-83
[8] Ren Hui. Environmental Protection, Sustainable Development and Green Finance System. Financial Work, 2009, 85(4): 85-88 (in Chinese)
[9] Chinese Academy of Science sustainable development study team. Sustainable Development Strategy Report of China - Explore the low carbon road with Chinese characteristics. First edition. Beijing: Science Press, 2009: 172-198