

China's Potential Policies for Energy Efficiency & Emission Reduction: Carbon Tax Approach or a New Sectoral Cap and Trade Approach?

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Abstract:

China has set up firm domestic policy targets for energy efficiency and emission reduction in the 12th five year plan, as well as committed the 40-45% carbon intensity reduction for 2020. Although during the past five years the command and control approach has play an effective role in reaching the target in the 11th five year plan, market-based instruments are strongly proposed by both government planners, practitioners and scholars around the country. Carbon tax has been frequently discussed as the major policy approach for future choice.

This paper argued against the prevalent view and based on analysis of theoretical setbacks of carbon tax as well as summarizing main characteristics of Chinese economy as state owned enterprises oriented, it is suggested that introducing carbon tax would have minimum environmental effects but transfer the tax burdens mostly to the consumers inducing possible inflation. Instead, a sectoral cap and trade approach has been considered and proposed in the policy menu as an innovative choice.

Key Words: China; Climate Policy; Carbon Tax; Sectoral Cap and Trade

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1. INTRODUCTION

As one of the biggest emitters in the world and party to the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol, China's efforts in energy efficiency and emission reduction has attracted much attention around the world. Whether China can make actual progress and lead the world moving towards low carbon path, is currently a hot topic.

In order to mitigating climate change as well as promote economic structural transformation, China actively participates in international climate negotiations and plays an increasingly important role. On the domestic level, China has voluntarily suggested its own reduction target. During the 11th Five year plan, China has for the first time set targets for energy efficiency and emission reduction, and succeeded to meet these targets generally at last. Before the Copenhagen conference, that is, by 2020 the carbon intensity, that is carbon emission per unit of GDP, will decrease to 40%-50% of the base level in 2005, and the non-fossil energy will account for 15% in total primary energy consumption. It has been committed that the forest area will increase 40 million hectares, and the goal for forest stock is an increase of 1.3 billion cubic meters.

Table 1 China's Energy Efficiency and Emission Reduction Target for 2020

Item		Targets (for 2020)
Reduction of carbon intensity		Reduce 40%—45%, based on 2005
Share of non-fossil fuels in primary energy consumption		Reach 15%
Forest carbon sink	forest coverage	Increase by 40 million hectares
	forest stock volume	Increase by 1.3 billion cubic meters

No doubt, China's policy and measures for energy conservation and emission reduction are currently facing serious difficulties. One of the most prominent problems appeared during the last five year plan is the efficiency of policy tools, as the major instrument used in the practice is command and control, while there is not any market-based policy tool. Therefore, the final effects has been largely depends on the responsibility and accountability of administrative agencies. This setback has been frequently criticized and has been recognized by some major decision-makers.

Compared with the practices in the major developed countries, we will easily find that some more efficient policy tools like carbon tax and emission trading are mainly chosen as major climate policy. What should China do so as to improve its performance in this respect? This paper intends discuss these problem.

2. CARBON TAX: PROPOSALS AND REFLECTIONS

Carbon tax, based on the pigouvian tax, together with emission trading are two major policy tools to combat climate change. And the former right now is mostly proposed in China for the coming years.

According to the classic theory of environmental economics, if the market has good institutional arrangements, and the information is complete, a carbon tax is the best emission-reduction path. Taking a carbon tax can promote the enterprises to reduce the carbon emission by increasing energy efficiency and encourage innovations. It also can change the consumers' behaviors. Moreover, the cost of carbon tax and the distortion to market are relatively low. Therefore, it is an effective way to solve the problem of carbon emission which belongs to public goods (e.g. see Nordhaus, 2008).

Recently, due to the pressures from the climate change and the reduction of the over-consumption of energy, the discussion on carbon tax has become a public topic in China. The government has design several plans of carbon tax, which have attracted great attentions from different parties in the society. It is exclaimed by the press that the carbon tax is coming in silence. The most famous one of these plans is designed by a think tank affiliated by the Ministry of Finance, which is called "the Framework Design of China's Carbon Tax System." This report suggests that the suitable starting point of China's carbon tax is at about 2012. And the main use of the tax is to subsidy the industries and enterprises in the energy saving and environmental protection field. The carbon tax is divided by central and local government as the ratio of 7:3. And the tax will increase by time, from 10 yuan / ton CO₂ to 70 yuan/ton CO₂.

Table 2 Chinese Abatement rate in different carbon tax rate by the Panel of the Ministry of Finance

Carbon Tax rate (Yuan/ton CO ₂)	Static simulation (Abatement rate, %)	Dynamic simulation (Abatement rate, %)	
		accumulation	average
10	1.09	18.57	1.86
20	2.16	36.29	3.63
30	3.19	53.22	5.32
40	4.20	69.42	6.94
70	7.06	114.15	11.42
90	8.84	---	

Source: Su and Fu, 2009.

However, given China's special institution background and the macro-economic conditions, I think it must be very cautious to adopt the carbon tax approach. The reasoning follows in five respects.

First, the emission reduction effect of carbon tax might be limited. According to the static analysis (i.e taking the carbon tax by 2012)by the Financial Ministry, if the rates of tax are 10 yuan/ton, 20 yuan/ton, 30 yuan/ton, 40 yuan/ton, 70yuan/ton, 90yuan/ton , it will reduce the carbon emission respectively as the rate of 1.09%, 2.16%, 3.19%, 4.20%, 7.06% and 8.84%. Therefore, the reduction effect is not significant. In the terms of dynamic analysis (taking tax after ten years later)by this report, the rates will reduce respectively 18.57%, 36.29%, 53.22%, 69.42%, 114.15% of carbon emission. Averagely, the yearly average reduction rates are from 1.9% to 11.4% (Su and Fu, 2009). Although it is more significant, there is still much uncertainty, especially when we predict the situation after ten years. Therefore, the environmental effectiveness might be negligible.

Besides that, two scholars of Tsinghua University, Gao Pengfei, Chen Wenying (2002) and Shang Kai (2009) has also evaluated the emission reduction effects under different carbon tax levels. It is shown in Table 2 that, by 2020, even when the carbon tax rate is as high as 50 USD/ton, the reduction rate is still at as low as 2-3%.

Table3 Chinese Abatement Rate under Different Carbon Tax Rates (2020, dollar price)

Carbon Tax rate (\$/ton CO ₂)	Gao and Chen, 2002 (Abatement rate, %)	Shang, 2009 (Abatement rates, %)
30	0.7	1.0
50	2.7	2.1
80		4.9
100	5.7	5.2
120		6.0
150	5.8	
200	6.0	

Source: Gao and Chen, 2002; Shang, 2009.

Now let’s consider the international experience of carbon tax. For instance, Finland has taken the carbon tax since 1990. “In Finland, without the CO₂ tax, emissions would probably have been 2–3 per cent higher by the year 2000 than they turned out to be; in Sweden, Norway and Iceland the figure was 3–4 per cent. The absolute level of emissions, however, increased across the 1990s in all these countries”(Anthony Giddens, 2009). Therefore, the efficiency of Carbon Tax are all still but significant. For China, a fast developing country, the space demand for energy consumption is rigid. Additionally, the economic system has still not completely developed, the anti-risk capacity is still weak and there is much uncertainty in the future as well. Therefore, it is worth doubting the reduction effect of the tax in China.

Second, how big will the tax impulse China's economy? The Financial Ministry report says that, the tax's negative effect on GDP is not essential. According to static analysis, if the tax rate is 10yuan/ton, the GDP will decrease 0.01%. If the tax rate is 70yuan/ton, the GDP will decrease 0.06%.According to the dynamic analysis, the GDP will decrease 0.19% (10 Yuan/ton) and 1.67% (70 Yuan/ton). Therefore, the numbers are not big (Su and Fu, 2009). However, if China is a developed country as Western countries which the GDP growth is only about 3%-5%, the 0.19% of GDP loss is very essential.

Table 4 Decline of Chinese GDP in different carbon tax rate by the Panel of the

Ministry of Finance

Carbon Tax rate (Yuan/ton CO ₂)	Static simulation (Decline of GDP, %)	Dynamic simulation (Accumulated decline of GDP, %)
10	0.01	0.19
20	0.01	0.4
30	0.02	0.62
40	0.03	0.87
70	0.06	1.67

Source: Su and Fu, 2009.

Third, how can China avoid the burden shift of carbon tax? In China, the most of the energy enterprises are state-owned. It is a big difference from Western countries. So, according to economic principles, if the elasticity of monopolistic goods is low, the monopoly can transfer most of tax burden to customers. The high emission industries such as power, oil, coal, transportation are all state-monopolistic in China; therefore, they can transfer their tax burden to costumers. Therefore, taking carbon tax might will not reduce the emission but increase the price of energy and then the CPI.

Forth, how to make the tax neutral? The current research including the Financial Ministry report all admit that the tax is regressive. The effect on low-income group is higher than high-income group, the effect on rurals area is higher than urban areas, the effect on western districts is higher than eastern districts. These all are serious unbalance problem existing in China. Additional, these problems are not releasing but deteriorating. A problem is,if China takes the carbon tax now, whether it will make the situation worse? Someone says that we can use tax for special purpose to transfer directly to poor people. But it is very difficult. According to the design by Financial Ministry , the tax income will divided by central and local government as the ratio of 7:3. Is it possible that the local tax income will be used for transferring? In current situation that the local government is facing serious financial difficulties, not only local government, but also central government can not transfer the tax income into poor group. Even though government has made the budget, it is still very hard to send the money to poor group.

Fifth, does the tax accord with China's national interest? China has been insisting that the common but differentiated responsibility principle in international environmental negotiations and refuse mandatory reduction required by developed countries. Given the current situation in international negotiation, developed countries may not coerce China to commit because the developed countries are still the main sources of global warming. The substantial development has been confirmed by the UNFCCC, and it has been also agreed by Western politicians and scholars. The Cancun Agreement also reiterated that developing countries can take voluntary emissions measures in their developing process.

In my opinion, at least by 2020 (there still ten years from the emission peak comes), the developed countries will not insist coercing China to reduce emission once China voluntarily reduces and makes its own contribution to global reduction. Before that time, taking tax will make great bad effect on China's economy and also cause carbon leakage. Whether does China still should give up its own development rights?

3. A PROPOSAL FOR SECTORAL CAP AND TRADE

Based on so many problems we need to fix first, therefore, I suggest we need more further research on this problem and revise the starting time of taking tax in 2012. Meantime, we still should pay much attention on carbon exchange and make efforts to build China's own carbon trade system

To the trade system, I suggest China should not take the national cap-and-trade system. China's target of developing economy and improving people's living is still very strict and China's historical emission accumulation and emission per capita are respectively low in this world. Therefore, it is not possible and China also has not the responsibility to execute the national cap-and-trade system as well. That is the baseline for China to take part in international negotiations. On the premise of the pursuit of sustainable development, voluntary reduction is still China's basic policy. And it will not swing in the short and middle run.

However, China also should not absolutely refuse the cap-and-trade system. It can be executed in some industries especially in high energy consumption, high emission and high polluting industries including electricity, transportation, coal, petroleum, cement and other manufacturing industries.

There might be three reasons as least arguing for my point.

First, these industries are all high-monopolistic. Almost all of the enterprises are state-own or the enterprise whose main stock are controlled by the state. Controlling the emission from those industries means grasping the key of emission reduction in China. From the past emission data, we can find that, the production, transport, energy conversion industries account for most of the total emissions and the emission amount is increasing quickly (Zhang Hongwu, Shi Linyun,

2009). Therefore, controlling the emission amount can make great contribution to the reduction target.

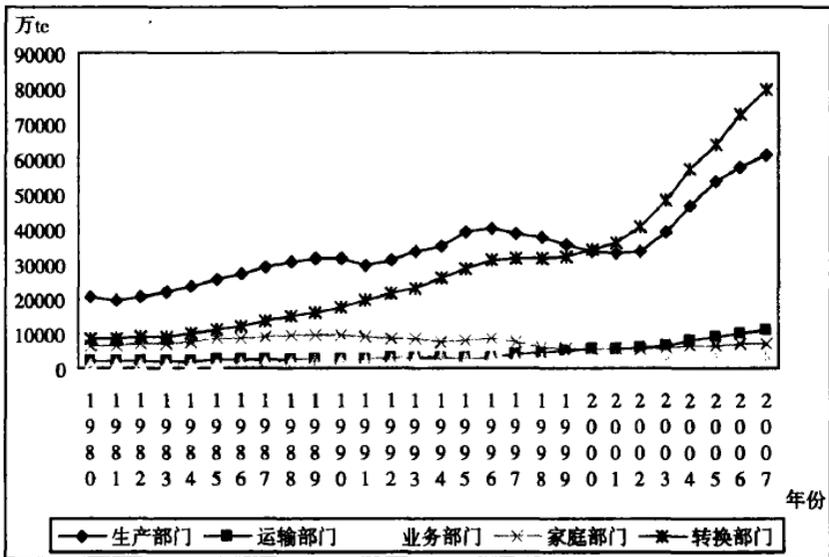


Figure 1 Change of CO2 Emission in Several Industries

Source: Zhang Hongwu, Shi Linyun, 2009.

Second, making cap-and-trade system is at China's advantages. Theoretically, carbon trade still belongs to the amount controlling method. It needs more powerful government, because the distribution of the caps is a very complex game procedure. From the global perspective, although the Western countries' markets are fully developed and the effect from government on economy are weak, however they almost all select the carbon trade system. China's economy is government-oriented and thus the government has strong power on the economy.

Third, making the cap-and-trade system in special industries can construct a solid base and get more experiences for the coming national cap-and-trade system. Along with China's economic development, China's emission peak will come at around 2030. Once the peak comes, under the pressure from the global climate change and carbon reduction, China will have no reason to escape the coercive reduction. Therefore, making the cap-and-trade system in some special industries before the peak comes can help to smooth the transition (to the coercive reduction) and help to make a core framework first.

4. CONCLUSIONS

This paper intends to discuss the problem of policy alternatives for energy efficiency and emission reduction. The basic idea of this paper is argue for an innovative sectoral cap and

trade as one of the major policy framework in China so as to improve efficiency while fulfill the target towards 2020. There are also some setback in this sectoral cap and trade system, and more consideration and extension is needed.

The carbon tax approach can also be considered, but the effectiveness should be carefully assessed and the scope of implementation should be limited. Maybe a comprehensive combination of these two instruments can be build, together with the traditional command and control measures.

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