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POLICY BRIEF

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Building successful carbon pricing policies in China

Xin Wang (IDDRI)[1]

China aims to develop a low-carbon economy with a bigger market share of high value-added and technology-intensive products and a cleaner energy mix. China's approach to tackle climate change has been marked by a shift toward market-based instruments, particularly carbon pricing policy since its twelfth Five Year Plan (FYP) (2011-2015) was launched. With a domestic objective to limit the export of energy-, resource- and pollution-intensive products, carbon prices were indirectly generated by the massive use of an export VAT refund rebate and export tax on these products since 2007. It will be explicitly complemented by an emission trading scheme (ETS) tested at provincial level by 2013 and implemented at national level by 2015. While one could expect such initiatives to grant China a status as a "climate-champion", doubts have been cast on the rationale for taxing energy-intensive exports on the one hand, and the value given to CO_2 either at the border or domestically on the other. In a world of unequal carbon prices, the discourse of carbon leakage and competitiveness has been a major (political) obstacle for consolidating global greenhouse gases (GHG) mitigation, where China is the most cited country. At one side, such an issue hinders the implementation of more stringent climate policies domestically in Europe as well as other developed countries. On the other hand, if proposals such as border carbon price adjustment are introduced, it risks generating trade wars and lowering mutual trust.

1. The author is the laureate of the 2011 Chinese Government Prize of Excellent Abroad for Ph.D Students. This Ph.D. thesis was successfully defended on November 4, 2011, at the University of Science and Technology of Lille, France. Some key results of the thesis have been selected and published in *Nature Climate Change* 2, 230 (2012), doi:10.1038/nclimate1477. (online 28 March 2012)

Institut du développement durable
et des relations internationales
27, rue Saint-Guillaume
75337 Paris cedex 07 France

www.iddri.org

Figure 1. Impact of carbon price on value-added at 100 Yuan/t CO_2 in China

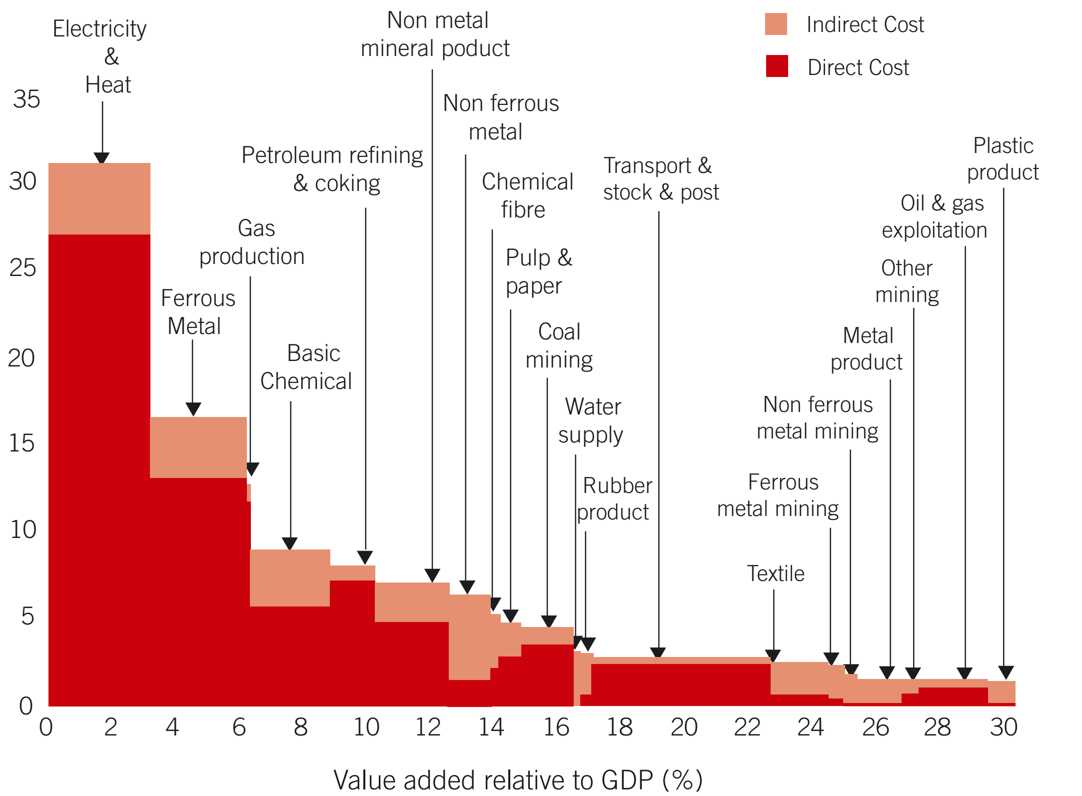


Table 1. Results of implicit carbon price on fossil fuels in China (Yuan/tCO_2)

		Coal	Oil	NG	Gasoline	Diesel	Aviation Kerosene
VAT		90.0	299.1	146.4	436.9	377	254.2
Resource tax	Low level	0.15	2.61	0.92	0	0	0
	High level	4.05	9.78	6.88	0	0	0
Consumption Tax		0	0	0	242.3	217.7	214.8
Fees		N/A	N/A	N/A	N/A	N/A	N/A
Fuel price adjustment (accumulated net effect since 2005)		0	0	0	1134.2	984.2	842.3
Total		94.05	308.88	153.28	1813.4	1578.9	1311.3

Note: implicit price calculated based on 2011 tax levels.

By using both quantitative and qualitative assessments, the thesis contributes to unpacking China's domestic and border carbon pricing policies by analyzing their incentives and consequences, both domestically and globally. It proposes a solution for enhancing cooperative GHG mitigation actions both to meet China's development objectives and the urgent need to reduce global GHG emissions.

First, it uses an approach similar to that was adopted by the EU when assessing the impact of carbon price on industrial competitiveness. To assess the impact if China introduces a carbon price domestically, it rearranges China's sectoral energy consumption data in order to examine the ratio of carbon tax added costs to sector GDP, thus determining the impact level of a carbon price on each sector (See Figure 1 for example). It then divides the sectoral trade impact into domestic and international competitiveness. It finds that a high carbon price level (100 Yuan/t CO_2) may necessitate compensatory measures to certain highly affected industries, and that a low tax rate (10 Yuan/t CO_2) would generate few competitiveness problems for all industries and may therefore be considered as an appropriate starting point.

Second, it adopts the computable general equilibrium model of the State Information Center of China (SIC-GE model) to examine the dynamic impact of a high carbon price (100 Yuan/t CO_2) in addition to the competitiveness assessment.

Five scenarios are analysed including different electricity market price rigidities and assuming possible carbon revenue earmarking mechanisms. The main conclusions include: first, such a price could contribute to an emission reduction ranging from 6.75% (rigid electricity price) to 11.16% (total carbon cost pass-through in the electricity sector). Second, electricity sector has the biggest emission reduction, representing roughly 50-66% of total emission reductions among scenarios, followed by steel and other carbon-intensive industries. Carbon price could be introduced first into these sectors. Third, earmarking the carbon revenue to reduce consumption tax would be efficient in the short term and cost-effective in the long term to feed the revenue back to reduce production tax.

The thesis then adopts several institutional approaches. In particular, it conducts several interviews with key policy makers, councilors and industries in China in order to assess major (and potential) obstacles for introducing a (high) carbon price in China. First, it argues that the administrative procedure may be long for China to introduce an explicit and high carbon price. The lack of a national wide law[1] hinders the implementation of a carbon tax. The pilot ETS may also take time to develop into a final national wide ETS. Second, the lack of a clear definition of governmental mandate among ministries at central government level, and the interests between central and local governments constitutes an important potential hindrance. Third, some Chinese experts suggest introducing a carbon price into existing taxes such as consumption tax, resource tax as well as pollutant fees by arguing that this may significantly shorten and facilitate the implementation procedure. Table 1 shows the implicit carbon price that current similar instruments generate in China. This provides a basis to introduce a fixed and explicit carbon price into these existing measures at a lower level than the implicit carbon prices.

Based on both quantitative and institutional assessments, the thesis argues that the short-term carbon price in China will very probably start at a low level. Such a progressive carbon price can no doubt contribute to China's domestic low carbon growth by sending a clear and predictable price signal. However, it would not remove the (at least theoretical) argument of carbon leakage and competitiveness, which constitute a major political lobby and hinders the implementation of more stringent climate policies in developed countries such as the EU and the US.

1. The current text of climate change law of China is still under consultation and may be adjusted in contents. The exact date of implementation is very uncertain so far.

By examining China's export policies and strategies, this thesis finds that there has been a strong domestic willingness for limiting the export of energy-, carbon- and pollution-intensive products since 2005 in China. The reason is explicitly expressed by several official decrees and circulars which aim to shift China's export structure towards more value-added and high technology products and away from those that cause pollution and consume large amounts of (natural) resources but generate low value-added. Since 2007, a massive reduction of export VAT refund (equivalent to export VAT rebate) as well as export tax has taken place on these energy-intensive products. Table 2 calculates the implicit carbon price that export VAT rebate and export tax generate on key carbon intensive sectors where the carbon leakage and competitiveness risks are deemed high. The high implicit export carbon price together with China's own willingness of limiting the carbon-intensive products' export provide a basis to assess the feasibility of introducing an explicit, predictable and high carbon price into China's export sector, while ensuring low and progressive domestic carbon price implementation, as a transitional measure until domestic carbon price catches up.

Table 2. Implicit sectoral export carbon price generated by export VAT rebate and export tax policies in China: 2007 (US$/t$CO_2$)

Sector	Implicit sectoral export carbon tax rate based on direct emissions	Implicit sectoral export carbon tax rate based on direct+indirect emissions
Iron and steel	41.64	32.78
Basic chemical	18.38	11.74
Petrochemical	292.11	261.37
Non-metallic products	46.82	31.69
Non-ferrous metal	494.24	119.07
Chemical fibre	764.59	332.39
Pulp and paper	294.09	181.11
Rubber	151.62	38.99

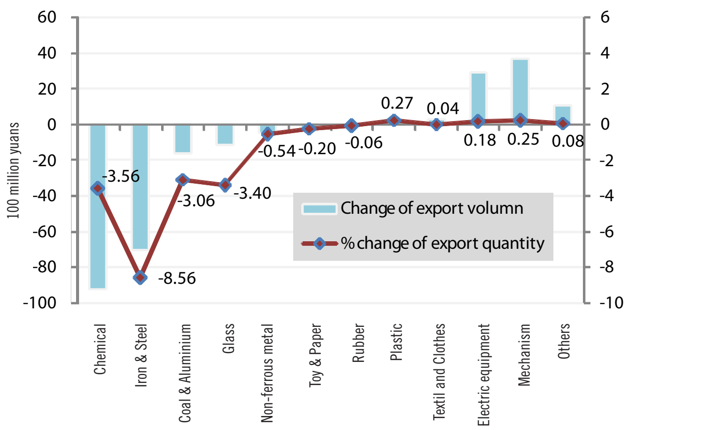
Note: indirect emission indicate the CO_2 emissions from electricity used by the exporting sector.

Two options are examined. First, by setting a comparable carbon cost (US$20/t$CO_2$ and US$30/t$CO_2$ are assessed here) for the eight major energy-intensive sectors to which the export VAT rebate is widely applied, it derives the corresponding *ad valorem* average rate for each sector. The introduction of a carbon cost into export VAT refund rebate policy would not increase the current export VAT refund rebate rate (except for the chemical sector), but would simply define a ceiling. This carbon price must be explicitly proclaimed and fixed for climate ends while the total export VAT rebate rate can still vary for other ends (inflation, domestic shortage, etc.). This measure is WTO-compatible as long as it is introduced within the export VAT refund policy and respects the non-discrimination principle.

Second, China can introduce an export carbon tax, which can be WTO-compatible if well consulted with China's major trade partners. The thesis then uses the SIC-GE model to simulate the impact of an export carbon price of 200 Yuan/tCO_2 (roughly between 20-30 euro/tCO_2). Three policy scenarios are studied, where the tax revenue is either undistributed or redistributed neutrally to stimulate investment or consumption. According to the model, the economic and climate effects of the different policy scenarios are not particularly distinguishable. The economic impacts are slightly negative while the effect on the export structure is significant (figure 2): the export of major energy-intensive products decreased and the export of certain sectors (labour-intensive or with higher value added) increased, resulting in a cut of 3.6% in total direct CO_2 emissions from exports. The revenue redistribution to stimulate consumption is shown to be the optimal scenario choice, which was confirmed by further sensitivity tests.

As a conclusion, the thesis proposes first to accelerate domestic carbon price stringency; and second to implement an explicit and comparable export carbon price (20$/t$CO_2$ for example), particularly on energy-intensive products, as a short-term transitional measure before a domestic comparable carbon price is introduced. This corresponds to China's domestic development objectives and would significantly alleviate the problem of carbon leakage and competitiveness, thus contributing to consolidating climate efforts globally.

Figure 2. Structural effect of export carbon tax on China's export (200yuan/tCO_2)



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