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Discourse

From Pollution Charge to Environmental Protection Tax: A Comparative Analysis of the Potential and Limitations of China's New Environmental Policy Initiative

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ABSTRACT Given the magnitude of China's economy, the newly drafted Environmental Protection Tax Law of the People's Republic of China is among the most ambitious forays into green incentives ever attempted. The law's provisions are evaluated as part of the country's *layering* orientation, where the gradual ratcheting up of government regulation is considered an effective and durable strategy. By making a transition from "taxes on good activities" to "taxes on bad activities" the new statute expands the polluter pays principle embedded in China's present environmental fee system into a broader suite of corporate and individual decisions. China's existing pollution charge system suffers from inappropriate exemptions and pricing levels. The proposed law does not offer clear solutions to these systemic problems. Pollution sources from agriculture, wastewater treatment and waste disposal, major sources of pollution in China, are exempted from the new environmental tax. Statutory language is vague regarding interagency interface between tax authorities and environmental officials. An effective tax on a full range of polluting activities is a critical next layer in the country's steady efforts to ameliorate its environmental challenges. Notwithstanding the progress it represents, this comparative analysis posits that the new Chinese tax program can still be upgraded.

Keywords: environmental tax; pollution charge; China; layering; policy analysis

I. Introduction

China recently approved the Environmental Protection Tax Law of the People's Republic of China) hereinafter "the EPT Law"). Given the magnitude of the Chinese economy, the statute is one of the most ambitious forays into green incentives

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ever attempted and its success is a matter of global significance. A closer assessment suggests that the EPT Law in no way constitutes a dramatic departure from previous Chinese public policies. In fact, it is a classic example of legislation that offers an additional "layer" (Rocco and Thurston 2014) to the considerable network of pollution fees and economic incentives introduced long ago to improve China's environment. Given the stakes involved, it is well to ask: "What effects can be expected from this policy reform?" And "Is it enough?"

The magnitude of the problems facing Chinese environmental managers is enormous. In a special 2014 editorial, leading medical journal *The Lancet* highlighted the toll that air pollution is taking on China's public health, reporting roughly 1.2 million premature annual deaths and losses of 25 million disability adjusted life-years (Watts 2005; Lancet 2014). With 16 of the world's 20 most polluted cities, almost half of the world's deaths caused by ambient air pollution occur in China. The World Bank has classified half of China's rivers as "unsafe for human consumption" (World Bank 2007). Groundwater in around 90 per cent of Chinese cities is defined as polluted to some degree, with 60 per cent "severely polluted" (van Wyk 2013). For over a decade China has been the planet's largest emitter of greenhouse gases, making global progress in climate change dependent on its environmental performance (UNFCCC 2015).

The statistics are particularly disconcerting because of heroic efforts which have already been made to reduce pollution for China's increasingly urbanized residents. Hundreds of factories have been closed or moved; increasingly stringent emission standards adopted; and the country contains the largest subway systems in the world. Although the numbers have declined somewhat, with 430 million bicycle owners cycling remains the most common form of mobility in the country. Yet, driven by a growing population and burgeoning standard of living, pollution levels continue to climb.

These conditions contributed to China's decision makers' decision to get serious about harnessing economic incentives for environmental protection. In December 2016, the National People's Congress (NPC) Standing Committee voted the revised version into law as a new Environmental Protection Tax Law (Xinhua 2016).

This analysis presents the essential components of the EPT Law and what differentiates it from existing environmental fees and levies in China. By analyzing the key provisions of the policy design and predicting its outcomes based on well-accepted criteria, it is possible to project the potential and limitations of the legislation. It identifies modifications that could make the statute even more effective as a tool for changing the country's incentive structure and environmental dynamics.

As in any ex ante assessment of public policy, selection of evaluative criteria is of critical importance. These should be applied to project outcomes rather than alternatives. Bardach and Patashnik (2016) review a variety of commonly used criteria for this purpose. We focus on the criteria of effectiveness in assessing the new tax and the likely outcomes it will produce, as well as briefly applying the criteria of efficiency and equity. The following are our operational definitions for the ex ante criteria.

- Effectiveness – or what is alternatively called "hitting the proverbial target". In the present context, it involves projecting both the anticipated revenues from the taxes and reduction in existing polluting activities (outputs) or pollution levels (outcomes).

- Efficiency – which generally refers to the cost-effectiveness of a tax and its ability to maximize the public interest based on the associated costs and benefits.

- Equality – or equity (the third of the "e's") assesses whether the tax is likely to be progressive or at least revenue neutral in the burden placed on socio-economically weak segments of society. This criterion should also implicitly include the ability of the tax to internalize the considerable external costs imposed on populations that are involuntarily exposed to chronic and acute pollution burdens. Moreover, equity should include the potential for enhanced enforcement, as poor compliance leads to patently unfair outcomes for those firms which invest meaningful resources in meeting environmental standards.

With regard to other criteria such as "freedom from government control" or "free markets", environmental taxes are typically considered superior to command and control policies by granting greater autonomy to firms as to how to conduct their business and optimize their expenses. Because of the emphasis on reporting and the removal of criminal stigmas, environmental taxes generally rank favorably according to procedural criteria associated with democratic processes, such as transparency and openness. Nonetheless, these kinds of criteria are deemed less critical to the success of environmental taxes and will not be considered in the present analysis.

The evaluation begins with a brief historic review of existing environmental fees and economic instruments in China. The new environmental tax is then described and the associated legislative process reviewed, with an emphasis on the layering process that took place as the country incrementally moved forward towards more ambitious incentive policies. The EPT Law's likely implementation is then assessed according to the three aforementioned criteria. The provisions of the legislation are contrasted with other international environmental tax regimes, and the implications of several notable omissions considered. These include the EPT Law's exemptions for agricultural pollution sources, sewage treatment plants and other potential polluters. We argue that while the layering of environmental taxes in China's public policy enhances its potential for making a long-term contribution to effective environmental performance, it does not guarantee success. Without answering some of the substantial flaws in the existing system, China's new environmental taxes will fall short of their potential as an instrument for environmental change.

II. The Evolution of Environmental Policy: From Pollution Fee to Tax

A Historical Review of the Pollution Fee Policy

The Environmental Protection Tax Law is hardly the first attempt by Chinese environmental managers to apply economic incentives to reduce pollution emissions. China has almost 40 years of experience with pollution fee policy. Several reasons drove the evolution of this policy over the years. Chief among these was the desire to improve existing policy design, making it a more effective and efficient incentive-based instrument for pollution control.

The logic behind such an iterative approach is that progress in addressing critical societal challenges is more readily achieved through the "introduction of new rules on

top of or alongside existing ones". "Layering" (Mahoney and Thelen 2010) is deemed preferable by many commentators to exogenous shocks that change the rules of the game and make a radical break from traditional program orientations. Such slow but steady efforts and piecemeal changes are frequently only recognizable when longer time frames are closely observed.

Beyond the obvious benefits of continuity, layering produces public policies that presumably are more attractive than radical single-stage reform, making them more durable and effective upon implementation (Daugbjerg and Swinbank 2015). Gradual policy reforms are more acceptable to policy makers than radical single-stage reform because implicitly (and frequently explicitly) they do not constitute an affront or a challenge to the legitimacy of existing institutions and leaders. Stakeholders and interest groups may also find it easier to come to terms with policies when they are layered, allowing for them to ease into a new approach and reach an equilibrium if it is gradually introduced. This contributes to enhanced prospects for the sustainability or "durability" of a given policy, increasing the likelihood that it will attain sufficient stature and traction to become a long-term, integral part of a country's regulatory culture. China's experience in the present context is a case in point.

In 1978 China promulgated its original pollution charge system and launched pilot projects soon after. With the basic regulatory infrastructure in place, in 1982 it released Provisional Measures for Collecting Pollution Fees (PRC State Council 1982) and began to formally collect pollution charges. The primary motivation for the initiative was to expand the narrow and inflexible command and control tools available to environmental managers in the field. There was also an ancillary objective of generating funds to compensate for the inadequate budgets that often limited environmental administration and enforcement programs.

Accordingly, in 1988, China began to implement Interim Measures for Paid Use of the Pollution Source Control Special Fund (PRC State Council 1993). Under the new policy, 20–30 per cent of fees paid for pollution discharged beyond emission standards were placed in a special fund, which was then used to provide loans to polluters. Hence, for years, China's pollution discharge policy served as an important source for funding pollution control. Earmarking these discharge fees for environmental activities was considered an entirely legitimate application of the "polluter pays principle".

A decade later, in 2003, based on 20 years of implementation experience, China formalized its pollution charge policy, the Management Regulation on Collection and Use of Pollution Fees, by replacing the previous charge on single pollutants with a multi-pollutants (Chinese State Council 2003). This meant that rather than imposing a charge on emissions that exceeded a given level, the fee sought to address emissions sources in their entirety. The 2003 regulation also doubled the fee levied if discharged effluents exceeded mandatory emission standards.

In 2014, the National Development and Reform Commission released a 'Circular on Relevant Issues Including Adjustment of Pollution Fee Collection Standard' (National Development and Reform Commission 2014). Fee rates were doubled before the end of June 2015 to reflect actual discharge levels more precisely and create economic consequences for polluting activities. Accordingly, if emission standards are exceeded, the pollution charge collected is doubled. This reform also tried to improve the collection rate of pollution fees by extending application of the automatic on-line monitoring data on accounting.

With the 2014 reforms, China's pollution fee policy sought at once to be more stringent while also being more flexible. But it was only partially successful. Specifically, the existing fee system suffered from conspicuous flaws that needed to be addressed:

- Fee rates were still too low relative to pollution abatement costs, making economic returns for emission/discharge reduction insufficient;
- The range of pollutants covered by the program was not sufficient, with many important sources exempt from discharge fees;
- Accuracy of measurements and quality of monitoring for discharged pollutants used as a basis for calculating fees was generally poor; and
- Enforcement was inadequate, as some local governments exploit loopholes by allowing negotiation over payments, exempting polluters that are significant contributors to fiscal revenue. Negotiated rates tended to be low.

The Initiative of Environmental Tax Reform

The second motivation behind the EPT Law emerged from within a broader context: China's general fiscal reform. The EPT Law started as part of a National Taxation Reform in 2004 (CPC Party Central Committee 2003). Two of the objectives of this new round of taxation reform are to strengthen the function of taxation in optimizing the resource allocation, and to promote the legalization of China's taxation system. In particular, fees should be removed or gradually replaced by a proper tax.

Under the Reform, two major environmentally related taxes: a fuel tax on refined oil products in consumption tax and an ad valorem resource tax on oil and natural gas were expeditiously adopted and integrated into the domestic taxation system in 2009 and 2011 respectively. Taxes on emissions, however, were still conspicuously absent. In October 2010, the 5th Plenary Session of the 17th CPC Central Committee issued a Proposal for Making the 12th Five-Year Plan on the National Economy and Social Development that contained a new tax category: the Environmental Protection Tax.

Like other layered policy interventions, lawmakers understood that it made no sense to discard the achievements of the past. The existing emission/discharge fee policy has already become an important part of the environmental policy system in China and produced significant environmental dividends. Accordingly, the new tax was supposed to ensure that the new taxation system incorporates existing emission/discharge fee programs. To be precise, the basic strategy of the reform was to transform the existing pollution fee into a formal tax.

On April 24, 2014, the newly revised and promulgated Environmental Protection Law of the People's Republic of China for the first time formally confirmed the name "Environmental Protection Tax" in a legal document (chapter 4, article 43). Finally, on December 25, 2016, the EPT Law was enacted, essentially as a pollution tax, merging the two policy initiatives.

III. A Brief Summary of China's Environmental Protection Tax Law

The EPT Law begins with the premise that the existing pollution discharge fee system needs to be upgraded. Accordingly, the statute can be characterized as a "fee-to-tax" shift, with the EPT Law's additional layer essentially serving as a comprehensive pollution tax.

The legislation maintains much of the basic settings of the design of existing pollution fee programs, and has five major characteristics.

1. Taxpayer: the EPT Law targets enterprises and public institutions that discharge listed pollutants directly into the environment (chapter 1, article 2). Those enterprises and public institutions that "legally" discharge listed pollutants into the centralized sewage or solid waste treatment/disposal facilities, or store/dispose of solid waste in legally established facilities/sites, are not included (chapter 1, article 4). In short, the new legislation does not discriminate between key or non-key taxpayers.
2. Tax base: the tax applies to four different types of pollutants or environmental media. Air pollutants, water pollutants, solid waste and industrial noise will be taxed; carbon dioxide will not (chapter 1, article 3). For air and water discharge, the top three conventional air/water pollutants (with highest emissions), or the top five if they include heavy metal water pollutants, will be taxed (chapter 2, article 9). Here again, provincial governments are authorized to expand this list and require additional pollutants to be taxed from myriad sources (chapter 2, article 9). The tax is still based on emission levels, calculated by a pollution equivalent (PE) function.
3. Tax rate: the proposed tax rate is set at 1.2–12 RMB (Reminbi) on stipulated quantities (pollution equivalent) of air pollutants, 1.4–14 RMB on water pollutants and a range of five to 1,000 RMB for each ton of solid waste (chapter 2, articles 7, 8). The base rates (1.2 RMB for air pollutants and 1.4 for conventional water pollutants) are, however, the same as current pollution fee rates (newly upgraded from the end of June 2015), but now extend to all listed pollutants. Provinces have authority to raise tax rates ten-fold, after approval by local People's Congresses based on their environmental protection and pollution control targets, while balancing social and economic development goals (chapter 2, article 9).
4. Taxpayer exemption: the EPT Law lists exemptions of sectors that are not required to pay green taxes for polluting behavior. Specifically, these include: agricultural sources (excluding large-scale livestock farming); mobile pollution sources (including motor vehicles, railroad vehicles, off-road vehicles, mobile machinery, shipping vessels, aircraft); and sewage treatment plants (domestic waste treatment plants if their discharges are shown to meet national/local discharge standards) (chapter 3, article 12).
5. Monitoring and enforcement: the EPT Law introduces new institutional arrangements for tax collection. The new procedures rely heavily on self-reporting by polluters. Required data are submitted to relevant tax authorities determining collection levels among polluters, while emission monitoring is supervised by the Environmental Protection Bureau (EPB). Offenders are to be penalized under the new law. Detailed discharge inventories and data are to be shared between tax and environment authorities. When the tax authority suspects fraudulent behavior, it can request verification of pollution data from the relevant environment authority. The EPT Law stipulates that tax and environment authorities establish an information-sharing mechanism (chapter 4, articles 14, 15, 17, 18, 20).

IV. Fee to Tax Reform: An Ex Ante Assessment

The two simultaneous motivations that drove the "Fee to Tax" reform can be seen as the two paramount objectives of China's EPT Law. At the *macro* level, the reform is to create

the "double dividend" that environmental taxes seek to produce: under the principle of revenue neutrality, green taxes improve environmental performance while decreasing the distortions of existing taxes on capital and labor, to create more employment, income and sustained gross domestic product (GDP) growth as well as a more progressive tax system. At the more *micro* level, the reform is designed to provide targeted, effective incentives to reduce emissions – incentives that are integrated into policy design – as well as to solve practical implementation problems that encumbered existing pollution fees, by enhancing the legal authority behind the policy and by improving the normative and institutional enforcement infrastructure.

By assessing the likelihood of attaining the above objectives, a plausible assessment of the EPT Law's outcome as well as the potential and limitations to achieving these policy goals can be made. We use the three standard, aforementioned criteria to assess the prospects for the new policies' success.

Assessing Effectiveness: Improving Pollution Control in China

Theoretically, environmental taxes must be set at a rate commensurate with the costs of any anticipated environmental damage (OECD 2011). The problem of course is that in practice, external damage is very difficult to measure. In order to solve the implementation problem of Pigouvian taxes, Baumol and Oates (1971) put forward a *standard-pricing* approach: governments should establish a pollution discharge standard based on environmental quality standards; the rates for an emission/discharge tax are set based on the projected marginal cost of pollution abatement, and are adjusted according to the actual environmental conditions existing until they reach an optimal level.

Environmental tax regimes are supposed to provide incentives for pollution abatement. When rates are set too high for industries, they may cause them to shut down rather than clean up; when they are set too low, some producers will simply pay them as part of doing business without upgrading pollution control systems. Indeed, when actual pollution reduction costs are computed, the proposed tax rate is decidedly low and is unlikely to induce changes inenviromental performance. For example, the abatement costs of COD (chemical oxygen demand), ammonia nitrogen, SO_2 (sulfur dioxide) and NO_x (oxides of nitrogen) for the industrial sectors of Shanxi Province in 2012 are 4.7 RMB/kg, 3.6 RMB/kg, 1.5 RMB/kg and 5.7 RMB/kg on average: all of these expenses are higher than the current required discharge fee level (Wu and Chen 2016). In such cases, a rational firm will opt to pay taxes and leave the associated polluting practices unchanged. Qin et al. (2015) indicate in their research that with modest levels of taxation, emissions of COD, ammonia nitrogen, SO_2 and NO_x are only likely to drop by 0.07, 0.03, 0.28 and 0.26 per cent respectively. Much like the initial experience in Scandinavia (Andersen et al. 2000), pollution taxes in China have not yet provided compelling incentives for pollution control. In short, there is clearly room for ratcheting up present tax rates under the EPT Law.

Unfortunately, it is not clear that reaching an appropriate tax rate, sufficient to trigger optimal environmental performance, will be one of the new program outcomes. For instance, the EPT Law authorizes considerable autonomy to each Chinese province to increase tax rates to no higher than ten times the base rate and to add more taxable pollutant types according to social, economic, environmental and development conditions. The logic behind this differential strategy is self-evident: it will allow each region to choose optimal tax rates according to actual environmental conditions. The problem is

that it may also create a risk that some regions will choose to offer more lenient standards and lower tax rates, creating "pollution havens" and pockets of particularly high environmental exposure.

Besides potentially low tax rates driven by a "race to the bottom" among competing jurisdictions, the effectiveness of pollution control will surely be weakened by inappropriate taxpayer exemptions. The EPT Law does not include agricultural pollution, motor vehicles, conventional industrial solid waste and urban sewage treatment plants among the pollution sources subject to the new tax. Agricultural pollution and motor vehicles are typically small, dispersed sources of pollution which constitute a considerable regulatory challenge. But their aggregate contribution to degraded environmental conditions is enormous.

According to the First National Pollution Source Census Bulletin, agricultural discharges contributed 43.7 per cent of the total COD load, 57.2 per cent of the total nitrogen (TN) load, and 67.4 per cent of the total phosphorus (TP) load in 2007 (Rao et al. 2011). Emissions from vehicles were identified as the largest source of pollutants in China's big cities, such as Beijing, Hangzhou, Shenzhen and Guangzhou, based on a pollution source analysis.

Because of their inherently diffused nature and the stochastic nature of agricultural discharges, which depend on weather conditions, it is very difficult to monitor farmers' environmental performance. Rather than tax direct pollution discharges, indirect taxes (e.g. tariffs on inputs, or substances whose utilization contributes to negative environmental outcomes) can be applied for pollution control purposes. International experience with nonpoint source pollution (e.g., agricultural runoff) suggests that in such cases, taxing inputs constitutes a more promising approach. For instance, Denmark, Finland, Austria Norway, Sweden and American states like Wisconsin, Iowa and Nebraska all introduced taxes to reduce demand for fertilizers and pesticides (Institute for Self-Reliance 2009).

To be effective, taxing agricultural chemicals or fuel should also become part of China's new environmental taxation strategy. Research confirms that fertilizers and pesticides are fundamentally elastic products: in countries with per capita GDP comparable to China (e.g. Mexico and Costa Rica), taxes successfully reduced applications of agricultural chemicals (Agnes 2000; Piña and Fo 2004). This is one area where there is room for expansion of the EPT Law even before implementation begins.

The EPT Law also grants exemptions to urban sewage treatment discharges. Wastewater treatment plants are a "classic" point source that is easily taxed according to any number of parameters (COD, BOD (biological oxyen demand), nitrogen, fecal coliform levels). International experience with taxation of sewage goes back almost 50 years: the Netherlands introduced its levy on discharged effluents in 1970; Germany in 1974; Denmark in 1992 (ECOTEC 2001).

For some time, it has been clear that surface water contamination in China will not improve in many areas unless discharges from urban sewage treatment plants are addressed. According to China's national environmental statistical data, COD and ammonia nitrogen discharges from urban areas already constitute 37.8 and 57.5 per cent of total COD and ammonia nitrogen released in China in 2013. The vast majority of these pollutants are associated with releases of treated and untreated wastewater. According to our calculations, the EPT Law only taxes 13.5 per cent of COD and 10 per cent of China's ammonia discharges overall.

Even if sewage treatment plants discharge effluents after sewage has undergone secondary treatment (as defined in the Chinese level-1, grade-A discharge standard) pollution concentrations are still far higher than the permissible surface water standards. In other words, after paying fees for existing pollution discharges, municipal wastewater treatment plants still may end up releasing unacceptably high quantities of pollutants into freshwater bodies, undermining restoration or rehabilitation efforts. The logic behind the EPT Law's exemption for treated sewage effluents is that wastewater treatment plants presumably have already paid "discharge fees". It certainly makes sense not to tax the same source twice for the same pollution discharge. But the ultimate result of the exemption is that China's single greatest contributor to surface water contamination will not adhere to the polluter pays principle. In short, there are some fundamental flaws with the new law which do not bode well for reaching the desired environmental outcomes.

Assessing Efficiency: The EPT Law's Contribution to a Broad Tax Reform

For a "green" tax system to be efficient, it should produce sufficient revenues to assist in financial consolidation and enable the government to reduce other, existing taxes. Historically, many countries established environmental taxes purely for the purpose of improving environmental protection (OECD 2011). More recently, however, environmental taxes are promoted as part of broader reforms in national tax systems. This reflects a quiet change in the motivation of environmental tax advocates.

Chinese tax policy followed a similar evolution. The considerable political will associated with the government's declared intention to *build an ecological civilization* and the emergence of the National Taxation Reform in China (including structural adjustments) offered an opportunity to expand the scope of environmental taxes, which were framed as part of the comprehensive tax reform. EPT has now become the 18th tax category that is enforced across the entire country, which ultimately makes China's overall tax structure more "green".

Greening the tax system through environmental protection tax reform makes sense ideologically. Advocates of environmental taxes have long argued that they can produce a "double dividend": incentivizing socially desirable behaviors while producing alternative tax revenues. In other words, under a guiding principle of revenue neutrality, environmental taxes can be employed to reduce distortions in existing tax categories that deter capital investment, optimal levels of employment/labor and continuous growth of GDP. Bringing pollution discharge fees into China's mainstream taxation system is an important step in such an integrated societal strategy.

Based on many years of international experience, green taxation represents a new fiscal paradigm that can upgrade the entire tax system structure. Perhaps the greatest potential benefits offered by a new environmental tax law involve their ability to reduce other taxes. By sticking to the declared principle of revenue neutrality, Environmental taxes can not only replace old taxation policies that discourage valuable activities such as working and innovation with a tax that discourages pollution of the air and contamination of water. China also can correct distorted and perverse subsidies that harm the environment and review the taxes of companies that historically have enjoyed preferential treatment.

The EPT Law's ability to increase overall efficiency ostensibly is enhanced by existing trends. China's environmental policies are already moving in the direction of incentives-

based regulation rather than conventional "command and control" interventions. The EPT Law is likely to give this approach a significant push forward.

Based on a broad definition of environmental taxation, since the mid-1990s China has already, step by step, implemented an environmental taxation system involving a variety of "green" taxes on:

- Raw materials or inputs (the resource taxes include taxes on coal, oil, gas and mineral resources, the Farmland Occupation Tax, Land Use Tax, and a Water Resources Fee);
- Products (consumption taxes, including fuel tax, Vehicle and Vessel Tax); and
- Emissions/discharges (pollution fees on pollutants discharged to the ambient environment).

The incremental layering of green taxes over the years has proven to be reasonably successful: Specifically, China saw an increase of more than 400 per cent in green taxation between 2007 and 2014, truly a quantum leap. Even if we compare the level of China's environment-related taxes historically with that in the EU and OECD countries for the years 2007–2014, it also shows a relatively robust environmental taxation system (Wu et al. 2013; Wu and Chen 2016): without counting VAT, from 2007 to 2014 the volume of China's environment-related taxes increased from 395.6 to 1659.3 billion RMB, with the ratio to GDP rising from 1.47 to 2.58 per cent on average. This is slightly higher than average levels of EU countries (2.46 per cent) and much higher than the average level (1.61 per cent) collected in Organization of Economic Co-Operation and Development (OECD) countries in 2014. The ratio of environment-related taxes to total tax revenue in China ranged from 8.68 to 13.9 per cent, a level much higher than that found in the EU, where it is only 6.35 per cent, or the OECD level of 5.23 per cent in 2014.

Notwithstanding this ostensible achievement, the increase in scale was mainly attributed to the reform of the Resource Tax and Consumption Tax on refined oil products. Government revenues for emissions and discharges in retrospect have been compromised by limited target pollutants, low tax rates and inadequate tax collection. The annual revenue from all pollution fees was 18.7 billion RMB, only contributing 1.12 per cent of the total environment-related tax revenue (without VAT) or 0.16 per cent of the total general tax revenue in 2014.

The EPT Law seeks to address these deficiencies and defines its pollution "fee-to-tax reform" as a new approach to taxation. But if it is limited to the transformation of existing pollution charges into taxes, little revenue contribution from the new tax can be expected and overall efficiency will not be enhanced. Based on 2014 emissions data, total volume EPT revenues could reach 49.3 billion RMB with the base rates (presume full collection rate), which will only contribute 0.4 per cent of China's total tax revenue. So EPT is not expected to bring extra revenue as the tax rate is basically unchanged, and therefore unable to directly support tax cuts in other area.

Assessing Equity: Collection Rates and Income Neutrality

Equity can be evaluated in two different contexts: First of all, tax burdens after implementation of the environmental tax should at the very least not become more regressive as a result of new taxes and if possible be consistent with a progressive taxation orientation. Secondly, policies must be even-handed regarding the regulated community. Inconsistent

implementation of environmental regulation produces unfair outcomes, undermining the deterrence needed for successful implementation and punishing "good actors" instead of rewarding them. And of course, equity is ultimately linked to the ability to reduce contamination levels, given the fundamental injustice of involuntary exposure to hazardous levels of pollution.

With regard to the anticipated burden, the declared revenue neutrality associated with the new tax promises to contribute to overall societal equity. This is one of the lessons to emerge from the successful implementation of a carbon tax in British Columbia: not only did the tax allow for substantial reductions in regressive taxes and de facto income redistribution (Beck et al. 2015). it also produced measurable employment benefits (Yamazaki 2017). Yet at present tax rate China's new environmental protection tax will not produce substantial revenue to supplant another tax. Hence, there is little basis for a positive projection in this regard, although the greening of China's tax system through the adjustment of the tax structure is obviously a task too complex and demanding to be solved through a single environmental tax statute. And indeed, the EPT Law does not purport to establish a new comprehensive tax system, but rather a single tax category.

With regard to the second criterion for equity, feeble collection constituted one of the primary motivations behind the present legislative reform. Based on emissions data of 2014 and pollution charge standards conducted the same year, the amount of collected pollution charges for five leading pollutants (COD, ammonia nitrogen, SO_2, NO_x and particulates) from industrial emissions in China should have reached 24.4 billion RMB. However, the actual amount of pollution charges for all pollutants collected in 2014 was only 18.7 billion RMB, with collection rate as low as 76.5 per cent. If additional fees that might have been levied on other pollutants are included, collection rates were even further below expected revenues.

The relatively low collection rates of existing pollution charges in China is primarily the result of flawed collection and management practices. Fees can be highly unpredictable and are frequently lowered as a result of negotiations between regulators and polluters. Fraudulent declarations about discharge volumes are not uncommon. The many plants in China that for years paid full pollution fees, while competitors avoided them, suffered an unfair economic disadvantage. Improved collection rates will not only improve the impact of the economic incentives but, equally important, constitute a more equitable policy toward complying facilities and encourage more effective environmental management.

There was considerable hope that the legal basis and guarantee of the EPT Law may strengthen the enforcement and improve the collection rate of pollution tax, and a more powerful collection and enforcement scheme would be part of the "fee-to-tax" reform. The EPT Law has formed the shared responsibility regarding tax collection and management between tax authority and environmental protection authority, and required them to establish an information-sharing platform to facilitate the collaboration between them, and stipulated the information that has to be shared compulsorily. It also emphasized the request the content of information that need to be self-reported by polluters. This will help to improve existing implementation of environmental taxation and regulatory performance.

But, at present, more innovations need to be created through the Implementation Rules under preparation. Under the EPT Law, if the tax authority believes that information declared by taxpayers is inaccurate, it may submit a request to the relevant environmental

protection agency to verify the actual emission levels. But the tax authority's capacity for evaluating applications and tax payments based on reported and shared data is doubtful. For an environmental tax law to be effective, it needs to specify that professionals from the Environmental Protection Ministry are responsible for ensuring the veracity of applications and payments. This requires highly skilled collaboration between the tax and environment authorities. While there is considerable optimism about the level of execution that can be expected in collection, at present, the extent to which enforcement and evenhanded implementation will improve under the new tax is unclear.

V. Conclusions

Pollution levels in China remain extremely high and environmental exposure constitutes the country's paramount public health priority. While there is a tendency to focus on China's high ambient pollution levels, in fact the country has created a substantial regulatory infrastructure for reining in emissions and discharges. Command and control legislation has certainly improved China's environmental performance in the past. But given the enormity of the regulatory task, when pollution control enters into the realm of high marginal costs for modest environmental gains, economic tools and powerful financial incentives are an increasingly critical component in the country's environmental strategy.

In retrospect, the layering legislative process that is now so apparent was strategically shrewd. It can be argued that without initial efforts to address the problem through pollution fees, it would not have been possible to move forward to the next level of regulation. It is also clear that given the phenomenal industrial growth the country has witnessed, existing efforts are not enough. Adopting a comprehensive Pigouvian initiative can lay a foundation for more effective environmental regulation and overall tax system reform in the future. Therefore, there is some basis for the sanguine pronouncements that accompanied the adoption of the tax. But that is also why it is so important to "get it right". "Fee to tax" reform reflects the gradual nature of this policy evolution. China has considerable experience with pollution fees. The new environmental protection tax constitutes the next, very natural layer of intervention.

Nonetheless, China's new environmental protection tax law may not generate its full potential in environmental dividends. The transition from a pollution charge to an environmental tax has delivered a clear political message in greening the country's tax structure. It will probably strengthen the legal basis for economic incentives as a central tool in China's environmental protection. Yet several problems in the present EPT Law remain unsolved. In many areas, it remains largely a copy of existing pollution fee policies, with only partial institutional innovations and improvements, raising concerns that it may still fall short of creating the effective and efficient incentives required for significant pollution control. Revenues may prove to be too small to directly promote tax cuts among other regressive levies and the path to such equity gains is poorly characterized. Without some meaningful amendments, the EPT Law can ultimately be seen as a great step forward in the evolution of China's general tax reform, a moderate step towards improving the Pigouvian pricing on pollution, but only a small step in attaining substantial emission reductions and a more equitable tax system.

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