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GREEN GDP STRATEGY AND CORPORATE RESPONSIBILITY

Jason Z. Yin
Stillman School of Business, Seton Hall University, South Orange, New Jersey, USA

Abstract: By most measures, the environmental challenges confronting China are at least as serious as those confronting many other nations in the world. A measure of Green GDP will almost certainly give policy-makers and the interested public a more defensible estimate for the extent and scope of environmental challenges. Based on a review of the two strategies in combating pollution, this paper suggests that a combination of governmental intervention and free-market operation could be a better strategy to reverse China's heightening environmental challenge. The thrust of this article is to suggest that while a better macroeconomic estimate may be helpful in motivating governments to act, a more microeconomic approach at the corporate level may yield more useful results both in terms of understanding the problem and in planning the steps that are likely to be needed in achieving a more acceptable solution.

Keywords: GDP (Gross Domestic Product,) free-market school, government intervention school, Green GDP auditing, TEV model (Total economic value model)

The measures of Green GDP (Gross Domestic Product) have long been the subject of research in western countries since the 1960's, but it has never been practically used in measuring economic outputs. Since the fall of 2005, Green GDP has swiftly become a hot policy and research topic in China. The research issues involve how to apply the concept of Green GDP to measure economic outputs and how to use Green GDP to support the government's objective of improving the balance between growth and equity. After close to thirty years of narrowly focusing on the growth of corporate outputs, the concerns for corporate environmental consequences and environmental sustainability have finally prevailed. The Chinese government started in 2006 to use Green GDP measures to account for environmental costs in corporate outputs and GDP calculation. While it has never been entirely clear what practical use would eventually be made of the studies in the West, the emergence of this Green GDP methodology in China will draw policy attention to the quality and sustainability of economic growth and will hopefully lead to better environmental outcomes.

Green GDP methodology is an adjustment to traditional measures of a country's output of goods and services taking pollution and waste of resources into account. This method refers to an accounting system in which environmental degradation costs and natural resource depletion costs are factored into the calculation of GDP growth. The goal of this methodology is presumably to provide a better measure for guiding public economic policy and thereby contributing to a more welfare-rich outcome than could be achieved using traditional measures.

The concept of Green GDP was initially developed in the West in the 1960's (Pearce, Markandya,

& Barbier, 1989). This concept is a relatively new idea in China and there is controversy over how to implement a financial accounting approach to measure the costs of environmental damage and degradation caused by pollution and resource exploitation. In spite of these difficulties, two Chinese government agencies, the National Bureau of Statistics (NBS) and the State Environmental Protection Agency (SEPA), were designated to research and develop the Green GDP index and use it as a standard measure of China's environmental sustainability. These two government agencies measure environmental costs in terms of economic growth. By so doing, China will be the first country in the world actually implementing the Green GDP concept in the measurement of its economic activities. To better understand the background for the issues involved in China's recent request for Green GDP, it is necessary for a historical review of human activities and environmental protection.

HISTORICAL REVIEW

Reckless usage of land and other natural resources which caused severe damage to the human living environment can be traced back to the Roman Empire and Middle-Ages in western civilization. For instance, the Libyan coast had been covered with vineyards and the hinterland was covered with dense forests before its conquest by Romans. The deforestation, land contamination, and land erosion during and after Roman times turned Libya and other parts of northern Africa into desert (Kala, 1998). Excessive Roman commercial transactions for timber and agricultural produce deforested and salinized large areas in Palestine and Mesopotamia. In the Middle Ages (about a thousand years between the fifth century and fifteenth century), the power of the Church grew rapidly and the Church gradually became the major landowner. Unfortunately, the growing church power helped neither economic growth nor environmental protection. Diminished natural resources and environmental degradation subsequently led to the stagnation of economic activities in Europe in the seventeenth century.

Environmental protection did not receive enough attention in classical economic studies and business practice of the eighteenth century. In The Wealth of Nations, Adam Smith (1776) contended that expansion and improvement in the agricultural sector would lead to greater prosperity. He argued that the pursuit of self-interest based upon free enterprise and free market economy was the key to economic growth and human well-being. He was optimistic regarding the adequacy of natural resources because at his time much good land still remained uncultivated and the greater part of cultivated land was not improved to reach its full potential. With the abundance of land and improved farming methods, Smith believed that agriculture posed no problem. Problems such as population growth, rapid urbanization, poverty and urban squalor became noticeable in Smith's time but were not yet a serious cause of concerns as in later years.

In the last hundred years of industrialization, acid rain, the greenhouse effect, O-zone depletion, deforestation, land and water contamination, soil erosion, accumulation of vast quantities of highly toxic chemicals, nuclear and other wastes have gradually created an environmental nightmare. Pollution began to cause serious harm human health, endanger aquatic life, reduce agricultural yields, and pollute drinking water. These environmental problems were closely linked to business activities. Business people were more concerned about corporate-level profit than negative environmental externalities at the societal level.

The Concept of Externality

Externality refers to the costs emanating from production or consumption processes by economic units, such as firms and consumers, which are passed on to outsiders by way of air and water pollution and soil contamination. In other words, in the absence of property rights to air space and water courses, the economic activities of individuals and organizations may abuse these resources for their gains and benefits at the price of production and consumption of other economic units (extra losses or costs). However those gains and losses were absent from the financial calculations for the gainers and the losers before the concept of externality came into the picture. This concept of externality built the foundation for environmental economics by relating economic analysis to environmental problems. The first substantial treatment of externalities was by Kapp (1950; 1963) with anticipation that economic growth has far-reaching adverse consequences affecting the environment.

STRATEGIES TO COMBAT POLLUTION

Employing the concept of Green GDP will help provide a better picture of the pollution problem at both national and corporate business levels. Pinning down the corporate polluters and the related financial costs at micro-level might help combat pollution. This information is essential in finding ways to cope with environmental challenges (Adlemann, Fetini, & Golan, 1997). The debates on how to deal with the adverse consequences on the environment lead to the creation of two major schools: free-market school and government intervention school.

Free-Market School

The free-market school maintains that the environment will be better served through the exchange of well-defined and enforceable property rights in which there is a role for government as enforcer (Kula, 1998). According to Coase (1960), if a system of property rights is properly instituted and guaranteed by legal force, there would be no need for intervention on pollution disputes. The polluters and those affected can achieve a satisfactory solution through negotiation. The self-interested parties will engage in a voluntary exchange of property rights in a free-market environment. Ronald Coase (1960) does not believe that the government has articulated knowledge on all aspects of environmental externalities and is capable to internalize the externalities. He argues that the imposition of a pollution tax can itself introduce a set of externalities. The environmental problems will be better resolved through the exchange of well-defined and enforceable property rights. The government will serve the role of regulator and enforcer to facilitate economic growth without compromising environmental quality.

However, the market environmentalists believe that individuals, not the government, are the best judges of their own welfare. With a well defined free-market structure, individuals should be capable to find the optimal solutions for themselves and the society as a whole (Kula, 1998). However, it seems that this property rights approach would work better when a small number of individuals are involved in external effects. Interested parties could effectively negotiate a payment scheme to induce those who generate externalities to adjust their behavior to acceptable levels. But when the number of interested individuals is large, this free-market model may be not practical due to the undoubtedly high cost of negotiation, implementation and enforcement (Kula, 1998).

Intervention School

In contrast to the free-market school, the school of government intervention argues that market forces are not always conducive to either prevention or creation of natural resource-based capital. For instance, the development of forestation and water resources would benefit environmental preservation and social welfare promotion in the long-term but would not necessarily generate satisfactory short-term returns to non-governmental private interest groups. According to Pigou (1929), the government categorically is the trustee for public interests to watch over and act to defend the exhaustible natural resources of the nation from rash and reckless exploitation. Pigou suggests three policy instruments for the rational use of exhaustible natural resources protection of environmental quality, curbing wasteful consumption: (1) state subsidies, (2) taxation, and (3) legislation. The objective of government intervention through policy instruments is to optimize resource allocation on behalf of the society and to correct the shortcomings of the free-market. The underlying assumption is that governments are efficient and capable to work out solutions to problems (Demsetz, 1969).

In brief, the debate between the two schools is about how to find the optimal environmental strategy to achieve the goals of sustainable economic and social development (Turner, 1988). The core of the debate is to find efficient ways to discourage or penalize the reckless use of environmental resources in order to support and improve current living standards. The depletion of natural resources will in turn compromise the ability to sustain future development or impede future generations from meeting their own needs.

WORSENING POLLUTION PROBLEM IN CHINA

Before discussion of how to formulate the right strategy to achieve green GDP goals, let us briefly review the environmental crisis China now confronts. In the 1960s and early 1970s, when the international community started to pay serious attention to environmental issues, China was experiencing chaos because of the Cultural Revolution. With ignorance, the Chinese government chose to deny its pollution problems and refused to participate in the international conference on human environment by claiming "[t]here is no need to participate in a global conference to address the environmental protection. A socialist nation does not suffer from the environmental ills of capitalism" (Ferris & Zhang, 2002).

Unfortunately and ironically, forty years later, China became one of the most polluted nations in the world. The air and water were badly polluted and much of China's land was contaminated, salinized or deforested. According to the World Bank, in 2000 China had 16 of the world's 20 most polluted cities. According to the International Energy Agency (IEA) forecasts, the increase of greenhouse emissions from 2000-2030 from China alone will nearly equal the increase from the entire industrialized world.[1] China's emissions of sulfur dioxide were the highest in the world in 2004. Acid rain caused by coal-burning plants caused "striking damage to agriculture, buildings, and public health." (SEPA, 2006).

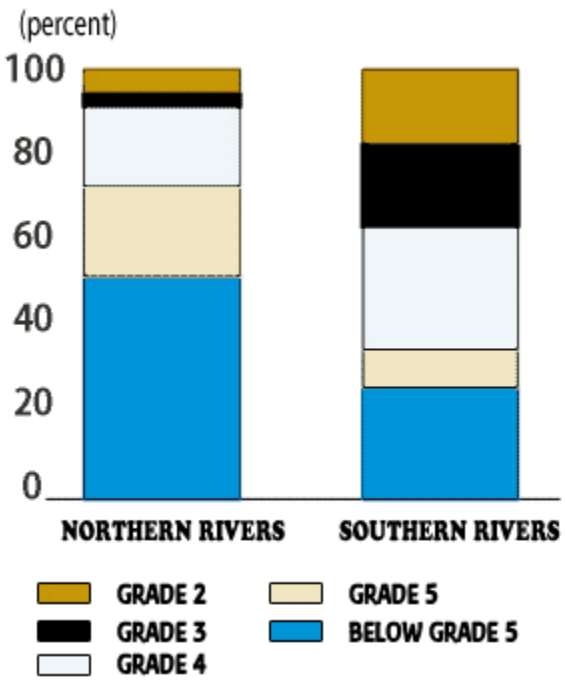


Figure 1. River pollution in China.

Source: www.carbon.cfr.washington.edu

Besides severe air pollution, water pollution is another dimension of the environmental crisis. According to the SEPA report (2006), the water in five of the seven largest rivers has been badly polluted. The Yellow River, Songhua River and Huai River regions have less than 10 % Grades I and II water suitable for human conduct; seriously contaminated by industrial discharges, many of these waterways are largely unfit for direct human use. Overall, 70% of the water was unsuitable for human use. Some rivers and lakes had dried up from overuse by factories and farms. Those that did not dry up have become open sewers while pollutants and fertilizer runoff cause algae blooms—red tides—along the river and the coastlines, devastating the fishing industry. In addition to the damage to the waterways, nearly 1,000 lakes have disappeared over the past 50 years. 75 percent of China's 20,000 natural lakes and thousands of artificial lakes suffered from algae pollution caused by an influx of waste water containing nitrogen, phosphorus and other harmful substances, according to Zhu Guangyao, Vice Minister of SEPA.[2]

Subsequent to the deterioration of inland water, Chinese coastal water also suffers from pollution. Sewage, inorganic nitrogen, phosphate, oil hydrocarbons, organic matters, pesticides, and heavy metals from land-based sources contaminate coastal ocean water. Large amounts of pollutants are discharged and dumped directly into the ocean. Sewage discharged into the ocean from factories and cities along the coastal line account for more than 10 billion tons and 146 million tons of toxic materials were discharged per year by 2000 (Li & Daler, 2004).

Elizabeth Economy (2004) wrote a book, *River Runs Black: The Environmental Challenge to China's Future.* Her first hand investigation of the Huai River region and China's growing pollution problems elicited serious public and research attention from the West concerning China's environmental

crisis. Land in China has also badly suffered from pollution. China has about 120 million hectares of arable land. About one tenth of the arable land has been damaged. Much of its land has been deforested, leading to erosion and flooding. By 2020, according to predictions, 25 percent of China's arable land will be gone (Economy, 2004). According to SEPA, "grave" soil pollution that jeopardizes ecology, food safety, people's health and the sustainability of agricultural growth. It is estimated that 12 million tons of grain are contaminated by heavy metals in the soil each year, which incur direct economic losses of around $2.5 billion.[3]

In addition, the acreage of farmland irrigated with polluted water is also growing. About 7.3 percent of the country's irrigated farmland was harmed by polluted water, an increase of 1.6 times of the figure in the 1980's, and 93 million hectares of farmland were polluted by pesticides. Desertification poses another threat. Due to over-development, large areas of the country's grassland and farmland are turning into sandy land. The acreage of desert land in China reached 2.62 million square kilometers in 2000 and is expected to increase at a speed of more than 2,400 square kilometers each year.[4] With such badly polluted air, water and land, it becomes imperative for China to take decisive actions to turn around this crisis before it is too late to reverse the course. Clearly, without decisive actions taken, the worsening pollution will make Chinese economic growth environmentally unsustainable.

ENVIRONMENTAL SUSTAINABILITY

It is almost impossible to accurately figure out the pollution costs of China's GDP because of the lack of standards for measurement and the difficulties in collecting relevant data on pollution damage. The World Bank estimated that pollution costs China 5% of its GDP, including health care and lost productivity. In 2004, the Economist estimated that pollution decreases China's GDP by 12%. In September 2006 China (for the first time ever) published a Green GDP Auditing Report for 2004.[5] According to this report, Pollution caused direct economic losses of RMB 511.8 billion Yuan ($64.2 billion). Water, air and solid material pollutions accounted for 55.9%, 42.9% and 1.2 % respectively. It would take RMB 1080 billion Yuan ($135.8 billion) of direct investment and RMB 287.4 billion Yuan ($34.2 billion) of operating costs to clean up the pollution hazard, which is about 8.6% of total GDP. Unfortunately, the total investment in environmental control was 1.18% in China's tenth Five-year economic development period (2001-2005), which was far less than what is needed to offset the environmental damage.

Green GDP auditing examines the costs of over twenty items while the current Chinese Green GDP auditing only cover the costs of ten items. The costs measured were: health, agricultural and materials losses caused by air pollution; health, industrial and agricultural production losses and water shortage caused by water pollution; and economic loss by land occupation of solid wastes. According to China's SEPA, underestimation occurred due to missing information in the calculated costs of the ten items. In addition, in this Green GDP auditing, another ten items such as the costs of damages to natural resources and biological environment, the costs of ground and underground water, soil contamination and in-house air pollution were also excluded (SEPA, 2006).[6] Those exclusions were due to lack of a fundamental research work which would provide the basis for auditing estimation.

Therefore, the accounting results reflect only a fraction of ultimate Green GDP. Even so, the environmental pollution costs and treatment costs (8.6% of GDP) were about to offset the total

economic growth of 2004 (9.5%). In other words, discounting the environmental costs, the net GDP growth would be less than 1% for 2004. If we take the twenty pollution items into account, China would have a negative GDP growth. The report indicates that the high economic growth over the years damaged the quality of life and long-term growth potential of future generations. Clearly, without taking serious corrective actions, China's long-term development plan would not be environmentally sustainable. Thus, the worsening environmental pollution problems have raised serious concerns about the sustainability of Chinese economic growth. China's miracle of economic growth might end soon because it will be overwhelmed by environmental problems. Regardless, the Green GDP estimates provide a better understanding as to the serious extent of the environmental challenge. The Green GDP report serves as a wake-up call for China to undertake the challenge seriously and immediately.

THE DILEMMA AND THE POLICY OPTIONS

China essentially is depleting its own natural resources for rapid economic growth, sacrificing long-term interest for the short-term gains. Ironically, the Chinese decision makers were not unaware of the worsening environmental situations, but they failed to respond adequately and efficiently because they have been facing a daunting challenge in balancing economic growth and environmental protection. Unfortunately, the push for growth has always superseded environmental considerations in the past decades. Until now, no clearly defined strategies have been formulated in combating the environmental crisis.

As mentioned earlier, the debate on strategies to cope with environmental challenges can be put into two categories: either free market operation or governmental intervention. Recent policy studies on China's environment suggest that governmental intervention is the key to a clean future, including stricter governmental industrial regulation and pollution levy reform. (Dasgupta, Wang, & Wheeler, 1997; Dasgupta, Laplante, Namingi, & Wang, 2000; Ferris & Zhang, 2002; Li & Daler, 2004). How to use a market approach for environmental control is much less explored. This paper intends to argue that combination of both free market operation and governmental intervention might provide better solutions.

Government Intervention

According to World Bank policy research on policy reform and industrial pollution in China, the damage of industrial discharge can be substantially reduced at modest costs if a stricter regulation is enforced. The research project also found that adopting an economically feasible policy of much stricter regulation will restore the health of many waterways (Dasgupta, Wang, &Wheeler, 1997). China's current environmental problems stem, in large measure, from weak pollution control. The weak pollution control stems from the failure to prioritize the economic and social development activities and formulate a cohesive strategy to take care of growth and equity simultaneously. For a long time, Chinese decision makers have tried to solve the puzzle of enforcing environmental standards without crippling economic growth. In practice, they have sacrificed the environment for economic growth. In the environmental protection community, the Chinese government has been labeled environmentally unfriendly.

To intervene properly, this paper suggests that the Chinese government needs to take measures in the following three dimensions. First of all, China needs to create an environmentally friendly

government from central administration to local authorities. The actions to be taken include:

- Creation of a legal framework of environmental protection and enforcement
- Green Accounting Reform: To deduct the cost of environmental damage from total outputs
- Green Tax Reform to impose excise tax on polluters and make the polluters pay
- To create and grow an environmental Industry--- regulated markets for technology to provide advanced air, water treatment facilities
- To increase environmental investment, China's Eleventh Five-Year Plan- 2006-2011 budgets $169 billion for environmental spending (1.6% of GDP), an increase of .8% from the budgeted allocation in the 1990's (.8%of GDP)
- To break the various problems into manageable projects
- To give tax credits for R&D on pollution control

Secondly, China needs to engage and cooperate with the international community. For example:

- Learn from the lessons of developed economies: seek answers about how to fix the pollution problem in terms of policy, economic priorities, technology and education/culture
- Combine macro economics and micro economics to identify problems and develop solutions such as steps to address urban air quality through sensible pricing of energy

Thirdly, non-governmental organizations: Green activists, entrepreneurship and NGO should play a more active role in environmental protection.

Free Market Operation

Like in any other nation, corporations in China are measured by their performance revenue and profitability at the firm level. Ultimately these corporations focus on productivity and quality management but neglect environmental management. This is simply because environmental management involves higher costs and lower profits than if they were managed jointly. Therefore, efforts must be made to link all of the main aspects of performance/efficiency measurement including environmental protection at the firm level (Giancarlo, 2005).

An important instrument to ensure sustainable development is to price and provide incentives for environmental development by making the polluter pay the marginal pollution damage expressed in monetary terms as "marginal external cost" (MEC). This instrument is also known as Polluter Pays Principle (PPP) which was developed by the OECD in 1974.[7] The purpose of the PPP approach is to prevent or offset the negative externalities of economic activities through charging the polluters the marginal external costs. At the micro-level, polluters violate the property rights of others, according to Coase (1960). To apply the PPP model, one needs to first define property rights and enforce them as laid out by Ronald Coase (1960). Without establishing well-defined and instituted property rights, there will be no legal basis to implement the PPP model. The basic mechanisms for the Making the Polluter Pay methods include:

1) Setting the standards, the cost of achieving which is initially borne by the producer;
2) Setting charges or taxes on the polluting product or input;
3) Setting a standard and issuing pollution permits in amounts consistent with the standard, and allowing those permits to be traded.

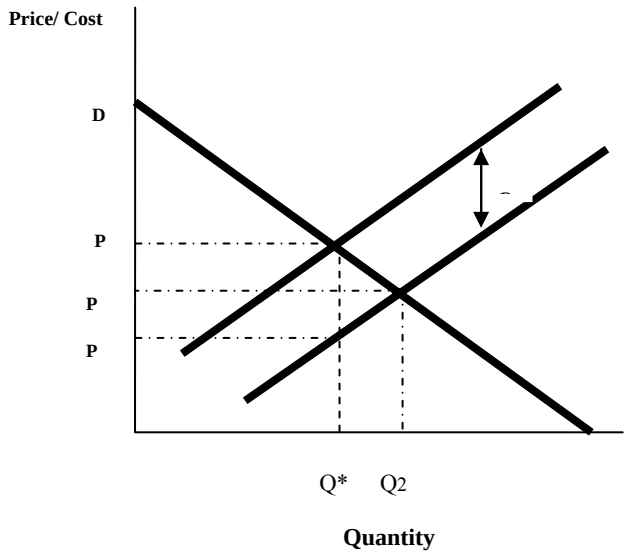


Figure 2. Sharing the cost of pollution control by both producers and Consumers.

As shown in Figure 2, without imposing a pollution charge, the consumers will buy Q1 and pay a price of P1 to producers. With a pollution charge, C, is put into effect, the total consumption is reduced from Q1 to Q*. The supply curve shifts from S to S' with a new market price, P* and consumers pay this price in the market. Since producers must pay the charge component C, the price received by the producers is actually P2. In this scenario, both producers and consumers share the burden of the pollution surcharge. In effect, the more competition in the market between producers, the less consumers will bear the burden of a pollution charge.

This is a market-based model of incentives for pollution control as it sets the prices for environmental services through the market. It can be carried out in the form of pollution charges. Ideally, the charge should be equal to the value of marginal external cost (MEC). This charge can be carried out more efficiently through market negotiation than levy taxes in certain circumstances. For instance, a local coal miner may create air and water pollution, affecting local residents. The coal miner can negotiate to pay the residents the cost for reallocation. This might be a better or more efficient solution than charging the miner a penalty. However, this approach will become too complicated and too impractical if it involves a large interest group of individuals and institutions. Government intervention might be a better solution.

OVERALL GUIDING PRINCIPLE

Whether using free market or interventionist approaches to establish the environmental control system, as a first step, it is critical to realize that a proper valuation of the environment is a major feature of sustainable development. There must also be a strong awareness and integration of sustainability into project appraisal. According to Pearce, Markandya, and Barbier (1989), a total economic value (TEV) model can be employed for project appraisal as to an environmentally related project.

1) Proceed with a development project
   if Bd – Cd > Bp and
2) Do not proceed with development project
   if Bd – Cd < Bp

Where
Bd refers to the benefits of the development.
Cd refers to the costs of the development.
Bp refers to the benefits if preserving the environment by not proceeding with the development project.

In this TEV model, we intend to relate the benefits or the total value of the assets left as a natural state to the benefits and costs of a development project. The evaluation for costs and benefits for the project is relatively simple because they can be measured based on the marketed inputs and outputs which have observable prices. But it is more difficult to measure Bp, the benefits of preserving the environment for not developing the project.

In practice, a few methods have been developed for directly measuring the monetary value of those gains for environmental preservation, such as using a surrogate market or using experimental techniques (Pearce & Markandya, 1989). The Green GDP calculation at a disaggregated level may help provide financial information in determining the feasibility of a project. Consistent with Green GDP, this TEV approach is to ensure that project appraisal within a sector or agency is carried out by properly taking environmental values into calculation to ensure that overall economic development is sustainable.

CONCLUSIONS

By most measures, the environmental challenges confronting China are real and serious. A measure of Green GDP will almost certainly give policy makers and the interested public a more defensible estimate of the large extent of these challenges. Green GDP also serves as a starting point in formulating strategies to cope with the environmental challenge. Based on a review of the two strategies in combating pollutions, this paper suggests that a combination of governmental intervention and free-market operation could be a better strategy to turnaround China's continuously worsening environment. The paper suggests that while a better macroeconomic estimate may be helpful in motivating the governments to act, a more microeconomic approach such as TEV may yield more useful results both in terms of understanding the problem and in planning the steps that are likely to be needed in achieving a more acceptable solution.

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