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## ANALYSIS

# A cost-benefit analysis for the economic growth in China

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## ABSTRACT

Currently, traditional development issues such as income inequality, depletion of natural resources, environmental pollution as well as retardation of infrastructure have occurred in China. In the future, more pressures would be imposed on China by the continuous fast development of industrialization, and with transfer of the world manufacture center to China. Sustainable development, including its economic, environmental and social elements, is a key goal of decisionmakers. This paper develops a methodology on cost benefit analysis of economic growth at macroscopic level to identify issues of China's sustainability. In order to address some important issues on how to make policies to improve the quality of economic growth, the CBA framework developed in this study analyses economic–ecological–social interaction, building three accounts that reflect three dimensions of sustainable development that includes 26 sub-models in all, and finally is integrated into an index as Net Progress Proceeds (NPP). The estimation methods of these submodels, such as cost of environmental pollution, depletion of natural resources and defensive expenditures are described in detail. Based on the framework and methods, this paper examines the costs and benefits of economic growth in three aspects of economy, ecology and society. The results illustrate that NPR of China's economic growth had been negative for a long time and has just become positive since year 2000 but was quite low. Even the best was only 1.6% in 2002 (the worst was –24.2% in 1982). Based on the comparison between three accounts, we can draw a conclusion that ecological cost is the dominant factor that affects China's NPR. The empirical results show that if no other innovative measures or policies are taken in the future the costs of growth would outweigh its benefits, resulting in un-sustainability. Basically, the long-term economic growth would be unsustainable due to increasing environmental damage and depletion of natural resources. There are a few limitations that we consider need to be improved in our CBA framework and method, nevertheless they have many options that can be explored by policy makers, to make the development path more sustainable.

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## 1. Introduction

China has experienced a steady and high economic growth since 1980. Yet the growth is mostly in a traditional way and has led to a significant depletion of natural resources, a severe

nationwide environmental pollution and ecological deterioration as well as a fundamental social change (Zhang and Wen, 2007). In 2003, China accounted for 4% of the world's total GDP. Its consumption of crude oil, ironstone, steel, alumina and cement, however, was 31%, 30%, 27%, 25% and

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40% of the world totals respectively (Ma, 2004). China's emissions of pollutants remain also in a high level. Presently, for instance, China's solid waste per unit industrial output value is ten times higher than that of developed countries. China's NO<sub>x</sub> emission load per unit GDP is 27.7 times that of Japan and 2.8 times that of India, and China's SO<sub>2</sub> emission load per unit GDP is 68.7 times that of Japan and 26.4 times that of Germany (Fan, 2004).

Over the last two decades, China has regarded economic development as a national priority to improve human welfare and eradicate poverty. Such economic growth indicators as GNP have been exclusively used to assess the success of national and regional development policies. Given the expectation that China's economy will be likely to continue to grow at the same pace in the next one or two decades as well as the fact that China is gradually becoming a world manufacturing center (Lu and Huang, 2003), China's natural resources, environment quality and social dimension are facing significant challenges. There is a great concern that if China is going to develop in the same way as it did in the last two decades, could China's economic prosperity be sustainable? What the implications would be to China's natural resources and environment? Might this development lead China to a disastrous ecological consequence and eventually social instability? To answer these strategic questions, there is a need to systematically investigate the relationships between economy, environment and society in China in the last two decades. In particular there is a need to examine the environmental and social costs China has sacrificed to its economic growth in the past. Based on these studies, our fundamental objective is to identify whether there is a pathway that will lead China to a more sustainable development track.

This paper is devoted to answer part of the questions above by estimating the major environmental and social costs and benefits related to China's economic growth between 1980 and

2002. The methodology is based upon a conventional cost-benefit analysis (CBA) framework, yet with focus on the long term changes of trend. More specifically, this paper will first argue for the need for the consideration of the three dimensions of sustainable development in Section 2. An index named Net Progress Proceed (NPP) is developed as an indicator to evaluate the sustainability or net benefit-cost of economic growth at national level, which is very different with other similar indicators discussed below. The greater the positive NPP is, the more sustainable the economic growth. Therefore, an analysis model of CBA will then be presented in details to illustrate how it is conducted. Finally, different policies are discussed to evaluate their implications to sustainability in Section 4 before we conclude this paper in Section 5.

## 2. The methodology

The methodology we applied in this study is the well-known Cost-benefit analysis (CBA), which has been widely used in integrated environmental assessments (Allen, 1989; Mendelsohn et al., 1994; Kim et al., 2003; Houtven et al., 1996; Hamilton et al., 1999; Shreekant et al., 1996; Philibert, 2000) and others (Cobb et al., 1995; Hamilton, 1999; Richard, 1998, 2003; ITC, 2002-renewable energy development strategy) over decades. More recently, this methodology has been applied to assess regional sustainable development. For instance, Islam et al. (2003) applied this approach to examine conditions upon which an optimal sustainable growth might be achieved in Australia via an Ecol-Opt-Growth-1 model. He estimated both the costs and benefits related to savings, investment, technological progress, substitutability of productive factors, intergenerational efficiency, equity and policies. Similar studies can also be found in Hamilton (1998), Moffatt et al. (1999) and Beckerman (1994).

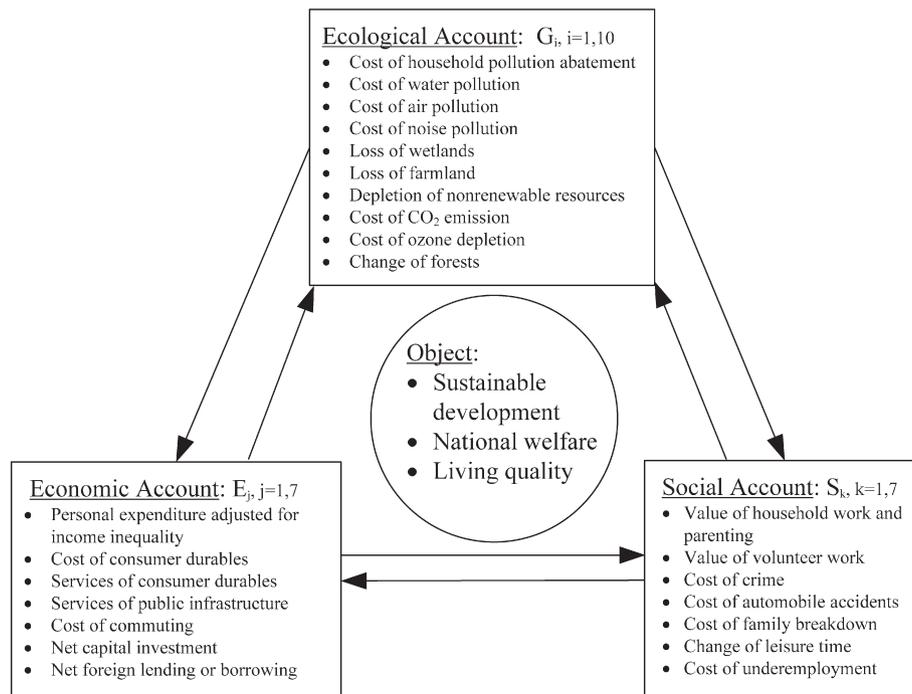


Fig. 1 – The CBA framework for assessing China's sustainable development.

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