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Improving the environment with an initial government subsidy

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Abstract

This paper attempts to study the approach of using government subsidies to mitigate negative externality, and aims to provide a system for the government to monitor the level of pollution and determine the optimal level of subsidy the level of pollution changes over time.

First, literature on the effects of environmental changes is critically reviewed. It is found that the value of pollution mitigation measures was seldom investigated. The Pigovian and Coasian approaches in dealing with the externalities are investigated by a case of the provision of a balcony as a subsidy (negative tax) to the developers for mitigating air and noise pollution in Hong Kong. The results show that the “green” effects provided by a balcony are reflected in property prices. The value of a balcony reflects the privatized cost of pollution to the tenants. Given that transaction costs of negotiation and contracting between polluters and tenants are prohibitively high (irrespective of whether rights of pollution are assigned to either party), the market cannot resolve the problems of the external effects of pollution. This however, does not necessarily call for government intervention, as the information cost for the government to make the optimal decision is also very high. However, we believe that the government subsidy can be used to mitigate negative externalities by making indirect use of market information in Hong Kong. This is possible because the value of mitigating the housing market in Hong Kong is active enough for the estimation of the effects of pollution using a hedonic price model. We proposed an iterative process to solve the government’s problem of determining the optimal level of subsidy. A higher than optimal initial subsidy is necessary to ‘bootstrap’ the iteration process.

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Keywords: Balcony; Environmental effect; Hedonic price model; Subsidy

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1. Introduction

A negative (or positive) externality arises when the costs (or benefits) suffered (or enjoyed) by one party due to the activities of another are uncompensated (or unpaid). Pollution is one of the earliest and most controversial issues in the study of negative externalities. Pigovian welfare economics contends that the existence of externality is a case of market failure and government intervention, such as imposing taxes on polluters, is required to deal with the problems of negative externalities. Conversely, the Coasian institutional economics has a reciprocal view on the problems, and emphasizes the use of a cost-and-benefit analysis. It provides a justification for government intervention when the transaction costs, including negotiation cost and the cost of enforcement, are so huge that the market may become too costly to operate.

However, it is equally difficult for the government to identify the level of pollution and who is producing the pollutants, let alone the optimal level of tax or negative tax. This paper attempts to study the use of government indirect subsidy (negative tax) in mitigating negative externality and aims to provide a model for the government to monitor the level of pollution and determine the optimal amount of subsidy. The model will be empirically studied using the value of a balcony, which acts as an indicator of the level of indirect subsidy.

Buildings and their surrounding environment are closely related. With the concept of sustainable development¹ becoming more popular worldwide, buildings have attracted a considerable amount of environmental concerns. Among these concerns are site environmental impact assessments, choice of building materials, energy efficiency, indoor air quality, and occupant health (Shiers, 2000). They have influenced the planning, design, construction, and management phases of a building's life. It is generally believed that green buildings are more cost-effective to run, healthier to their occupants, more socially responsible to the public, and potentially more valuable to building owners. Some governments also consider granting development intensity concessions to developers so as to encourage the development of green buildings.²

A balcony is one of the green features that could be incorporated into the design of buildings. It offers several advantages over traditional window designs. From an environmental standpoint, Griffiths (1999) consider a balcony to be a “more sensible solution to traffic noise control without compromising views and urban image”. It is especially relevant in high density cities with high-rise buildings as in Hong Kong because it becomes very expensive to cut off traffic noise to the upper levels of buildings by installing noise barriers along the road (Cheng, Ng, & Fung, 2000). There were also many experiments that showed that a balcony acts as good noise barrier from nearby traffic (Mohsen & Oldham, 1977; May, 1979; Hammad & Gibbs, 1983; Hothersall, Horoshenkov,

¹The term “sustainable development” is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission for Environment and Development, 1987).

²For example, in Hong Kong, the Buildings Department, Lands Department, and Planning Department, (2001) encouraged the incorporation of green and innovative features in building developments by exempting these features from the GFA and site coverage calculations: (a) balconies; (b) wider common corridors and lift lobbies; (c) communal sky gardens; (d) communal podium gardens; (e) acoustic fins; (f) sunshades and reflectors; and (g) wing walls, wind catchers, and funnels.

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