



# On the relationship between the provision of waste management service and illegal dumping

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## ABSTRACT

The illegal dumping of waste has been a serious environmental concern of most countries in the world. This paper examines the relationship between the provision of waste treatment facilities and the frequency of illegal dumping. Our results show that a shortage of intermediate waste treatment facilities has played an important role in increasing the frequency of illegal dumping.

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## 1. Introduction

The illegal dumping of waste has been a serious environmental concern for most countries. According to the USEPA (1998), for example, illegal dumping is “a major problem for many communities throughout the United States”. The UK Environment Agency also reports that “[i]t is estimated to cost £100–150 million every year to investigate and clear up” illegal dumping.<sup>2</sup> In response to these situations, several countries have begun to reexamine their regulations for illegal dumping and are introducing more stringent rules and/or penalties for waste crimes. UK’s DEFRA

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<sup>2</sup> [http://www.environment-agency.gov.uk/subjects/waste/1029679/1032559/?lang=\\_e](http://www.environment-agency.gov.uk/subjects/waste/1029679/1032559/?lang=_e).

<sup>3</sup> See the news release (<http://www.defra.gov.uk/news/2008/080613a.htm>) from July 13, 2008 for details.

launched tougher penalties against waste crimes like illegal dumping,<sup>3</sup> while the Japanese government has over the last decade repeatedly strengthened the penalties laid down in the *Waste Disposal and Public Cleansing Law*.

Although illegal dumping occurs for various reasons, one of the main factors inducing illegal dumping is thought to be a shortage of proper waste treatment facilities. In the absence of sufficient proper waste treatment facilities, the cost of proper waste disposal will increase. As a result, people are more likely to dispose of their waste illegally to reduce the cost of such disposal. Munton (1996), for instance, noted that “[i]ncreased demand coupled with insufficient disposal capacity ‘threatens to increase illegal disposal, a result which would exact a terrible price in terms of environmental degradation and danger to human health’”.<sup>4</sup> This logic is quite intuitive, but there is little quantitative evidence to support the argument that a shortage of waste treatment facilities increases the frequency of illegal dumping.

In this paper, then, we empirically demonstrate how the shortage of waste treatment facilities influences the frequency of illegal dumping. For this purpose, we use prefecture-level panel data on illegal dumping in Japan. In order to measure the shortage of waste disposal facilities, as we do in the following section, we examine the number of landfill sites and the number of intermediate waste treatment facilities, where waste is incinerated or reduced in weight before being disposed in landfills.

The present study is largely related to that of Sigman (1998), to our knowledge the only study besides that of Kim et al. (2008) that empirically examines the issue of illegal dumping.<sup>5</sup> Sigman studied the illegal dumping of used oil in the United States and showed that the number of illegal dumping incidents was related to restrictions on the disposal of used oil. She did not, however, examine the effect of a shortage of waste treatment facilities, which is the main focus of this paper. Kim et al. (2008) also examined illegal dumping, but from a different point of view. They argued that illegal dumping was induced by the introduction of unit pricing of municipal solid waste in Korea. They urged authorities to be cautious about increasing unit prices.

The main findings of our study are as follows. We statistically show that (1) increasing the number of intermediate waste treatment facilities decreases the number of illegal dumping incidents, yet (2) number of landfill sites has ambiguous effect on the number of illegal dumping incidents, and (3) there is a positive relationship between the weight of waste discharge and frequency of illegal dumping. We also find that (4) stronger penalties for illegal dumping deter illegal dumping. In the next section we describe the state of waste discharge and its illegal dumping in Japan. In Section 3 we provide economic and econometric models and the properties of the relevant data. In Section 4 we present the estimated results and their policy implications. Finally, in Section 5 we provide some concluding remarks.

## 2. Waste management and illegal dumping in Japan

All waste in Japan is classified as either municipal solid waste or industrial waste. Chapter 2 of the *Waste Disposal and Public Cleansing Law* defines 20 types of waste produced by business activity as industrial waste, while all other waste is defined as municipal solid waste.<sup>6</sup> In the following study we focus on the illegal dumping of industrial waste, since data on illegal dumping of municipal solid waste is not available. For the sake of notational convenience we refer to industrial waste as “waste” in our analysis. Since the weight of industrial waste discharge is much larger than that of municipal solid waste,<sup>7</sup> we believe our analysis reflects the major features of illegal dumping in Japan.

### 2.1. The state of waste discharge in Japan

First, we briefly summarize the state of waste discharge and treatment in Japan. Fig. 1 shows the weight of discharged waste, and how the discharged waste was treated. In 2005, about 421 million tons

<sup>4</sup> Munton (1996), p. 7.

<sup>5</sup> Contrary to the empirical study, there are several theoretical studies focusing on illegal dumping, such as Fullerton and Kinnaman (1995).

<sup>6</sup> Broadly speaking, waste is defined as industrial waste if it is emitted from a firm. It is called municipal solid waste when it is emitted from a household.

<sup>7</sup> In 2005, for example, the volume of industrial waste discharge was about 421 million tons, while the volume of municipal solid waste was about 50 million tons.

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