



The relationship between municipal waste diversion incentivization and recycling system performance



Calvin Lakhan*

Wilfrid Laurier University, Department of Geography, Wilfrid Laurier University, Waterloo, ON, Canada

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ABSTRACT

This study examines the effects of municipal recycling incentivization on municipal recycling rates and program costs in Ontario, Canada. Ontario is currently one of only two jurisdictions in Canada to fund municipal waste diversion programs using an incentive-based system that allocates funding in proportion to a municipality's recycling rate performance. Packaging fees remitted by packaging producers under Ontario's shared producer responsibility model are distributed to municipalities based on three factors: relative recycling performance, program costs and adherence to recycling best practices. Using a combination of panel data collected from 223 Ontario municipalities between the periods of 2003 and 2014 and semi structured interviews with recycling stakeholders, this study aims to examine whether municipalities respond to financial incentivization by increasing total recycling or decreasing costs. The results of the statistical modeling used in this study indicate that there is no statistically significant relationship between municipal incentives, recycling rates or program costs. This suggests that Ontario's municipal recycling funding methodology fails to achieve its intended objectives, and as such, necessitates that the approach be revisited to ensure maximum waste diversion.

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1. Introduction

The management of municipal solid waste remains at the forefront of policy and planning debate and discourse in North America. Increases in municipal waste generation, coupled with legislative restrictions on where municipalities can dispose of waste, necessitates the implementation of comprehensive (e.g., diversion and disposal programs for all materials streams—printed paper and packaging, waste electronics and hazardous waste) and cost effective waste diversion programs. However, the terms comprehensive and cost effective are often (but not always) dichotomous with one another. Recycling is a costly waste management strategy for municipalities, particularly when compared to conventional land filling and disposal options. As such, many jurisdictions have chosen to implement policy measures designed to increase both waste diversion and the operational efficiency of household recycling programs.

While a significant body of research exists exploring the efficacy of municipal recycling instruments in promoting household recycling (see [Sidiqie et al., 2009](#); [Barr et al., 2004](#); [Beatty et al.,](#)

[2007](#); [Domina and Koch, 2002](#); [Hornik et al., 1995](#)), there remains a paucity of relevant research regarding how municipalities respond to recycling incentives and disincentives. Historically, recycling literature has focused on the response of individual consumers or households to intrinsic and extrinsic motivators ([DeYoung, 1986](#); [Hopper and Nielson, 1991](#); [Thogersen, 1996](#)). In this research, municipalities have generally been characterized as external facilitators of recycling, encouraging consumer behavior through the provision of incentives, promotion and education and investments in recycling infrastructure ([Lakhan, 2014, 2015a, 2015b](#); [Elia et al., 2015](#); [Jurczak et al., 2006](#); [Simmons and Widmar, 1990](#); [Reams and Ray, 1993](#); [Tucker, 1999](#); [Mee et al., 2004](#)). While municipalities continue to assume these roles, recent developments in how municipalities fund waste diversion programs necessitates that the research focus be expanded beyond the household to include local governments. Canadian municipalities operating in jurisdictions with extended producer responsibility (EPR) schemes have their waste management costs fully or partially reimbursed by packaging producers. In Ontario, the distribution of this reimbursement is performance based, with the allocation of funding being in direct proportion to a municipality's recycling rate and cost of material management. All other things being equal, municipalities with high rates of waste diversion will have a larger percentage of their program costs subsidized when compared to municipalities with low recycling rates. As such, municipalities are incentivized to increase

* Mailing address: 21 Madrid Crst, Brampton, Ontario, Canada, L6S2X5. Tel.: +1 519 884 0710x3288.

E-mail address: lakh2440@mylaurier.ca

recycling rate performance at the lowest possible cost. This can be achieved by undertaking initiatives that encourage household diversion, increasing the recyclability of a broader range of materials and making direct investments in recycling infrastructure. Thus far, the effectiveness of this approach has yet to be evaluated in a systematic or academic capacity. Policy decisions have been made predicated under the assumption that the funding methodology employed in Ontario improves recovery of household recyclables. This study seeks to test this hypothesis by evaluating how Ontario's incentive-based model of EPR funding has influenced recycling rate performance and material management costs for municipalities over the past decade.

In doing so, the objectives of this research will be to explore the following questions:

- (1) Do incentives/disincentives at the municipal level encourage increased recycling of packaging material (paper, cardboard, boxboard, aluminum, steel, glass and plastics)?
- (2) Do incentives/disincentives at the municipal level encourage municipal cost containment?
- (3) What are stakeholder perceptions regarding the efficacy of Ontario's municipal incentivization methodology?

The analysis in this study builds upon the existing research, shifting the research focus away from individual consumers and households to municipalities. To date, no study has evaluated how incentivization at the municipal level affects recycling rates. The distinction between this study and those that preceded it is that this research explores incentives being provided *to* municipalities and not incentives being provided *by* municipalities. This study aims to examine whether municipalities respond to financial incentivization by increasing total recycling or decreasing costs. Doing so provides unique insights into the effectiveness of performance-based funding, particularly as EPR spreads to other jurisdictions. Another unique feature of this research is the use of panel data for recycling rates, program funding, material generation and material recovery. Earlier works have tended toward the use of cross section data, and as such, are unable to evaluate the cumulative effects of policy or regulatory decisions over time. This data is complemented by semi structured surveys with affected stakeholders to provide additional context and color to the results. The robustness of the data used in this study enables meaningful and credible analysis related to the effects of incentive-based municipal funding.

2. Literature review

Early literature on understanding recycling motives emphasized the role of external incentives in encouraging consumer recycling. Various studies on environmental behavior operate under the assumption that individuals make rational choices and choose alternatives with highest benefits against the lowest costs (expressed in terms of money, convenience and/or social approval) (Steg and Vlek, 2009; Domina and Koch, 2002; Ando and Gosselin, 2007). As such, environmentally desired behavior can be achieved via mechanisms that reduce the relative costs of the behavior, such that the perceived benefit yields the individual a net increase in utility (Kinnaman and Fullerton, 2000). Studies by Geller et al. (1982), McNeely (1988), Anton et al. (2004) have demonstrated that monetary incentives are generally successful in promoting a desired behavior. More recent research examining the role of market incentives in encouraging recycling via "Pay as you Throw" systems have shown that the demand for household recycling is elastic to changes in the cost of waste diversion (Thogersen, 2003; Kinnaman and Fullerton, 1997, 2000; Hong, 1999; Allers and Hoebin, 2010; Sidique et al., 2009; Lakhan, 2015b). If consumers are obligated to

pay fees (either in the form of a fixed fee or in proportion to the weight of material disposed in the residential waste stream), the relative cost of recycling is reduced, thereby incentivizing source separation. While regulation by the means of economic incentives is gaining traction in environmental policy, critics of this approach question the merits of incentive systems in promoting an enduring change in consumer behavior (Thogersen, 2003). Studies by Pardini and Katzev (1984), Wunder (2014), Culiberg and Bajde (2013), Kalinowski et al., (2006) argue that a desired behavior would persist only for as long as the incentive was made available. In the absence of said incentive, it is assumed that the cost of recycling (expressed as time and effort on the part of the consumer) would be sufficiently high to deter the act of recycling itself

However, subsequent research by Gamba and Oskamp (1994), Ulph and Daube (2014), Barr et al. (2004) and Jensen (2015) point to evidence that a consumer's propensity to recycle may be attributable to internal motivators that are non-remunerative in nature. Thogersen (2003) states that conventional economic reasoning assumes that a consumer's preferences are given, independent of relative pricing and unaffected by policy regulation. Behavior scientists argue that this may not be the case, as economic regulation may interact with an individual's intrinsic values and personal motives for partaking in the desired behavior. This suggests that the research surrounding determinants of recycling behavior should be expanded to include drivers of recycling that are rooted in social and moral norms.

While there is a rich literature exploring internal motivators for consumer recycling (see Pieters, 1991; Ajzen and Fishbein, 1980; Thogersen, 1996), it is unlikely that drivers of recycling at the municipal level are attributable to intrinsic or altruistic motives. It is perhaps erroneous to anthropomorphize municipalities, assuming that the determinants of consumer recycling behavior are analogous to what occurs at the municipal level. Subscribing to the views put forward by public choice theorists, we assume that municipalities are indeed utility maximizing agents (much like consumers). However, as postulated by Niskanen (1971), utility maximization for government agencies is largely economic in nature, with the goal being to maximize budgets and/or reduce departmental costs. Given that recycling programs are a cost incurred by municipalities, it is unlikely that such programs would be implemented voluntarily without significant household demand for recycling services (or a legislative requirement). Incentives may be seen as a mechanism to encourage maximal recycling efficiency and performance for municipalities—if the share of funding they receive is directly proportional to recycling performance, they may be encouraged to design and deliver the most efficient recycling system possible.

3. Materials and methods

3.1. Description of study site

Ontario remains at the forefront of recycling initiatives and legislation in Canada, recognized as one of only three provinces in Canada to implement an extended producer responsibility scheme (EPR) for household recyclables. Residential and commercial waste diversion programs exist for MHSW (Material Hazardous or Special Waste), WEEE (Waste Electrical and Electronics Equipment), automobile tires and printed paper and packaging (Blue Box) materials. Each of these programs exists under the oversight of Waste Diversion Ontario, (WDO), a non-crown corporation created under Ontario's 2002 Waste Diversion Act (Waste Diversion Ontario, 2012a). The WDO was established to develop, implement and manage waste diversion programs for stakeholders from both private and public sectors (Waste Diversion Ontario, 2012a).

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