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The long and winding road to resource efficiency – An interdisciplinary perspective on extended producer responsibility

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ABSTRACT

Extended producer responsibility is advocated for its capacity to spur resource efficiency through green innovation and closing loops downstream of consumption. Its rationale is the extension of the polluter-pays principle to the post-consumption phase. This paper analyze the underlying mechanisms that are supposed to work under the EPR approach, and proposes an alternative view. The main purpose of EPR is seen as the creation of the bases for legitimizing the involvement if industry taking over the task of diverting waste from landfill. Its success rests on the superior managerial capacity of industry and the need to organize post-consumption markets that transcend the local scale and have access to the economies of scale and scope. The emphasis on producers does not add anything special, but may reinforce the bases for legitimizing the implicit delegation of power to industry. Primary and above all, we have witnessed in the last 20 years a gigantic effort of market design, and this is the main demonstration of EPR's success.

The diffusion of extended producer responsibility (EPR)

Extended producer responsibility (EPR) has become a cornerstone of solid waste management (SWM) policies throughout the world. The EU has embraced it for a large number of materials, from used lubricants to batteries, from packaging to electronic waste (European Commission, 2010a). The Organization for Economic Cooperation and Development (Oecd) strongly recommends EPR for its effectiveness in achieving otherwise unconceivable recycling targets and promoting efficient secondary markets (Oecd, 2001, 2006).

The EPR principle has been initially proposed in the frame of management sciences and industrial ecology, as a way to improve resource efficiency. It rests on the assumption that patterns of waste generation result from the way the production and distribution are managed and organized; EPR implements the idea of "closed loops", promoting a re-design of value chains so as to encompass reverse logistics (Lindhqvist, 2000). EPR is seen as a practical way to introduce "green supply chain management" and to extend it to the post-consumption phases (Srivastava, 2007; Gupta et al., 2011). EPR enlarges the focus from end-of-pipe management of waste to resource efficiency, with a substantial boost to waste prevention and recycling. Green innovation is also expected, as EPR promises to provide incentives to recycling-oriented research and technological development (RTD) and design for the environment (Tojo, 2004).

Something suchlike has actually taken place: in 20 years recycling levels have grown exponentially, the dream of a "zero landfill" world is already reality in many countries. But to what extent is EPR the real cause? And if it is, what are precisely the underlying mechanisms? Insinuating that EPR effectiveness is more often postulated than demonstrated would perhaps be deemed as blunt neoclassical negationism – although influential economists, such as R. Porter, still express skeptical views (Porter, 2005). Yet nobody would seriously affirm that the question is answered once forever. Nor does the existing empirical evidence serve too much in order to formulate predictions and derive systematic lessons.

The present paper aims at moving some steps in this direction, mostly from an economic viewpoint, but grafting as much as possible further contributes and insights from contiguous disciplines: institutional economics, economic analysis of law and management sciences. We argue that policies inspired by EPR have been indeed successful, but probably for different purposes and for different reasons than initially believed.

We start from a taxonomy of market failures that hamper resource efficiency and sustainable consumption ("Resource efficiency and market failures"). A definition and a temptative classification of EPR are then provided ("Inside the black box of EPR").

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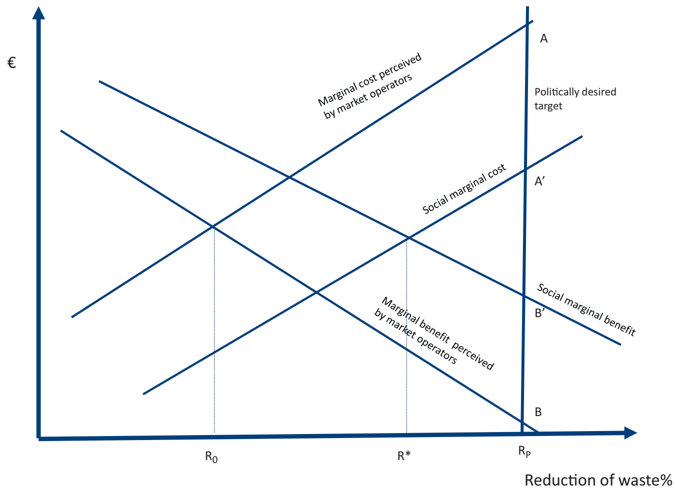

Fig. 1. Socially optimal rate of waste reduction and market failures.

"Theoretical arguments revisited", examines how EPR (and alternative EPR arrangements) tackle market failures, and attempts some generalizations.

Resource efficiency and market failures

If markets were able to transmit price signals without frictions, EPR would be unnecessary: a waste collection charge incorporating externalities (e.g. a landfill tax, a tax on raw materials) would generate equivalent results without distortions (Kinnaman, 2009). Therefore, a theoretical justification of EPR should start from a recognition of market imperfections, and then discuss the capability of instruments of tackling with them (Walls, 2003). In other words, EPR is a typical second-best policy approach, whose essence lies in the attempt to correct market imperfections through the deliberate introduction of some distortions to its functioning (Walls, 2006).

In a standard cost–benefit analysis, efforts for reducing the volumes of waste addressed to final disposal should be undertaken until their marginal cost is equal to the social marginal cost (Fig. 1). The marginal cost is supposed to have an increasing slope because of diminishing returns of these efforts. Preventing waste implies the sacrifice of utility associated to consumption, once the most obviously wasteful habits have been abandoned. Waste disposal could be reduced through recycling: but again achieving higher source separation levels for recyclables entails more complex and costly separate collection services (e.g. kerbside vs. drop-off); the quality of materials collected worsens, imposing more costly sorting processes downstream, higher discard rates etc.

Social benefits arise fundamentally from the market value of recycled materials and the saved costs (waste disposal, energy, virgin materials etc.). A third category of benefits may be added, namely the "warm-glow" utility arising from the pleasure of behaving ethically and for the good of the community (Kinnaman, 2009). We can suppose that the social benefit decreases at the margin with an increasing rate of recycling: in other words, the additional social benefit generated by an additional increase of recycling rate becomes lower, even if still positive. First, because the market value of recovered materials declines, since the average quality worsens, thence an additional recycling effort will reward a lower net additional economic value. Second, the more waste is recycled, the lower pressure is put on disposal sites (and hence their average price can diminish, or at least remain constant). Third, behavioral studies show that warm-glow benefits, too, are likely to decline beyond a certain threshold, once most people feel they have provided a fair commitment to the common good (Andreoni, 1990). Thence the positive feelings associated to improving recycling, say, from 10% to 20% are probably higher than from 70% to 80%.

A socially optimum recycling rate corresponds therefore to the point where the marginal benefit equals the marginal cost (R^*): beyond that level, an additional effort for increasing the recycling rate would imply higher costs than benefits. Governments, however, may choose $R_P > R^*$: this is equal to considering recycling as a "merit good", perhaps because some further values are believed to be associated with it, that go beyond individual utility and cannot be captured by monetary evaluation of benefits (Martinez-Alier et al., 1998).

The market equilibrium is actually determined by costs and benefits perceived by operators. These may diverge from the social cost and benefit curves for many reasons (Walls, 2003; Oecd, 2006). The overall result is an inefficient equilibrium (R_0 instead than R^*).

A first category of market imperfections regards the benefits associated to resource efficiency. In order to account for the full social cost of SWM, all externalities should have been evaluated and internalized, either with the requirement of technical standards for pollution control or via environmental taxes. The market price should also incorporate the "user cost", namely the economic value of future use of scarce non-renewable resources (Pearce, 2005, Fullerton and Wu, 1998).

This might not necessarily happen, for many reasons. The time horizon of policymakers may not fully consider long-term implications of dissipative use of resources and thence adopt a discount rate that undervalues future benefits (Massarutto, 2007). For example, SWM service prices may be regulated with a short-term horizon in order to minimize the impact on households or to prevent monopoly rents. Landfill owners may adopt predatory pricing strategies, to discourage alternative solutions, which require sunk investments and cannot deliver immediate results.

Yet probably the most important obstacle is the "unfair competition" of illegal disposal (D'Amato et al., 2011). Effective internalization implies that waste producers are charged according to the waste they produce (pay-as-you-throw and similar schemes). Even neglecting the high transactions costs for implementing such schemes, opportunities for playing against the rule are wide, and range from do-it-yourself "moonlight dumping" to organized crime.

Furthermore, interstate trade of materials should be considered. This is obviously a positive thing, as far as it allows to satisfy the growing demand for raw materials in developing economies (Ley et al., 2002); it also creates opportunities for "masked dumping", facilitated by asymmetric regulations and looser enforcement in the "waste havens" (Kellenberg, 2010, 2012). Materials that are theoretically aimed for recycling, if not actually recycled, will return back as waste to be disposed of in other countries or regions, thence bypassing regulations (Massarutto and Antonioli, 2012).

In the second place, recycling markets may be imperfect (Oecd, 2006; Arcadis and Eunomia, 2008). Resource efficiency requires efforts from many subjects. Consumers should separate waste and make responsible choices. Effective and accessible separate collection facilities should be in place. Convenient sorting and treatment capacity should be deployed downstream. Recycling markets should actually absorb sorted materials. Industry should ensure that products are easy to recycle. The retail sector should not encourage too much packaging.

All initiatives should be coordinated and integrated. An efficient collection requires an interplay between operators (who have to provide convenient and accessible systems) and users (who are supposed to effectively participate). Transport and logistics have to be optimized. Facilities have to be located and sized accordingly, technological choices should be coherent etc. This arises a classic