

Perspective article

## Circular Economy Rebound: The Third Wheel on the Date Between Circularity and Sustainability

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### Abstract

The Circular Economy Rebound (CER) effect is a phenomenon that can compromise the capability of a Circular Economy to achieve its intended benefits. Its occurrence can lead to firms overstating their environmental performance and being prone to greenwashing. From a broader point of view, it jeopardises sustainability and economic prosperity from the circular transition and can hinder the decoupling between production and virgin resource extraction. Thus, CER may play a pivotal role in micro and macroeconomic decision-making and policy-making in a Circular Economy. Yet, it is largely unknown, and the search for concrete solutions to limit its occurrence and mitigate its effects is strongly overlooked. Accordingly, this perspective paper aims to increase awareness about CER and tease academics, practitioners, and policymakers to join forces and develop holistic, actionable solutions to manage this detrimental unintended consequence of establishing circularity.

**Keywords:** Rebound; Greenwashing; Sustainability; Circular Economy

In 2011, the Science Gallery in Dublin exhibited a model on a 1:500 scale of the Euthanasia Coaster – a roller coaster designed to bring painless death to its passengers through seven consecutive clothoid inversions. When I found it out a few years ago, I remember thinking that an attraction born for amusement had been re-conceived as a deadly device through high-intensity circularity. So, when I recently saw an image of that roller coaster again, it came naturally to me to relate it to the Circular Economy (CE) field and ask myself the following question: *would too much circularity be an issue?*

The answer to this question is associated with the conceptualization of a CE. The first CE conceptual representation that pops up in the mind of most people, including me, is that of material flows going from downstream to upstream in a supply chain. However, Zink and Geyer (2017) cunningly highlight that this view does not pay due attention to the economic nature of a CE. In this regard, a CE can be viewed as a system of nested and interconnected markets in which materials, components, and products are exchanged – one market for final goods, one for end-of-life goods, one for refurbished goods, one for remanufactured goods, and so on. Thus, in a CE, secondary products compete with primary production and hopefully prevent it across multiple markets. In addition, they do it through interactions that are more complex, unpredictable, and numerous than commonly believed.

This CE conceptualization is able to explain some unexpected, detrimental consequences of the circular transition, such as the Circular Economy Rebound (CER) effect. CER is the phenomenon according to which a CE practice, which causes lower per-unit production impacts, leads to increased levels of production and consumption that counterbalance the environmental benefits (Zink and Geyer, 2017). For example, Makov and Vivanco (2018) investigated in the US context to which extent reusing specific second-hand iPhone models – the secondary product – can reduce the environmental burden of new smartphone production – the primary product. It seems logical to expect that buying used smartphones will reduce the production and purchase of new smartphones and related emissions.

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Surprisingly, their findings show that the emission savings from smartphone reuse are much lower than expected – from one-third to their entirety – and CER is the culprit.

CER is caused precisely by the CE multimarket nature, in particular by the limited ability of secondary products to substitute for primary products and the effect that the entry of secondary products into markets has on prices. Such a phenomenon can be both an environmental and an economic issue. For instance, CER can lead to firms claiming better environmental performance than it actually is, increasing the likelihood of greenwashing. Furthermore, a particularly high CER might induce decision-makers to abandon or postpone the circular transition, forgoing the economic opportunities associated with it. These risks have largely been overlooked because the CE notion has relied too much on the idea that producing and selling one unit of a secondary product would prevent one unit of the primary product from being produced and the needed virgin resources from being extracted. This is far from reality and might occur only rarely. For example, let us hypothesize that a firm was able to recover one ton of gold from end-of-life electronic devices through an innovative method. No one would ever call the gold mining site to ask to mine one ton less. Even if someone did, the chance of getting an affirmative answer would be less than I would be of having dinner with Anya Taylor-Joy. Indeed, CER may be one of the main reasons why decoupling secondary production and virgin material extraction is unlikely to occur on a large scale. Moreover, it may be a point in favor of those who see a CE as an occasion for increasing profit across global circular supply chains through arbitrage rather than environmental friendliness and sustainability (cf. Ellen MacArthur Foundation, 2013, 2014).

Unfortunately, a reboundless CE is likely impossible to realize because CER is inherently rooted in almost all the alternatives to primary production, including product sharing and product/service systems. Thus, if we cannot get rid of CER, how can we deal with it? What solutions can we put into practice to manage CER? This quest is a multidimensional problem that pits production and consumption against each other at the microeconomic, macroeconomic, and policymaking levels. In fact, CER synthesizes and conceals an unbelievable amount of multi-stakeholder interactions between primary and secondary products.

When I think about solutions to CER, I refer to *actionable* ways to manage it, i.e., specific courses of action. In that sense, one of the first works that tried to pursue this objective is the one by Zerbino (2022), in which I proposed a set of guidelines and a tool that firms may adopt to manage CER. Despite this, the set of solutions that a firm may implement to manage CER remains limited. From the macroeconomic point of view (e.g., supply chain or ecosystem), the landscape of solutions is even more desolate. From the policymaking standpoint, extant proposals are still conceptual and sometimes contradictory (Zerbino, 2022).

A Holy Grail solution to CER would require joint efforts by policymakers, producers, and consumers because CER arises from the interaction among them. Looking for solutions to manage CER without involving multiple parties would result in local optimums and opportunistic behaviors. For instance, a manufacturer of refurbished smartphones may state that its product is less pollutant than producing a new smartphone and less costly than a brand-new smartphone and that, therefore, the market is responsible for the CER occurrence. A consumer could say that s/he is happy to buy a refurbished smartphone, but that it is nowhere near being as trendy and functional as a new smartphone, and that a second-hand and a new smartphone are not fully substitutable because they meet slightly different needs. In this context, policymakers may incentivize the production of second-hand smartphones over new ones, but this may dampen profitability from primary production and meet resistance from primary producers. More importantly, these considerations take for granted that the CER notion is known by market players, which is not the case. Without a holistic effort, there would be a sort of Mexican standoff in which everyone shifts responsibility for CER onto others, leaving the issue unresolved. But, thus, *who* should do *what* to cope with CER? This is an open question.

One of the most insightful take-home messages from being aware of CER is that circularity does not necessarily lead to sustainability, and what is sustainable is not necessarily circular. Yet, every time I attend a CE event, I hear about the need to maximize material and product circularity. In light of CER, the “*the more circular, the better*” and “*circularity at any cost*” mantras are questionable. Circularity is a means to achieve and stimulate sustainability – or amusement, in the case of a roller coaster – without jeopardizing value creation and should be considered neither an objective per se nor an inevitably positive imperative.

Queen sang Too Much Love Will Kill You. I wonder if the same might be true for too much circularity.

## DECLARATIONS

**Competing interests** The author declares no competing interests.

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