

The impact of policies on waste sorting and waste accumulation

Alessandro Bucciol *

*University of Verona (alessandro.bucciol@univr.it)

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Incentives

- Throughout the world we are switching to Door-to-Door (DtD) and Pay-As-You-Throw (PAYT) waste (management and billing) policies
- Main goals: Promote waste sorting and limit waste accumulation
- From an economic point of view, the policies create monetary (PAYT) and non-monetary (DtD) incentives

Door-to-Door policy

- Households are endowed with personal bins for separate waste collection. Waste is left outside home and collected at scheduled frequency
- Non-monetary incentives
 - DtD reduces the effort to sort (waste remains at home and does not have to be carried outside)
 - DtD sets a physical limit to the amount of waste that can be accumulated (through the bin size and the schedule of collection)
 - DtD increases awareness of the sorting issue (bins for separate waste collection at home)
- Side effects
 - Correctly sorting takes time and effort
 - People are forced, rather than invited, to sort waste

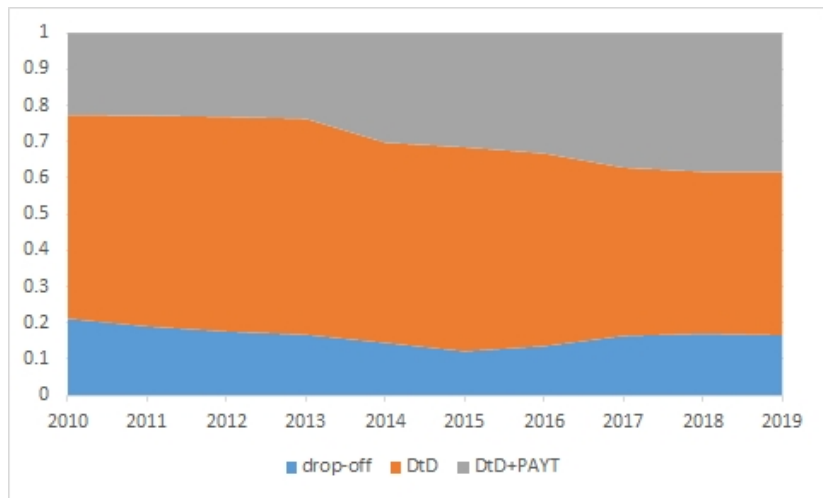
Pay-As-You-Throw policy

- Households are charged for the waste management service a fee proportional to how much unsorted waste they present for collection
- Monetary incentives
 - PAYT penalizes the accumulation of unsorted waste
 - PAYT makes it clear that not all types of waste matter the same: residual, unsorted waste is more harmful
- Side effects
 - In the absence of monitoring, people may prefer to "hide" residual waste by mixing it with other types of waste, dumping it or leaving it in common bins of nearby cities where there is no such policy

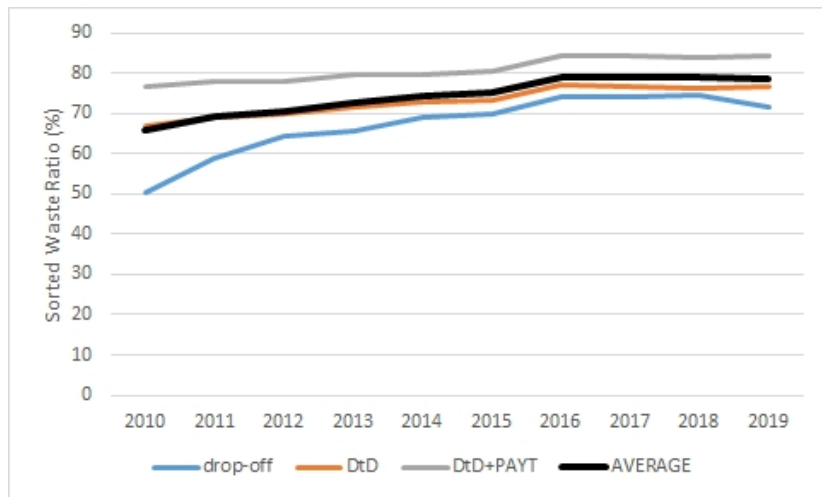
Studies on the effectiveness

- Both policies provide incentives but also promote potential deviating behavior
- The effectiveness of the policies is an empirical issue that researchers try to assess
- In a number of works we studied the problem using data from the Regional Agency for Environmental Prevention and Protection (ARPAV) about the Veneto Region of Italy
 - Municipalities in that area are considered among the best practices in Europe
 - All the analyses make use of econometric and statistical techniques, where we control for specific and intrinsic (e.g. inner motivation) characteristics of the municipalities, as well as time and space effects

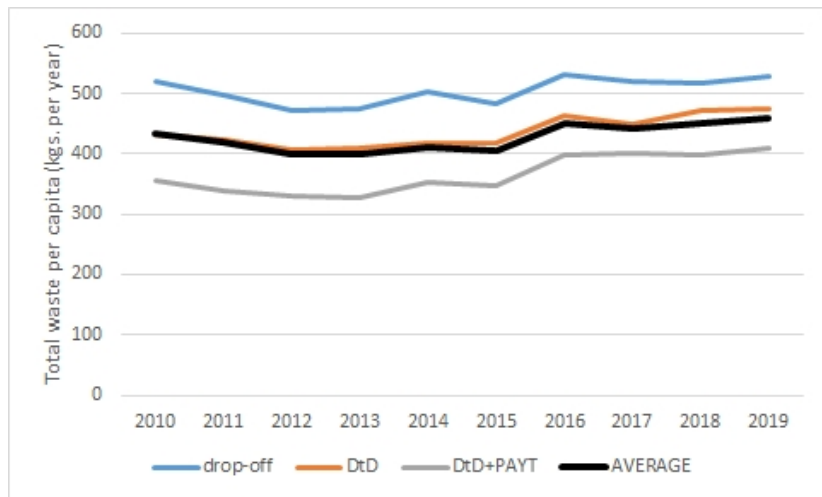
Main policies in use (SWR, source: ARPAV)



Sorted Waste Ratio (SWR, source: ARPAV)



Total waste (source: ARPAV)



Main findings - I

- Incentives matter (Bucciol, Montinari and Piovesan, *Scandinavian Journal of Economics*, 2015)
- Relative to drop-off, SWR increases
 - by 16% with DtD
 - by 17% with PAYT
- Similar outcome, different way
 - DtD decreases total waste accumulation by 12%
 - PAYT shifts waste from unsorted to sorted one

Main findings - II

- Both policies are more effective when there are already good levels of SWR and total waste accumulation
- Learning effect (weak evidence)
 - SWR increases by 2% every further year of PAYT
- Waste tourism
 - SWR increases by 14% when PAYT and most nearby towns just have drop-off collection system (and no PAYT)
 - More to study!

Main findings - III

- The bin for residual waste may be shared between 2+ households for technical/logistic reasons
- In these cases the PAYT fee is equally split between the households and may give rise to free riding behavior (Bucciol, Montinari and Piovesan, *Ecological Economics*, 2019)
 - When exactly 2 households share the bin, less waste (-24%) is actually accumulated
 - Weak evidence of free riding, when 3+ households share the bin (not supported by statistical tests)
 - Visibility promotes peer monitoring and fear of punishment

Comments

- While both policies are effective in increasing SWR, the effect on the total waste accumulation seems weaker
- Total waste naturally tends to increase with the population size and with higher income
- There is growing interest toward the "Zero waste" goal (e.g. European Directive 2008/98/CE). How to reach it?

Behavior and beliefs

- Boto-Garcia and Bucciol (*Ecological Economics*, 2020) analyze the answers of European individuals to questions on climate and environment
- They observe frequent belief that nothing can be done at the individual level to limit climate change. This belief is usually linked to a daily behavior that does not care about the "ecological footprint"
- We can imagine similar attitude with waste (and in Bassano we are actually studying it!)

Is KAYT the key?

- **It is not true that it does not regard us**
- Next goal: increase awareness that all types of waste (separated and residual) matter and should be reduced
- Is Know-As-You-Throw (KAYT) the key?