



MASARYK UNIVERSITY

# Factors Influencing the Effectiveness of Municipal Waste Management Expenses Are municipal decisions effective? Case study in the Czech Republic

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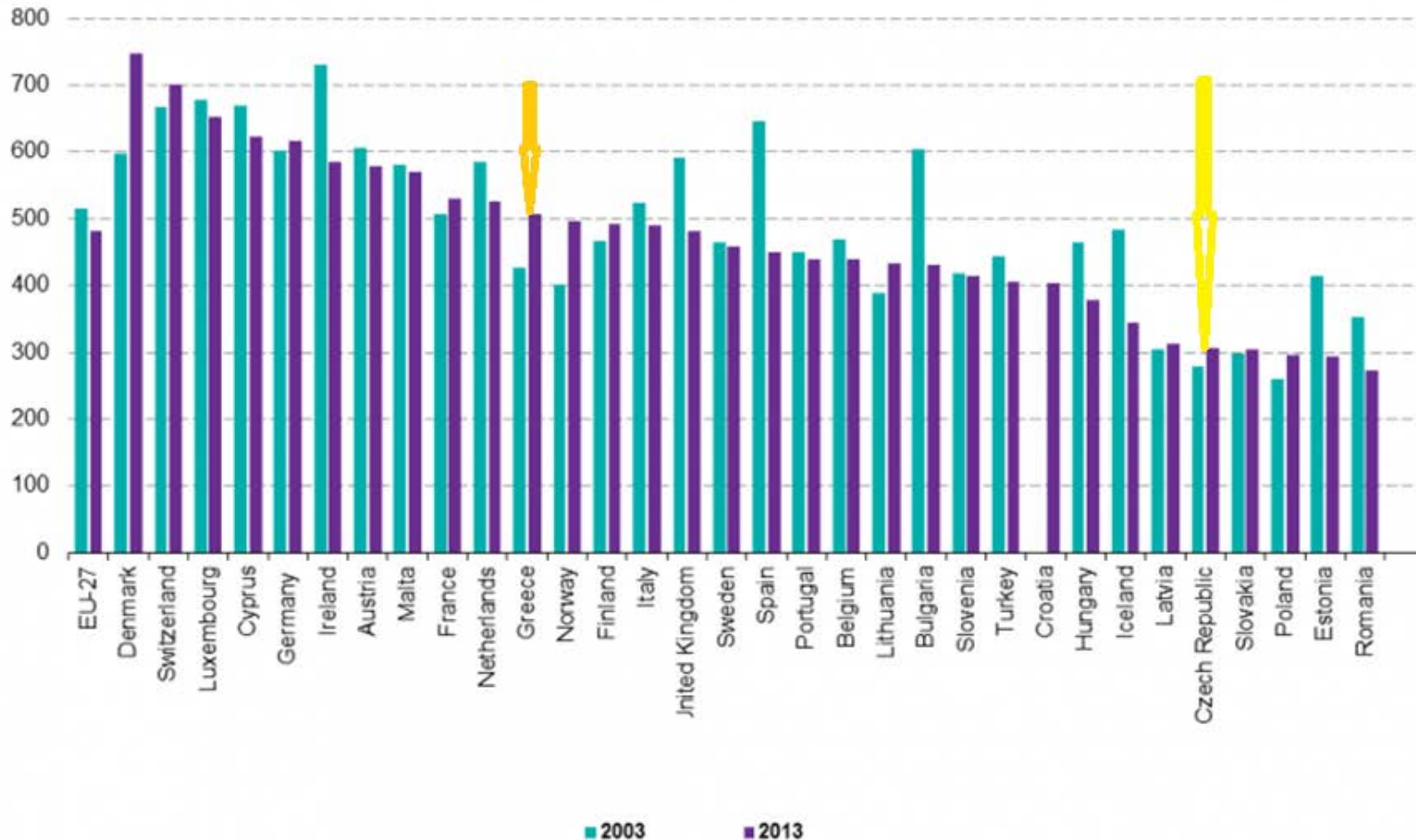
## Content of paper

- Introduction
- Municipal solid waste (MSW) and its management
- Municipal solid waste expenditure (MSWE)
- Developments of models of MSWE
- Choosing appropriate parameters
- Results and discussion
- Conclusions

## MSW generation in general

- Municipal solid waste (MSW) is mostly from its nature a by-product of citizen consumption
- Problem is that as societies get richer, they tend to consume more goods, resulting in more waste + expend
- A complex and important current environmental issue, however might be overlooked by general public
- Municipal solid waste generation differs in European Union countries

# Municipal waste generated by country in 2003 and 2013, sorted by 2013 level (kg per capita) Eurostat (2015)



## Previous research concerning MSW

- ❖ Mostly focus on the technical parts of the issue but only little to consideration of the economic aspects;
- ❖ Beigl et al. (2008) reviews 45 modelling approaches for MSW generation, Lebersorger & Beigl (2011) quantified impacts of household structure etc.;
- ❖ Hřebíček et al. (2013) proposed integrated model of waste management with socioeconomic parameters;
- ❖ Parameters usually identified as important cover **population, income level, or household characteristics** etc.
- ❖ MSW is a notable problem in **fast-developing regions**

## MSW management in the Czech Republic

- ❏ MSW – mixed MSW produced by citizens is mostly collected in **trash bin** (not recyclable waste, not business waste);;
- ❏ **Municipal government is responsible** for dealing with such MSW (companies in case of business waste);
- ❏ Municipalities contract specialized waste companies (public, private, or mixed) and pay them for the service;
- ❏ Municipalities can charge fees in order to cover these expenditures (per capita, per house, per trash bin, etc.);
- ❏ Usually each house has its own trash bin (except shared trash bins for condominiums).

## Objective of the paper

- ❖ **Analyze how municipal solid waste expenditures (MSWE) are affected by various sociodemographic characteristics of municipalities: **Population and Area covered; Age groups of population; Economic in/activity; Student status, Retired status; No. of flats in houses /condominiums; No. of flats used for recreation****
- ❖ Base on linked open data estimate models calculating MSWE at municipal levels using multiple linear regression
- ❖ Use only linked open data of eGovernment of the Czech Republic (Czech Statistical Office, Ministry of Finance)

## Case study: Chosen sample of municipalities

Sample thresholds:

- ❏ **654 municipalities from the South Moravia Region**
  - ❏ Basically all municipalities under 10,000 population
  - ❏ Several municipalities dropped due to the missing data, etc.
- ❏ Data from national census of CZSO (2011)
  - ❏ Population and Area covered; Age groups of population; Student status; Economic in/activity Retired status; No. of flats in houses /condominiums; No. of flats used for recreation
- ❏ Data from Ministry of Finance ,
  - ❏ Municipal expenditure, etc.



## Results 1 – age structure

- Effects of age structure on MSWE (significant results):
  - **Low contribution** by 0-19 age group
    - Especially in case of 15-19 subgroup
  - **High contribution** by 20-29 and 30-39 age group
  - **Rather low contribution** by 40-49 and 50-59 age group
  - **Very high contribution** by 60-69 age group
    - Especially in case of 60-64 subgroup
  - Low to very low contribution by 70+ age group (nonSig)

## Results 2 – housing structure, etc.

- 2 categories of flats – in houses or condominiums
  - Additional category of recreational flat
- **Flat in a house cca 30% less MSWE than flat in condominiums**
- **Recreational flat cca 50% less MSWE than flat in condominiums**
  
- Rather high contribution to MSWE by unemployed
  
- Economic activity decreases MSWE contribution

## Results 3 – aggregated data

- More population – decreasing  $\emptyset$  MSWE
- Larger area – increasing  $\emptyset$  MSWE
- Higher % of flats in condominium – increasing  $\emptyset$  MSWE
- Higher % of recreational flats – increasing  $\emptyset$  MSWE
- Higher % of retired people – increasing  $\emptyset$  MSWE

## Discussions

- We have created several models for estimating MSWE in the given sample of municipalities
- **Age and housing structures have influence on MSWE**
- Effects of parameters have intuitive interpretation
  
- Currently it is most common to charge a fixed level per capita fee in each municipality, that usually does not fully cover expenditures related with MSW management
  - Increased top fee limit in 2013

## Conclusion

- Calculated **results can explain what are the determinants behind MSWE**, which can be utilised in designing policies/charging schemes in MSWM, like:
  - Variable charges according to age
  - Charges per flat instead of per capita
  
- Potentially more efficient, but politically challenging
  
- Another use of such estimations is for predicting MSWE, or comparison/benchmarking between municipalities

# Thank for your attentions

## Questions ?

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