

The efficiency of distribution network operators

Past and future challenges

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1. Challenges in an efficiency comparison

Sample

- Size and composition
- Aim: best possible approximation of the “true” efficiency frontier

- *Challenge: Samples that are too small or unrepresentative can lead to biased results and unattainable cost targets*

Data

- Comparability in data acquisition and definition is central to unbiased efficiency results

- *Challenge: Distinction between endogenous and exogenous data is often not clear in practice*

Method

- Many methods available to measure efficiency
- Not every method is equally suitable for the same objective

- *Challenge: data robustness, implementation requirements, dealing with outliers, or accounting for heterogeneity ...*

2. Dealing with challenges

How to deal with the issue of outliers and heterogeneity

Existing outlier analyses are not suitable for the identification of heterogeneity in the dataset

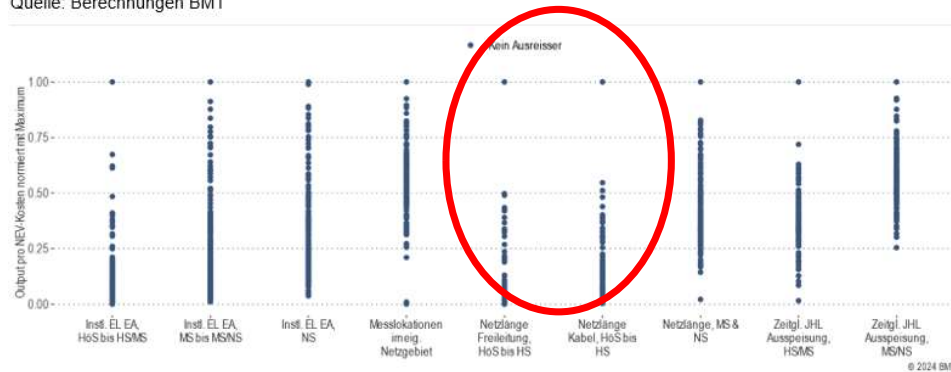
- Outliers = single companies with unsuitable data
- Heterogeneity = multiple companies with a different supply task

DEA: dominance and super-efficiency analysis → Masking problem with high levels of heterogeneity

SFA: Cook's distance → Difficulty in detecting outliers in highly heterogeneous datasets

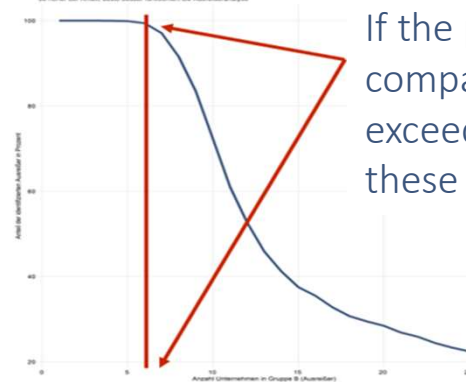
Abbildung 4 Output pro Kosten NEV für Modell 4. RP ohne DEA-Ausreisser | Netz

Quelle: Berechnungen BMT



Anteil identifizierter Ausreisser

Je höher der Anteil, desto besser funktioniert die Ausreisseranalyse



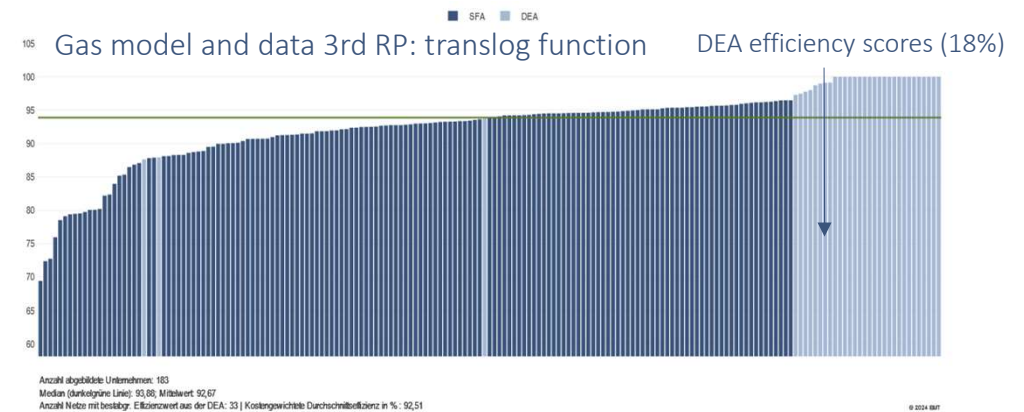
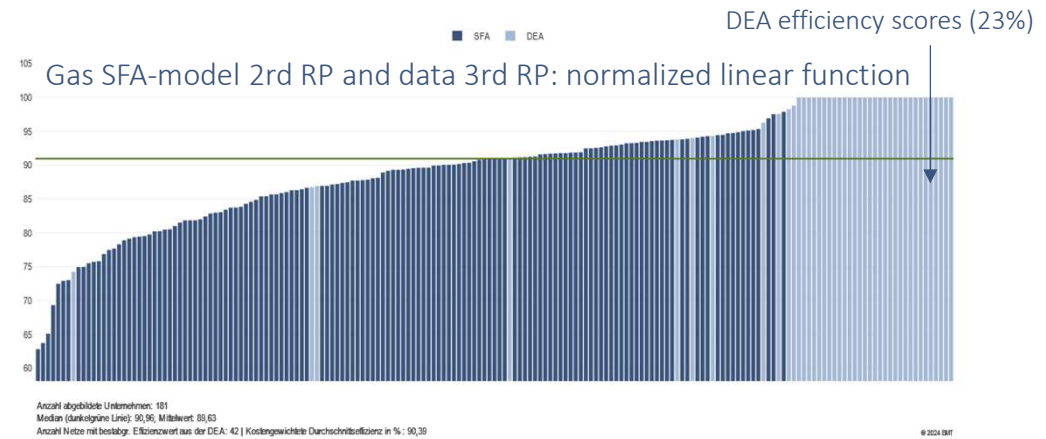
If the proportion of heterogeneous companies in the total data set exceeds a certain value, not all of these companies can be recognized

2. Dealing with challenges

To make use of the individual strength for each of the methods

SFA's advantage became DEA's disadvantage

- Implementation of a flexible option in SFA in the 3rd regulatory period in gas regulation
→ Translog function instead of normalised linear
- Due to sample size: Translog allows fewer model parameters (instead: interaction terms)
- Due to the uniform model parametrisation between SFA and DEA, the downsized model became a disadvantage in DEA



3. Upcoming challenges for electricity DNOs

Growth in Operating Costs

- Different growth due to diverse reasons
 - Charging stations
 - Expansion of renewable energies
 - Digitalization,
 - Automation
 - ...
- Coordination between the various elements of the regulation formula is necessary
- Risk that cost reduction targets can not be achieved or investments are not realized
- Increasing of “new” heterogeneity

“New” Heterogeneity

- Focus of the previous discussions about heterogeneity → companies in the sample partially have different supply tasks and are therefore only comparable to a limited extent
 - Focus of the “new” heterogeneity → companies are at different stages of the transformation process (anticipatory investments)
- This new heterogeneity must be reflected in the efficiency comparison

4. Theses for future electricity efficiency comparisons

Thesis 1: Outlier and heterogeneity

Thesis 1

The identification of outliers and the consideration of heterogeneity in the data are two different challenges in efficiency comparison each requiring a different methodological approach.

Implications

- The outlier analysis is used to identify individual companies that occupy a special position due to their data situation (e.g. data errors)
- The heterogeneity in the data set must be addressed by means of appropriately differentiated parameterization, the selection of alternative efficiency methods or the implementation of separate efficiency comparisons

4. Theses for future electricity efficiency comparisons

Thesis 2: Exploiting the advantages of the methods

Thesis 2

The advantages and disadvantages of the applied methods must be used consistently.

This applies to the parametrisation and the methodological implementation.

Implications

- The identification of the cost function for example depends on the options that the various methods allow for testing possible cost drivers
- The various methods for measuring efficiency are suitable for different challenges
- Such differences must be considered when determining the model parameters and the methodological implementation

4. Theses for future electricity efficiency comparisons

Thesis 3: “New” heterogeneity

Thesis 3

The “new” heterogeneity must be contained in the choice of model parameters

Implications

- It must be ensured that changes in costs and model parameters in different years do not distort the efficiency values
- For this reason, the use of parameters measuring the potential value of a given characteristic is one possibility to tackle this problem

POLYNOMICS