TEMPORAL SCALE EFFICIENCY IN DEA PANEL DATA ESTIMATIONS

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CONTENTS

1. Introduction
2. Theoretical framework
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Research objective:

What is the best form to provide municipal services?

Collaboration:
Search for cost efficiency

New Public Management (NPM) reforms

- Agencification
- Contracting out
- Mixed firms
- Inter-municipal cooperation
Organizational structures of local public services

Cost efficiency in local governments

Overall cost efficiency

First application
MUNICIPAL COST EFFICIENCY

Specific cost efficiency

Second to fourth applications
MSW COST EFFICIENCY

Current application
MSW temporal application
First application
Rethinking New Public Management Delivery Forms and Efficiency: Long-Term Effects in Spanish Local Government

Published in
*Journal of Public Administration Research and Theory*
(25:4, 2015)
First application

COST EFFICIENCY OF LOCAL PUBLIC SERVICES

Agencification

Contracting out

Mixed firms

Inter-municipal cooperation

H_1

H_2

H_3

H_4

H_5

H_6

Economic and financial variables

Political factors

Socio-economic variables

Great Recession

Hypotheses:

H_1

H_2

H_3

H_4

H_5

H_6
**First application**

2. In the absence of financial crisis, the use of agencies and contracting-out increase inefficiency.
3. During the *Great Recession*, inter-municipal cooperation and contracting-out tended to improve municipal efficiency.
4. Mixed firm forms contribute to higher level of cost efficiency in both scenarios.
### Second application
Reducing Costs in Times of Crisis: Delivery Forms in Small and Medium Sized Local Governments’ Waste Management

Published in  
*Public Administration* (91:1, 2013)
Second application

**H1**: If Cost (SINGLE) > Cost (JOINT), then Economies of Scale

**H2**: If Cost (PUBLIC) < Cost (PRIVATE), then preponderance of Neo-Weberian Bureaucracy (Post-NPM)

**Previous empirical applications**

- Impact of the political factors
- How to provide the service of waste collection?
- Impact of the socio-economic environmental factors

**Empirical applications**

- Single management
- Public management (MUD)
- Private management (contracting out) (MUC)
- Public management (CON, MCD, SUPRA)
- Private management (contracting out) (MCC)

**Theoretical framework**
Second application

2. Inter-municipal cooperation reduce total costs.
3. Tourism activity increases inefficiency, industrial and commercial activities reduce inefficiency.
4. Increasing quality raises costs (no TQM).
5. Public management help to control costs.
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**Third application**

Cost Efficiency in Municipal Solid Waste Service Delivery. Alternative Management Forms in relation to Local Population Size

Published in *European Journal of Operational Research* (255:2, 2016)
Third application

MUC obtains better levels of cost efficiency than MUD

Cost efficiency with MUC

\( H_1 > \)

Cost efficiency with MUD

\( \text{YES} \)

\( \text{NO} \)

- Population

\( H_{2a} < \)

Cost efficiency with joint management

\( H_{2b} > \)

Cost efficiency with PPC

Cost efficiency with IC

\( H_{2c} > \)

Cost efficiency with MUC

Cost efficiency with joint management

Cost efficiency with MUD

• Other alternatives
• Municipal size

Cost efficiency with MUC

Cost efficiency with PPC

Cost efficiency with IC

Cost efficiency with MUD

• Theoretical framework
• Previous empirical applications
• Empirical application
• Conclusions
Third application

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- Population
- Total Cost
- \( \dot{U} \)
- \( \dot{U}_{\text{IC}} \)
- \( \dot{U}_{\text{PPC}} \)
- \( X \)
- \( U \)
- \( U_{\text{PPC}} \)
- \( U_{\text{IC}} \)
- \( \text{MUD} \)
- \( \text{MUC} \)
- \( \text{IC} \)
- \( \text{PPC} \)
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**Third application**


2. Inter-municipal cooperation and municipal under contract are the most efficient forms.

3. Municipal direct very inefficient.

4. In populations around 20000 to 50000 inhabitants, contracting out is the second best efficient form.
Fourth Application
Understanding the Dynamic Effect of Contracting Out on the Delivery of Local Public Services

Published in
*Regional Studies*
(50:12, 2016)
Fourth Application

Learning effect

Contracting out efficiency

Transaction cost

Short-term

Long-term

Time dimension

Market
Fourth Application

1. Intertemporal order-m and PSM. 422/3106, 2002-2010. Counterfactual analysis.
2. Time lag between contracting out and efficiency improvements.
3. Short-term cost increases after contracting out (transaction costs).
4. Cost-efficiency is increased after three years experience.
Fifth Application
Temporal Scale Efficiency in DEA Panel Data estimations

Accepted in
*Omega. The International Journal of Management Science*
(forthcoming 2017)
Fifth Application

Production process in time period $t$

- Inputs in $t$
- Average value of the inputs ($t$ and $t+1$)
- Inputs in $t+1$

Production process in time period $t+1$

- Outputs in $t$
- Average value of the outputs ($t$ and $t+1$)
- Outputs in $t+1$
Fifth Application

1. More robust long-run fixed effects panel data, invariant (and variant) efficiency.
3. Inter-municipal cooperation exhibits the most efficient scale sizes.
4. Private inter-municipal cooperation for most populated municipalities. Direct inter-municipal cooperation for small municipalities.
### Conclusions

1. Impact of the economic cycle (and how the contracts are negotiated).
2. Hybrid forms (mixed firms) seem to operate efficiently in different economic cycles.
3. Inter-municipal cooperation reduces costs and achieves the optimal scale size.
4. Quality increases costs (against TQM).
5. Contracting-out is a good strategy for big municipalities. Transaction costs are expected in the short-run and learning curve in the long-run.

### Extensions

2. Temporal analysis to identify which are the most innovative forms.