



Evaluating efficient public good provision: Theory and evidence from a generalised conditional efficiency model for public libraries

Kristof De Witte^{a,b,*}, Benny Geys^{c,d}

^a University of Leuven (KU Leuven), Naamsestraat 69, 3000 Leuven, Belgium

^b Top institute for Evidence Based Education Research, Maastricht University, Kapoenstraat 2, 6200 MD Maastricht, The Netherlands

^c Norwegian School of Management (BI), Nydalsveien 37, N-0442 Oslo, Norway

^d Wissenschaftszentrum Berlin für Sozialforschung (WZB), Reichpietschufer 50, D-10785 Berlin, Germany

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ABSTRACT

Provision of most public goods (e.g., health care, libraries, education, police, fire protection, utilities) can be characterized by a two-stage production process. In the first-stage, basic inputs (e.g., labor and capital) are used to generate service potential (e.g., opening hours, materials), which is then, in the second-stage, transformed into observed outputs (e.g., school outcomes, library circulation, crimes solved). As final outputs are also affected by demand-side factors, conflating both production stages likely leads to biased inferences about public productive (in)efficiency and its determinants. Hence, this paper uses a specially tailored, fully non-parametric efficiency model allowing for both outlying observations and heterogeneity to analyse efficient public good provision in stage one only. We thereby employ a dataset comprising all 290 Flemish public libraries. Our findings suggest that ideological stance of the local government, wealth and density of the local population and source of library funding (i.e., local funding versus intergovernmental transfers) strongly affect library productive efficiency.

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1. Introduction

In much the same way that concerns over allocative efficiency are at the heart of micro-economic theory (e.g., Leibenstein, 1966; Frantz, 1992), allocative efficiency in the public sector has always been a major concern in public finance. Numerous studies, for example, analyze whether local governments – which often have important responsibilities with respect to education, housing, health care, social welfare, recreation, infrastructure and the environment (including refuse collection) (John, 2001) – have a tendency to over- or under-provide public goods (see, e.g., the pioneering work of Brueckner (1979, 1982, 1983) and many references thereto). Moreover, scholars studying the decentralization of tasks from higher-level governments to the local level often evaluate this evolution in terms of allocative efficiency. Smaller jurisdictions with more homogeneous populations are argued to increase allocative efficiency as they are more capable of matching the

provision of public goods with the preferences of their constituents (Musgrave, 1959; Oates, 1972), while numerous “*informal and formal versions of the Tiebout model demonstrate that private allocative efficiency tends to be increased by Tiebout choice*” (Hoxby, 2000,1211).

In contrast, this paper concentrates on local government productive efficiency.¹ This has received significantly less attention in the decentralization literature thus far (for important exceptions, see, e.g., Hoxby, 1999, 2000), even though one could argue that decentralization is most fruitful when local governments are, all else equal, more productively efficient than higher-level governments (e.g., Geys and Moesen, 2009). This relative neglect is all the more surprising given that the financial constraints within which local governments are expected to execute their (increasing) assignments have tightened significantly over the past decades. Indeed, given that tax- and deficit-increases are often politically costly (e.g., Geys and Vermeir, 2008a,b), one way to deal with increasing tasks and

* Corresponding author at: University of Leuven (KU Leuven), Naamsestraat 69, 3000 Leuven, Belgium.

E-mail addresses: kristof.dewitte@econ.kuleuven.be, k.dewitte@maastrichtuniversity.nl (K.D. Witte), Benny.Geys@bi.no, geys@wzb.eu (B. Geys).

¹ As in the private-sector, efficiency constitutes one among many aims; including effectiveness, equity, responsiveness, adequateness and appropriateness (Dunn, 2004). Our focus on productive efficiency obviously does not imply that it should take precedence over other aims of public service provision. Note also that we will use the terms productive and technical efficiency interchangeably throughout the paper.

tightening budget requirements is to improve productive or technical efficiency (understood in terms of providing a maximum amount of output for a given level of inputs; see Koopmans (1951), Fried et al. (2008).

We are clearly not the first attempting to measure and explain local government productive efficiency (for reviews, see Tang (1997), De Borger and Kerstens (2000). Yet, we differ from this previous body of work in three crucial respects. First, we build on important – but often neglected – insights from the urban governance and public administration literatures to more thoroughly describe the public sector production process prior to the actual analysis. These literatures illustrate that effective public service provision depends on an active involvement by the recipient of these services (e.g., Whitaker, 1980; Parks et al., 1981; Kiser, 1984; Parry, 1996). For example, schools can “supply little education without inputs from students”, while police forces have “very little capacity to affect community safety and security without citizen input” such as reporting crimes or testifying in court (Parks et al., 1981,1003). Such ‘coproduction’ has important implications for the measurement of technical efficiency, as it suggests that observable outcomes (e.g., library circulation, school results, waste collected, fires extinguished, crimes solved) – the most commonly employed output indicator in existing studies of public sector productive efficiency² – are inappropriate as they are not really ‘produced’ in a strict sense by the public service provider (see also Cordero-Ferrera et al., 2008). We therefore propose to view public good provision as a two-stage production process (adapted from Hammond (2002)) in which, *first*, basic inputs – such as labor and capital – are translated into ‘service potential’ – such as available materials and opening hours – and then, *secondly*, the latter are transformed into observable outputs – such as school outcomes, library circulation or crimes solved. Particularly in the first-stage of this process can the public service producer be most directly held accountable for translating a given amount of public expenditures into a maximum possible amount of service potential (whereas the second-stage is probably more appropriately analyzed in a supply–demand framework).

As a second contribution, we employ a recently developed fully non-parametric framework and thus do not impose any *a priori* assumption on the production technology. This is crucial given the difficulty – if not impossibility – to argue that the public good production process follows one or another functional form. While our approach is closely related to Data Envelopment Analysis (DEA) models (Charnes et al., 1978; Deprins et al., 1984), it goes further than such models by allowing for outliers (following the order-m technique of Cazals et al. (2002) and heterogeneity (building on the conditional efficiency estimators of Daraio and Simar (2005, 2007). Note that reliance on such conditional efficiency estimates is particularly convenient as it does not require a separability condition (i.e., the assumption that the exogenous environment does not influence the level of basic inputs and service potential). The final model is based on De Witte and Kortelainen (2008), who extended Daraio and Simar (2005, 2007) to allow for (1) both discrete and continuous exogenous variables and (2) statistical inference in the conditional efficiency approach. As such, besides reducing the impact of outliers and controlling for heterogeneity, we are able to non-parametrically evaluate the strength of the correlation between exogenous characteristics and productive efficiency.

The latter also constitutes our third contribution. Previous studies generally fail to evaluate how the institutional environment – in terms of socio-demographic, economic or political characteristics – affects efficiency, or look at this via an econometric two-stage approach (e.g., De Borger et al., 1994; Geys, 2006;

Hemmeter, 2006; Borge et al., 2008). Both exclusion of such background factors and their use in a two-stage approach, however, leads to biased results and incorrect inferences (see, respectively, Battese and Coelli, 1995; Kumbhakar et al., 1991; Reifschneider and Stevenson, 1991). In this paper, we exploit the above-mentioned non-parametric conditional efficiency model to include the operational environment immediately in the efficiency estimates. Relying on extensive public choice and political economics literatures, we thereby focus on the following elements: (1) ideological stance of the local government, (2) share of women in the local council, (3) wealth of the municipality, (4) population concentration, and (5) source of public funding.

While our central argument – and the ensuing empirical approach – can be readily applied to various public goods, our empirical application exploits an exceptionally rich dataset of (all 290) municipal public libraries in Flanders in 2007.³ The Flemish setting is particularly attractive since nearly every municipality has its own library, generating a large and diverse dataset. Moreover, as the central and regional governments in Belgium set the overall framework in which local public service providers operate, the latter’s work is largely execution-oriented and devoid of value choices (in contrast to, say, the US, where the value-component of local policy decisions is larger). This generates a situation that is particularly conducive to efficiency measurements as the value-content or neutrality of the inputs and outputs then becomes less of an issue (see also Geys and Moesen, 2009). Finally, we focus on libraries as local public library services are unlikely to be essential to individuals’ choice of residence (for recent evidence, see Bhatt (2010), unlike, for example, a jurisdictions’ public education, tax policy or public safety. Moreover, selection of consumers by public libraries is unlikely to occur (unlike in, for example, education or health care; e.g., Parry, 1996). This is important since it strongly mitigates potential concerns about endogeneity and identification (more details below). Our findings suggest that the ideological stance of the local government, the wealth and density of the local population and the source of library funding (i.e., local funding versus intergovernmental transfers) are significantly correlated with an efficient generation of service potential. At odds with recent work on the effects of female representation on public policy (e.g., Chattopadhyay and Duflo, 2004; Geys and Revelli, 2009; Svaleryd, 2009), the number of women in the local government or the presence of a female mayor does not add to the explanatory power of the model, *ceteris paribus*.

The remainder of the paper is structured as follows. Section 2 describes the theoretical background and our main hypotheses. Section 3 introduces the estimation methodology, while Section 4 discusses the institutional setting and data. Our findings are presented in Section 5. Finally, the main conclusions are summarized in Section 6.

2. Theoretical background and hypotheses

2.1. Public good provision as a two-stage production process

A key characteristic of many public services is that “without the productive activities of consumers nothing of value will result” (Parks et al., 1981,1002). Such view of the importance of citizens-consumers as ‘co-producers’ of public service production and delivery first developed among urban governance and public administration scholars in the early 1980s (e.g., Whitaker, 1980; Parks et al., 1981; Kiser, 1984; Percy, 1984). Although discussion about the exact nature, origins and consequences of such coproduction continues (e.g., Alford, 2002; Mitlin, 2008), the basic idea

² See, for example, Worthington (2001) for the case of education.

³ To facilitate the application in alternative settings, the R code underlying the present analysis is available from the authors upon request.

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