Does regionalization of local public health services influence public spending levels and allocative efficiency? ☆

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A R T I C L E   I N F O

A B S T R A C T

This paper uses a panel data set of Connecticut communities to offer several empirical insights into the economics of local public health services. First, the demand characteristics associated with local public health services are explored. Tax-share, income, and aid elasticities of local public health demand and the congestability of local public health services are estimated and compared to similar estimates for local public education and municipal services. Second, local and regional demands for public health services are compared with respect to their underlying characteristics and spending levels. Third, Brueckner's test is conducted to determine if resources are efficiently allocated to local public health services in communities with an independent health department and those participating in a regional health district. Empirical evidence reveals that the demand for local public health services is inelastic with respect to tax share, unrelated to income, and relatively sensitive to intergovernmental aid. Moreover, regionalization appears to increase spending on public health services especially relative to both municipal and local education services. Finally, regional health departments serving large populations appear to overspend on local public health services.

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1. Introduction

In sharp contrast to medical care, which deals with personal health issues, public health services reflect the actions taken by society to advance the general health of the population as a whole. Although these services take on myriad forms, most public health spending funds the surveillance and prevention of communicable diseases, testing and preservation of water quality, maintenance of sanitary conditions (e.g., approval of septic systems), ensuring of food protection (restaurant inspections), and provision of health information. Nearly 3000 local public health departments deliver public health services in almost every area of the U.S. Local public health departments are organized in many different ways. Some service jurisdictions with 1000 or fewer people as a separate agency of their municipal governments. Others deliver public health services as independent, multi-county departments with populations of 1 million or more. Funding

for local public health typically comes from intergovernmental grants, taxes, and fees (NAACHO, 2006).

Also, unlike medical services for which numerous demand studies have been undertaken (e.g., see any health economics textbook), relatively little is known about the demand characteristics associated with local public health services. The few studies that have been conducted on the demand for public health services (Borcherding and Deacon, 1972; Santerre, 1985; Bates and Santerre, 2008) have all been cross-sectional in nature. Moreover, two of them may have confused acute health care spending in government-run hospitals with spending on public health services. Thus, unobservable heterogeneity or misspecification error may have led to erroneous conclusions drawn about the demand characteristics associated with public health services. Also, no study to date has compared the underlying demand for public health services in communities participating and not participating in regional public health departments or tested if resources are allocated efficiently to local public health services.

This paper addresses these gaps in the literature regarding public health services. It contains four more major sections. Two empirical models are developed in Section 2 that allow an estimation of the demands for local public goods and the implementation of Brueckner's (1982) test for allocative efficiency in the local public sector. Section 3 describes the sample, data, and variable constructions used in the empirical analysis. Empirical findings regarding the demands for public health are reported and discussed in Section 4, along with some simulations to determine any differences for public spending in communities belonging and not belonging to a regional health district. A comparison

of allocative efficiency in the two types of public health departments is also conducted. Finally, Section 5 offers a summary of the paper and some concluding comments.

2. Theoretical development of the empirical models of local public health behavior

2.1. Modeling the demand for local public health services

Regardless of whether the public health department is organized on a regional or local basis, decisions must be made about how much to spend on public health services each fiscal year. Trade-offs are inevitable. If more spending takes place on public health services, less money is available to spend on other public and private goods within the regional or local economies. Obviously, some type of choice mechanism must be specified to identify the amount of spending that actually occurs.

A number of researchers, beginning with Borcherding and Deacon (1972) and Bergstrom and Goodman (1973), have found that a median-voter model represents a useful way of depicting how local communities make decisions. Based upon various assumptions such as single-peaked preferences, public choice theory predicts that the median demand dominates over all other demands when decisions are driven by a simple-majority rule within a direct democratic setting (Bowen, 1943).[2] The median demand may also dominate in a representative democracy if politicians gravitate towards the middle of the preference distribution to maximize their number of votes (Downs, 1957). Thus, it follows in both settings that the median voter can be treated, at least conceptually, as being the pivotal voter when it comes to deciding public expenditure levels.

Specifically, suppose that public officials, either at the regional or local level, maximize the utility (U) of the median voter in the relevant jurisdiction, subject to the constraint of a fixed income (y).[3] Assume that the median voter receives utility from consuming housing services (q), a composite private good (x), and the "captured" units of a representative public good, g, which are referred to as public health services.[4] Further suppose that utility can be captured by the following strictly concave function:

$$U = U(q, x, g). \tag{1}$$

The captured units of public health services depend on the total amount provided (G), population in the jurisdiction, N, and its degree of publicness or congestability, d:

$$g = G/N^d \tag{2}$$

Public health services are considered as a pure public good when $d = 0$ and a private or highly congestable good when $d = 1$. Intermediate values of d allow for some congestability or rivalry in consumption.

The median-voter's income constraint can be written as:

$$y + sA = P_Q q + P_x x + sP_G G \tag{3}$$

where A stands for the amount of intergovernmental aid, s reflects the median-voter's tax share, P_Q and P_X represent the unit prices of

housing services and the composite good, and P_G represents the price or marginal cost of producing public health services. Using Eq. (2), the income constraint can be rewritten as:

$$y + sA = P_Q q + P_x x + sP_G N^d g. \tag{4}$$

The term $sP_G N^d$ reflects the perceived tax price for the captured units of the public health services. For example if $d = 1$ and $s = 1/N$, then the median-voter's tax price equals P_G.

On behalf of the median voter the public officials (either at the regional or local level) maximize Eq. (1) subject to Eq. (4). Assuming the demands for housing and public health services are separable, the median-voter's demand for the captured units of public health services can be derived from that utility-maximization process and specified in general form as:

$$g = g\left[\left(sP_G N^d\right), P_x, sA, y\right]. \tag{5}$$

Further assuming that the demand function in Eq. (5) can be written in constant elasticity form and $P_X = 1$ gives

$$g = k\left(sP_G N^d\right)^n (sA)^r y^m, \tag{6}$$

such that n, r, and m denote the tax-price, aid, and income elasticities of demand, respectively. Because g is not measurable, Eq. (6) is multiplied by N^d to determine G, the total amount of public health services, and then multiplied by P_G to determine total expenditures on public health, E, yielding

$$E = ks^n P_G^{n+1} N^{d(n+1)} (sA)^r y^m. \tag{7}$$

Finally, taking the log transformation gives the equation to be estimated:

$$\log(E) = \beta_0 + \beta_1 \log s + (\beta_1 + 1) \log P_G + \beta_2 \log N + \beta_3 \log sA \\ + \beta_4 \log y, \tag{8}$$

with $\beta_0 = \log k$, $\beta_1 = n$, $\beta_2 = d(n+1)$, $\beta_3 = r$, and $\beta_4 = m$.

With the estimated version of Eq. (8) we can retrieve the various elasticity estimates and compare the local and regional demand for public health services and the corresponding spending levels.

2.2. Modeling the allocative efficiency of public health services[5]

Efficient resource allocation remains the key concern of economists. Unfortunately, reliable information on marginal social costs and benefits is typically unavailable for assessing allocative efficiency in both the private and public sectors. As a result, economists must often resort to efficiency benchmarks, such as perfect competition, and analyze if the necessary conditions for that benchmark are being met to evaluate allocative efficiency.

Before 1956, most economists believed that the public sector fails on efficiency grounds because in part, consumer-voters are unable to reveal their preferences and fiscal choices are typically limited. However, Tiebout (1956) points out in his now-classic study that the necessary conditions for allocative efficiency may exist at more decentralized levels of government. At the local level, Tiebout argues, residential consumers "vote with their feet" and choose the local community offering the best value for their fiscal dollars much like consumers vote for different private goods and services with their money. Oates (1969), and others, have tested and found evidence

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[2] Like most models, the median-voter theory has its critics and shortcomings. For example, see Romer and Rosenthal (1979) or Gruber (2011).

[3] Of course, the median voter at the regional level will reflect the median of the local median voters participating in the district. The preferences of the regional median voter should not be located too far away from those of the local median voters because they would not continue to voluntarily participate in the regional district, particularly in the long run.

[4] For ease of exposition only one public good is specified here, however, three public goods are included in the empirical analysis: public health, education, and other municipal services.

[5] Development of the model in this section greatly benefited from revisiting Brueckner (1982), Deller (1990) and Taylor (1995).