A Leontief Model of Municipal Budgeting

Phillip J. Bryson
phil_bryson@byu.edu

Follow this and additional works at: https://scholarsarchive.byu.edu/facpub

Part of the Economics Commons

BYU ScholarsArchive Citation
https://scholarsarchive.byu.edu/facpub/919

This Peer-Reviewed Article is brought to you for free and open access by BYU ScholarsArchive. It has been accepted for inclusion in Faculty Publications by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
A LEONTIEF MODEL OF MUNICIPAL BUDGETING

Phillip J. Bryson, Brigham Young University, Provo, Utah, USA

ABSTRACT

Local budgeting in transition countries is an important process because it can reveal the extent to which fiscal decentralization has occurred. Because central planning regimes were highly centralized, adopting a market-democratic approach requires a devolution of power from the central government to regions and municipalities. A Leontief model is presented as a simple theoretical approach to local budgeting. Local revenues are considered as financial inputs and local expenditures as financial outputs. A method of measuring the degree of local autonomy as a part of the budgeting process is a part of this model.

Keywords: public sector decentralization, subnational government autonomy, Leontief model

1. INTRODUCTION

Because of the importance of fiscal decentralization in the local finance systems of the transition countries of east and central Europe, it would be helpful to understand how decisions are made and what constraints are binding upon those decisions in the process of preparing and implementing municipal budgets. Planning processes for effective allocation of whatever revenues a city may anticipate, whether that city be rather large or quite small, will have common characteristics. At the same time, in cities where an effort is underway to overcome the excessive centralization of a central planning legacy, there will be some unique characteristics associated with the process. This is the case for the transition countries, which have spent nearly two decades attempting to establish anew the principle of local government autonomy.

Under the Marxist-Leninist regime of central planning, all governance decisions were made at the center by the party for the cities and towns. Peripheral local governments had only one role to play, which was to carry out delegated tasks (přenesené působnosti) of “state administration” (státní správa) assigned to them by the central government. The point of fiscal decentralization, ostensibly the objective of the Republic since 1990, is to achieve local self-government (samospráva) with greater local autonomy.

The present paper will review the process of local budgeting in the Czech and Slovak Republics, which are ideally suited for a comparative study. The two republics were paternalistically joined under communism, becoming a federation after the Prague Spring of 1968. When the Velvet Revolution came in 1989, the two countries began their joint transition to a democratic market orientation by modifying their fiscal systems, ostensibly to provide for greater local autonomy. They established joint legislation and institutions for their financial systems which were in place when the Velvet Divorce set them on separate paths in 1993. For some time they retained the legislation and institutions with which they began the transition, but before joining the EU in 2004, they each pursued reforms of public administration as a part of the accession process. With these reforms they began their first substantive divergence from their common beginnings. The deviation from the common path was undertaken primarily by the Republic of Slovakia, which initiated reforms in local finance that began to produce divergent financial outcomes beginning with the year 2005. At the end of the common transition era, then, we will evaluate Czech/Slovak local budgeting for the last time in which the historic similarities will have been so great.

The actual budgeting process, i.e., the mechanical protocols followed to bring local budgets into existence, is not the focus of this paper. It is straightforward and can be explained succinctly as Sedmihradská and Klazart (2005) have done. The municipality's budget officer sends instructions to the heads of departments, prepares revenue estimates and receives submitted reports from the department heads. The investment department prepares the capital budget. Requests are discussed and negotiated with department heads. After adjustments are made, the requests are summarized and become a part of a proposed budget for discussion by the budget officer, department heads and now the municipal manager, mayor,
council and advisory bodies, leading to the publication of the budget proposal. The budget becomes effective upon approval by the council.

The general concept of local budgeting stems back to the early 1900s movement in the United States to bring uniform accounting methods and general efficiency to local government, including transparency, uniformity of methods, standard accounting and cost accounting, intercity cost comparisons, and effectiveness assessments to local government (Mullins and Pagano, 2005). That includes, of course, the municipal forecasting that would rationalize and strengthen the early stages of the budgeting process (Forrester, 1991) in the twin republics.

The literature on local finance developments in the Czech and Slovak Republics (Sedmihradská and Klazar, 2005; International Monetary Fund, 2004) demonstrates secular progress since the beginning of the transition period. There was much to overcome in the legacies of public sector finance from the era of central planning and a good deal of progress has been made in the past fifteen years in implementing improved methods. There has been motivation from inside the twin republics and also incentives and assistance offered from the outside, especially from the European Union, to adopt and become proficient in utilizing appropriate budgeting techniques. The EU has assisted by promoting reforms of public administration in the course of accession.

An example of reform developments that should be mentioned in this regard are multi-year, rolling budget processes recently adopted in both the Czech and Slovak Republics. Zachar (2004) reports on this and other reform efforts undertaken by the Slovak Republic to meet the requirements of the *acquis communautaire* before accession to the European Union. Under the new system introduced into law in Slovakia in January of 2005, local governments no longer receive their annual allocation from the national tax revenue as an announcement (usually quite late) published in the State Budget Act. The new system was designed to stabilize the flow of revenues in the long run and permit multiple-year financial planning (Ministry of Finance, SR, 2004, p. 31). The new “multi-annual budgeting” features a three-year time frame and creates a link between the term of service of elected municipal and regional councils and the budgetary period. This permits more long-term financial commitments on the part of municipalities and regions. Revenues and expenditures for budget years two and three under this system are not obligatory and may be adjusted in the next three-year budget appearing the following year. Similar institutional arrangements have been developed and implemented in the Czech Republic (Hrabalová, 2005).

This paper will be less concerned with the mechanics of preparing budgets in general or the implementation of modern budgeting practices as mentioned above than with the process of decision-making pertaining to the sources and uses of funds to be allocated for specific municipal tasks and projects. Following this introduction, the next section presents a simple theory of municipal-level budgeting; a modified Leontief model is used to consider local revenues as financial inputs and local expenditures as financial outputs. Conceptual measures of the degree of local autonomy associated with municipal budgeting processes are presented.

**2. A LEONTIEF MODEL OF LOCAL BUDGETING**

What characteristics of municipal budgeting suggest the usefulness of a Leontief-type approach? Municipal budgets consist of diverse receipts and expenditures. Because in transition governments few of the revenue sources are “own revenue” sources, municipal officers are bound to accept transferred revenues with a commitment to honor the specified expenditure obligations attached to them. Such funds come not only from the central government, but since the process of accession to the EU began (culminating successfully in 2004), from the European Union as well.

This model is designed to show the sources of revenues and measure the extent to which municipal budget officers are constrained to expend transferred budget funds or grants in specific ways. Interestingly, gaining access to European Union regional development funds is expected in the Czech Republic to increase related municipal expenditures. It will be necessary for the cash-hungry municipalities and regions of both republics to take credits to take advantage of EU programs. Increased municipal debt will be required to generate the matching funds involved (Eliáš, 2003). Banking
sector estimates forecasted a twofold growth of debt finance. In 2003, the year prior to the EU accession, local debt grew by 70 billion CZK (2.95 billion USD), with the debt of Prague alone representing nearly half of that sum (33.5 billion CZK or 1.41 billion USD).

The simple model used in this paper to consider these budget relationships is in the spirit of the more complex methodological approach of Iwamura and Liu (1998), which uses integer programming to model capital budgeting problems. The interest here requires a less ambitious technique to account for the interplay between expenditures and receipts and the fiscal constraints associated with the spending mandates of grants and transfers. We begin by assuming two categories of budget receipts: 1) receipts from various tax revenue transfers, grants from the center, or grants from the EU, i.e., the basic municipal revenues, \( Y_n \), 2) receipts from “own revenues,” \( OR_n \), usually in the form of property tax, local user fees, or receipts from privatized municipal properties and assets. These are exceptionally small shares of total revenue in the Czech Republic and have been small but growing in the Slovak Republic.

Expenditure types are \( X_a, X_b, X_c, X_d, \) and \( X_n \), “other expenditures.” \( X_a \) may be expenditures for education, \( X_b \) may be expenditures for public health, \( X_c \) may be for roads, \( X_d \) for general government administration and \( X_n \) for other expenditures such as police protection, public transport, and water and sewage. Let \( \alpha \) be the coefficient representing the mandated share of a given total revenue source assigned or specified by either the central government, national law, or EU regulations to be spent for a given project. Thus, \( \alpha \) is an assigned value (AV) or budgeted amount to be spent on a particular activity expressed as a percent of a total revenue source. A Slovak municipality may, for example, plan to spend 40 per cent of the total amount of personal income tax revenues transferred to it by the center for elementary education, so that \( \alpha(Y_1) = 40,000 \) SKK, where \( \alpha = .4 \) and \( Y_1 = 100,000 \) SKK. A first potential measure of municipal autonomy would be the ratio of mandated expenditures to the total of funds spent. Mandated expenditures would be any spending assignments which the municipality receives from outside, either from the center or from, for example, European Union regional development programs, which specify the purposes for the transferred funds contractually or even in an informally binding manner. This simple measure would sum the \( \alpha \)s representing mandated expenditures and divide that total by total expenditures to determine the ratio of assigned values to total expenditures.

As will be observed below, the Republic of Slovakia recently increased the transfer of shared taxes to its municipalities in a substantial way, implying that these funds were to be spent as determined by the municipalities. At the same time, it mandated that those municipalities would henceforth be responsible for funding and administrating elementary education. Whether or not the contractual arrangements are clear, when additional funds are supplied in conjunction with a new spending mandate, the attached strings are apparent and one can legitimately speak of informal spending assignments.

The coefficient \( \beta \) represents the share of the revenue source actually spent by the municipality for a given activity. It is the chosen expenditure (CE) level of the municipality, and may deviate from the AV or \( \alpha \). The actual \( \beta \) will reflect, though not necessarily with precision, the preferences of the municipal authorities. A matrix of local expenditures can be constructed with budget receipts listed horizontally across the top and with expenditure categories listed vertically down the left-hand side of the matrix. Reading downward in a given column we observe the expenditures funded from the revenue source listed at the top of that column. Reading along any given row horizontally we see the specific amounts spent on a particular public service from various revenue sources, appearing as below. Here, we have the matrix conforming to central government intentions, the coefficients representing the \( \alpha \)s, or assigned values (AVs).

\[
\begin{array}{cccccc}
\text{OR1} & \text{OR2} \\
Y_1 & \frac{Y_1}{0.3} & Y_2 & Y_3 & 0.2Y_4 & 0.5Y_4 \\
X_a & \frac{0.3Y_1}{0.7} & 0.6Y_2 & 0.2Y_3 & \frac{0.2Y_3}{0.6} & 0.2Y_4 \\
X_b & \frac{0.4Y_2}{0.7} & \frac{0.4Y_2}{0.6} & \frac{0.5Y_4}{0.5} & \frac{0.4Y_2}{0.5} & \frac{0.4Y_2}{0.5} \\
X_c & \frac{0.4Y_2}{0.7} & \frac{0.4Y_2}{0.6} & \frac{0.5Y_4}{0.5} & \frac{0.4Y_2}{0.5} & \frac{0.4Y_2}{0.5} \\
X_d & \frac{0.4Y_2}{0.7} & \frac{0.4Y_2}{0.6} & \frac{0.5Y_4}{0.5} & \frac{0.4Y_2}{0.5} & \frac{0.4Y_2}{0.5} \\
X_n & \frac{0.4Y_2}{0.7} & \frac{0.4Y_2}{0.6} & \frac{0.5Y_4}{0.5} & \frac{0.4Y_2}{0.5} & \frac{0.4Y_2}{0.5} \\
\end{array}
\]
A matrix can also be written showing $|\alpha - \beta|$, the differences between mandated spending and the level of expenditures actually chosen by local authorities. This assumes, of course, the possibility that occasionally a mandate will not be contracted with precision, will not be fully binding, or will be subject to imperfect monitoring, any of which conditions will permit some discretion on the part of recipient municipalities. Adding the $\beta$ values to Figure 1 would show the difference between mandated allocations and the municipality’s chosen expenditures level.

If we had perfect knowledge of local preferences, or if local preferences were revealed (and expressed as $\alpha'$, the desired level of expenditures for a particular task), we could calculate the following values based on $\alpha$, $\alpha'$, and $\beta$.

A coefficient of incongruity, $CI = |\alpha - \alpha'|$

A coefficient of compliance, $CC = 1 - |\alpha - \beta|$, and

A coefficient of autonomy, $CA = 1 - |\beta - \alpha'|$

At first blush, the coefficient of autonomy may appear contradictory, since it emphasizes a difference between chosen municipal expenditures and actual preferences. But the two values will on occasion actually diverge, since local officials may feel pressured or actually be constrained to choose levels of expenditures they do not prefer. Assume three different municipal administrations characterized as Milquetoste, Intrepid and Median. All have the same preferences in the face of a particular $\alpha$ mandate from the center, but the first conforms perfectly to the mandate, the second is at complete defiance, and the third is between the two extremes. The coefficients use absolute values because the local administration may want to spend either more or less from a particular revenue source than the center mandates, as can be seen by the following simple example.

In the absence of revealed local preferences, we can gain less detailed but nevertheless helpful information simply by looking at the Coefficient of Compliance for the various categories of local public expenditures. We observe that in instances where the center transfers untied or non-mandated funds, it is essentially adopting local preferences in the action, so that $\alpha$ is assumed to be the same as $\beta$ and the $CC = 1.0$. Across all expenditure categories, this will raise the average $CC$.

In general, this simple methodology is interested in finding a matrix of the absolute values of the differences between coefficients of assigned values and chosen expenditures, $|\alpha - \beta|$. The absolute values of these differences, $|\gamma| = \sum(\text{AV-CE}) + \sum(\text{CE-AV})$, declines as autonomy increases. We have no measurement of the Coefficient of Autonomy as defined above, but can only measure differences as expressed in the Coefficient of Compliance.

In summary, we have $[\alpha_{ij}] - [\beta_{ij}] = |\gamma_{ij}|$ where $[\alpha_{ij}]$ is a matrix of the coefficients of spending mandates. These are rules for the use of transferred funds or state grants. The matrix represents available, constrained funds designated for essential spending programs or projects. Planned spending is represented here as a share of a total expenditures budget, which could also be viewed as an average of spending among similar communities. $[\beta_{ij}]$ is a matrix of actual municipal spending choices. It represents the actual sum spent for a program or project. $[\gamma_{ij}]$ is a matrix of differences between mandated and actual expenditures.

<table>
<thead>
<tr>
<th></th>
<th>$\alpha$</th>
<th>$\beta$</th>
<th>$\alpha'$</th>
<th>$\text{CT}$</th>
<th>$\text{CC}$</th>
<th>$\text{CA}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milquetoste</td>
<td>0.4</td>
<td>0.4</td>
<td>0.1</td>
<td>0.3</td>
<td>1.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Intrepid</td>
<td>0.4</td>
<td>0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Median</td>
<td>0.4</td>
<td>0.25</td>
<td>0.1</td>
<td>0.3</td>
<td>.85</td>
<td>.85</td>
</tr>
</tbody>
</table>

We would get the same results, of course, if we had values reflecting municipal preferences to spend more on a public service than the center mandates, as seen below.
3. CONCLUSIONS AND IMPLICATIONS

Treating local finance as a matter of revenue inputs and expenditure outputs perceives local finance as a response of municipal officials to their own budgeting preferences. These preferences must take account, of course, of the demands of constituents as well as the financial constraints imposed by granting authorities whose modus operandi is frequently to transfer funds with spending mandates attached. As a result, actual spending patterns will not perfectly reflect the preferences of the local officials, since they would sometimes prefer to do things that they perceive they cannot do and in fact avoid doing. Nor are local preferences necessarily revealed preferences. We have the public record only of actual revenues and expenditures, which may not perfectly reflect either local preferences or even transferred spending mandates. Empirical analyses of municipal budgets would, therefore, be very difficult to perform, although we would welcome the results of such and efforts to develop empirical analyses are to be recommended for future research.

REFERENCES:


