AN EMPIRICAL TEST OF PUBLIC CHOICE THEORY: COMPARING UNITED STATES AND UNITED KINGDOM LOCAL GOVERNMENTS☆

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ABSTRACT

The Gonzalez and Mehay model is a public choice model successfully used to test the incentives of local government decision makers, including accounting-related control and monitoring. It is a monopoly model that assumes that bureaucrats dominate government decision making, since they have a monopoly position on financial information. A key question is whether this model is generalizable to non-American local governments. This paper compares the use of the Gonzalez and Mehay model for both United States and United Kingdom local governments. British local governments are chosen because information is available and the political structures have interesting similarities and differences to U.S. local governments. Our research seems to be the first to test public choice models: (1) using British governments; and (2) conducting comparative testing across countries. This model works reasonably well for U.K. local districts; however, results differ on some dimensions from U.S. cities. A key point is this model can be compared across countries with

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reasonable success. Differences suggest that institutional and public policy relationships may differ from country to country, an important consideration for further cross-country analysis.

INTRODUCTION

Public choice models have been used effectively to test the incentive structures of American local governments. The Gonzalez and Mehay (GM, 1985) model was used to evaluate United States (U.S.) local government control systems and information asymmetries (Giroux, 1989; Giroux & Shields, 1993). GM is an analytical monopoly model, which assumes that bureaucrats control government decision making because they dominate accounting information dissemination. More precisely, the bureaucrats know the true costs of goods provided and use this information to maximize their budget (Giroux, 1989). However, Giroux and Shields (1993) demonstrate that certain types of accounting controls, information disclosure, and financial audits limit bureaucratic control for U.S. local governments. This suggests that accounting factors increase government efficiency.

Although the empirical model has been tested only with U.S. local governments, the analytical model developed by GM should be generalizable. The purpose of our study is to test the GM model on comparative samples of United Kingdom (U.K.) and U.S. local governments. Britain is chosen because current economic and demographic data are available and there are interesting similarities and differences between U.S. and British local governments, as well as concomitant accounting and auditing practices.

Public choice theory should be generalizable across countries, but different institutional structures, economic characteristics, and public policy goals exist. Empirical results likely differ across countries. In the mid-1990s both the British and American voters replaced conservative governments with more liberal governmental executives and both experienced economic expansion (approximately three percent growth in gross domestic product annually in both countries). The tax systems are somewhat similar, with heavy reliance on income and payroll taxes, and government spending is based on a combination of national and local decision levels. On the other hand, U.K. is traditionally more liberal, has somewhat higher taxes, has a national health service, and a different relationship between the national and local governments. Different empirical surrogates are likely. Differences in interpreting the GM base model relate to intergovernmental aid (since virtually all U.K. local governmental revenue comes from the national government) and demographic differences (e.g. non-white population is not a major factor in Britain). Because much of the relevant control of local government

rests with the U.K. national government, accounting-related factors are less likely to be significant. For example, auditors are chosen by the Audit Commission, a national agency, not by the local districts. A primary objective of this comparative analysis is to determine to what extent public choice theory is generalizable, when differences such as this exist.

PUBLIC CHOICE OVERVIEW

Public choice models combine economics and political science to evaluate public output decisions based on actor incentives. Key actors include voters, elected officials, bureaucrats, and special interest groups. A major point of public choice is the observation that each individual has unique incentives and strives to maximize his/her utility, even when involving society-wide decisions. Thus, public choice models are similar to agency theory except the focus is on non-market decision making.

In voter behavior politicians are elected to satisfy public welfare based on majority voting rules to aggregate individual preferences (Mueller, 1976). Voters prefer some level of public output produced at minimum cost. Assuming perfect information and high political competition, voters should dominate the process and elected officials should base public spending and tax decisions exclusively on voter preferences (Downs, 1957). Bureaucrats under typical voter behavior models have no choice but to act as agents to maximize public welfare based on voter preferences.

Voters may be relatively uninformed about government decisions, a concept called rational ignorance (Browning & Browning, 1994). That is, the costs of gathering and analyzing information are greater than the perceived benefits. Elected officials have the authority to make all-important financial decisions. Public output is provided by the bureaucracy and voters have limited recourse to bureaucrats.[1] If voters are unhappy with public output levels or taxes, they should vote out the incumbent elected officials. Presumably, elected officials will limit bureaucratic power only if political competition is high; i.e. voters may vote them out of office (Browning & Browning, 1994).

Elected officials have power and benefits associated with public office. It is assumed that the major incentive is the reelection potential (e.g. associated with continued prestige, power, remuneration, perquisites of office). This reelection incentive generally is associated with meeting vocal constituent demands (e.g. special interest groups) rather than direct monitoring of the bureaucracy, partially because of the rational ignorance of the voters. If political competition is low, elected officials have fewer incentives to meet constituent demands (Weingast, 1984).

Bureaucrats are appointed by elected officials and are granted authority by the politicians. Bureaucrats may dominate public output decisions with only moderate checks by voters or elected officials, since they have a monopoly position over financial information and because it is difficult to observe bureaucratic behavior (Bendor et al., 1985). The bargaining power of the bureaucracy is related to their ability to conceal relevant information (Niskanen, 1971). By limiting the financial information available, the bureaucrats can expect to overproduce public goods to enhance their position. This may include shirking, financial slack, and excess consumption (Niskanen, 1971).

This suggests a "bilateral monopoly." Bureaucrats are experts in their areas and have a substantial information advantage. However, elected officials have the authority of government. Elected officials approve budgets and tax levels and control operations through monitoring (including the audit) and penalties (such as firing bureaucrats). Elected officials can use their superior authority to counteract bureaucrats' information monopoly (Bendor et al., 1985; Miller & Moe, 1983). The effect of this interaction of elected officials and bureaucrats is a key concern to public choice modeling.

Control-loss is defined as the cumulative discrepancy between the actions of bureaucrats and desires of voters and elected officials (Tullock, 1965). The two components of control-loss are: (1) the excess supply of public output; and (2) inefficient production (Breton & Wintrobe, 1975). This can be stated in budget terms as the difference in appropriations that the bureaucracy succeeds in obtaining vs. the minimum costs of the preferred budget of the voters (assumed to be determined by the position of the median voter) (Toma & Toma, 1976).

Monitoring and control procedures can be used to limit control-loss and many significant procedures are accounting-related. The budget process is a major control process. Budgets limit spending levels and taxes levied, which require legislative approval. If budgeting is effective, excess spending should be minimized and inefficient production monitored and reduced. Full disclosure using annual financial reports should provide financial information; however, it has not been demonstrated that these disclosures limit the bureaucrats' monopoly position over information.

Bureaucrats may adopt a strategy of subverting both output and shirking by limiting access to information. The use of "budget games" by the bureaucracy when faced with potential budgetary oversight is described in detail in the budgeting literature (e.g. Anthony & Herzlinger, 1975, Chap. 10).

In summary, the key public choice actors have different incentives and it's not clear who dominates the process. In a democracy voter interests should be paramount. However, voters may be apathetic and subject to rational ignorance. Elected officials have the power of office, but may be more concerned with

reelection than administrative control. Bureaucrats are professionals and have monopoly power over financial information, but are subject to legislative approval. It seems likely that relative power will differ for alternative government structures.

THE GONZALEZ AND MEHAY MODEL

The GM model is built on the Niskanen (1971, 1975) bureaucratic framework. It assumes bureaucrats determine public output to maximize their utility, based on their monopoly position over government financial information. Constituents receive a bundle of public output (Q), which is funded by total taxes (T). A balanced budget is assumed, with T equal to total expenditures as a measure of Q. It is assumed that bureaucrats maximize the discretionary budget (somewhat analogous to profit maximization by a monopoly firm), the difference between T and the minimum necessary costs (C[Q]) to produce public output to satisfy voters. The discretionary budget is used by bureaucrats to increase available perquisites and, if possible, increase their incomes.[2]

According to GM, the elasticity of taxation with respect to population depends on the evaluation of the publicness parameter. The model implies that population changes will be matched by proportional spending changes for pure private goods (measured as a population coefficient equal to one), but greater relative spending for quasi- and pure public goods (measured as a population coefficient significantly greater than one).

GM test their theory on California cities using expenditures as a measure of public output and six independent variables: population, population density, mean income, intergovernmental aid, median age, and population change. Positive signs are predicted for population, mean income, intergovernmental aid, and median age. GM predicts that public output rises directly with population if government output behaved as pure private goods. Voters are expected to demand more public output as personal income rose. Because of the "flypaper effect," governmental grants are expected to increase spending rather than replace local revenues. Median age is a measure of dependent population, positively associated with higher spending. If population change has a negative sign, government spending is not keeping up with expanding populations; if a positive sign, spending rises more rapidly than population growth.

Four definitions of public output are used as dependent variables: total spending, police, fire, and parks and recreation. The model proved descriptive using multiple regression, with explanatory power of approximately 80% and the majority of the independent variables significant in the expected direction. Particularly important to their theoretical model, public output is shown to behave as "pure private

goods" with expenditure levels rising proportionately with population (measured with a regression coefficient of population equal to one). Fawson and Giroux (1988) extend GM by testing the model on capital outlays. Their results indicate that capital spending behaves as quasi-public goods (with a population coefficient significantly greater than one).

GM assume no monitoring by voters or elected officials in their analytical modeling; i.e. bureaucratic power depends on their monopoly position over information. The expectation is that public output would be greater than the level desired by the median voter and produced inefficiently, because of bureaucratic shirking and related incentives. Consequently, bureaucratic power is likely overstated in this model. Government regulation mandates annual audits. Budget requirements include control elements and most local governments are subject to balanced budget requirements in some form. The value of monitoring and control is to make camouflaging actual costs of providing government services more difficult; i.e. "as a deterrent against distortion of information" (Breton & Wintrobe, 1975, p. 119). GM do not attempt to measure the moderating effects of monitoring and control or the related interaction of elected officials and bureaucrats.

Accounting controls, financial information dissemination requirements, and financial audits may limit bureaucratic power, resulting in lower public output levels produced with greater efficiency.[3] Giroux (1989) adds a measure of effective auditing to the GM model, which reduces expenditure levels significantly as predicted. Giroux and Shields (1993) add several accounting- and audit-related variables to the GM model and find several variables that reduce spending levels, including unqualified audit opinions and cities awarded a Certificate of Achievement for Excellence in Financial Reporting. However, they also discover the potential for bureaucratic roadblocks to limit the effectiveness of accounting control techniques. These include the use of budgeting surpluses to increase spending levels, higher levels of long-term debt to increase capital outlays, and less than complete financial disclosures.

BRITISH LOCAL GOVERNMENTS

At the start of 1997 there were 472 local governments in the U.K. British local authorities are aggregated for fiscal and control purposes, with revenues and spending regulated by Parliament, although accounting and auditing standards are relatively loose. The U.K. is a unitary state with Parliament the ultimate source of authority. Local governments are subject to the doctrine of *ultra vires*, that limits local governments to do only what the law specifically empowers them to

do. Almost all revenues come from nationally provided sources. Ashworth and Gemmell (1996) suggest that local officials in the U.K. justify overspending by encouraging voters to blame the central government for over-taxation.

Local governments are multi-function organizations that include services such as education, housing, environment, health, personal social services, libraries, parks, museums, buses, roads, and street lighting. They are administered by elected councils and professional staffs. Total spending by local authorities represents about 11% of Gross Domestic Product. Most of the authorities (about 85%) represent from 50,000 to 500,000 people.

Local governments are required to maintain a balanced budget, but deficits can be budgeted as long as they are covered by existing reserves. Limits on long-term borrowing are set by the central government and moneys can be spent only for capital expenditures.

The professional accounting body associated with local governments is the Chartered Institute of Public Finance and Accountancy (CIPFA) and its members are Chartered Public Finance Accountants. All local authorities must be audited annually and auditors are picked by the Audit Commission of Local Authorities in England and Wales, a national government agency. Most auditors are District Auditors that now work for the Audit Commission, although about 30% of the governmental audits are performed by public practice accountants on a contract basis.

The fiscal year of all local governments ends March 31 and financial statements must be published by the following December 31. Fund accounting is used, with each fund having a balance sheet, income and expenditure account, and some have a cash flow statement.

COMPARING U.S. AND U.K. LOCAL GOVERNMENTS

While British government is centralized, there is a constitutional split between the federal government and the 50 states in the U.S. Instead of the fewer than 500 local authorities in Britain, there are over 80,000 American local governments that include cities, counties, school districts, and special districts. U.S. cities are multi-functional and, thus, large cities are in some respects similar to U.K. local authorities. U.K. local authorities are subject to *ultra vires*, but U.S. cities come under the jurisdiction of specific states and are generally fairly autonomous. U.S. cities raise most of their own revenues, with some funding from federal and state sources. Local governments in both countries can borrow long-term from national (and potentially international) capital markets, but these funds are limited to capital expenditures.[4]

Both countries were in the middle of an economic expansion in 1995–1996, the period under study. In the U.K., gross domestic product (GDP) grew at a 2.5% rate, with inflation at 3%. Comparable U.S. data are 3.4% GDP growth and inflation at 3.3%.

Local governments in both countries use fund accounting, formal budgeting procedures, and measure spending using expenditures. Both have professional bodies associated with local government accounting issues: CIPFA in the U.K. and the Government Accounting Standards Board (GASB) in the U.S.

Audits are required annually in both countries. Audit requirements in the U.S. are based on American Institute of Certified Public Accountants (AICPA) standards, General Accounting Office (GAO) regulations and federal laws (beginning with the Single Audit Act of 1984). Most governmental audits are performed by independent CPAs, but state auditors are mandated in some states. Auditors in the U.K. are appointed by the Audit Commission of Local Authorities in England and Wales, mostly district auditors working for the Audit Commission.

Annual reports are issued by local governments in both the U.S. and U.K. In the U.K. the fiscal year ends on March 31 and annual reports issued by the following December 31. Fiscal year-end varies for U.S. governments and annual reports usually issued within six months of the end of the fiscal year.

SAMPLES

The U.K. sample is based on the 64 local districts used by Giroux and Jones (1998). The sample is based on the 1995–1996 fiscal year for English districts and 1994–1995 for Welsh districts. After 1995 Wales moved to unitary districts.[5] Annual reports were requested from the U.K. sample districts and 40 were received. These are used to capture the auditing variables. Since this is substantially less than the full sample, U.K. regression results include both the full and reduced samples.

The U.S. sample is cities over 100,000 in population for fiscal year-ended 1996. We requested annual reports from the 209 U.S. cities over 100,000. We also gathered U.S. Census Bureau data. Complete information is available for 165 cities. We tested for size bias between the responded and non-responding cities and found no significant difference based on a *t*-test. Large cities are used as a reasonable comparison for British districts for two reasons. First, they are about the same population size on average and, second, they are multi-function governments. Also, Giroux and Shields (1993) used large cities (fiscal year 1983) to analyze accounting-related factors related to the GM model.

Table 1. Empirical GM Models: Variables and Sources of Data for U.K. Local Districts and U.S. Cities.

GM Model	U.K. Model	U.S. Model
Dependent variables		
Operating spending	Log of net revenue expenditures (NRE) 1996[a]	Log of current expenditures (TCE) 1996[e]
Capital spending	Log of capital spending 1996 (CS)[c]	Log of capital outlays 1996 (CO)[e]
GM base model		
Population	Log of population (POP) 1996[a]	Log of population (POP) 1996[f]
Population density (population per square mile)	Log of population density (PD) 1996[a]	Log of population density (PD) 1996[f]
Average income	Mean income (INC) 1995[d]	Log of income per capita (IPC) 1989[f]
Intergovernmental aid	Not included	Not included
Population change%	Population change% (PC) 1986–1996[a]	Population change% (PC) 1990–1996[f]
Demographic control	Dependent population% (DP) 1996[b] (under 18 & over 65)	Nonwhite population% (NW) 1996[f]
Accounting related		
Surplus-deficit	Appropriations to (from) reserves (APPROP) 1996[a]	Actual surplus-deficit (ASD) 1996[e] (total government revenues/total operating expenditures)
Long-term debt	Log of total borrowing (DEBT) 1996[c]	Debt per capita (DPC) 1996[e]
Auditor	Public accountant (AUDITOR)[e]	Big six auditor (AUDITOR)[e]
Audit timing	Days to audit report (TIMING)[e] Financial data in £	Days to audit report (TIMING)[e] Financial data in $

[a] Chartered Institute of Public Finance and Accountancy (CIPFA), *Finance and General Statistics*, 1996–1997. Net Revenue Expenditures is a CIPFA definition for operating revenues.
[b] CIPFA, *Personal Social Services Statistics, 1995–1996 Actuals*, 1997.
[c] CIPFA, *Capital Payments, Financing, and Debt Statistics, 1995–1996*, 1997.
[d] Inland Revenue: *Inland Revenue Statistics 1996*.
[e] Annual reports of individual cities, fiscal year-ended 1996 and local districts, fiscal year-ended 1995 or 1996.
[f] U.S. Census Bureau.

EMPIRICAL MODELS

The two empirical models used for the U.K. and U.S. samples are similar to the original GM model with some modifications, which are summarized in Table 1. The

British data are based primarily on the 1995–1996 fiscal year, using information from Chartered Institute of Public Finance and Accountancy (CIPFA) statistics. Two definitions of public output are used: (1) net operating expenditures as a broad measure of current operating spending; and (2) capital spending, both of which are logged because of skewness.

Four variables are almost identical to GM: population, population density (population per square mile), population change (from 1986 to 1996), and average income. Intergovernmental aid was deleted, since in the U.K. virtually all revenue comes from the central government, some of it distributed on a per capita basis. This is quite different from U.S. local governments, where grant requests are generally required for funding, often on a competitive basis. Dependent population is used as a demographic control variable. GM use median age, while Giroux and Shields (1993) use percent of non-white population. Because the demographics in the U.K. differ from U.S. counterparts (e.g. there is a small minority population), percent of population 18 and under and 65 and older is used in the U.K. sample. The prediction is the same as GM: dependent population should increase public output. However, there are additional structural differences. For example, healthcare in the U.K. is provided by the National Health Service. There is an added burden to U.K. public expenditures, but not on local districts. Also, there is a slow trend in the U.K. toward the private sector. For 1995 base case projection of long-term costs for older people is £4.5 billion for local authority expenditures and £4.0 for private expenditures (which is expected to grow more rapidly for the private sector).

Two variables are used to capture financial accounting-related control factors. In the U.K. appropriations to (from) reserves (APPROP) is used to measure surplus-deficit. Local districts are subject to a balanced budget requirement, but deficits can be funded from existing reserves. APPROP measures the difference between total operating expenditures and total revenues. This difference effectively is the net operating surplus or deficit. Under the GM model, bureaucrats seek to maximize the discretionary budget to provide financial slack and other purposes. If the balanced budget works as an effective control, a negative coefficient is expected; i.e. reducing public output. However, if bureaucratic strategy dominates, a positive sign should result. Budget slack provides bureaucrats a method of expanding the discretionary budget through strategic manipulation of budget vs. actual surpluses and deficits (Giroux & Shields, 1993).

Total borrowing is used as a measure of non-revenue spending, which may represent a form of fiscal illusion. Long-term debt allows bureaucrats to increase current spending beyond immediate revenues available. The rationale is that voters may be unaware of spending from non-tax sources or that the debt must be repaid with interest (Wagner, 1976). A negative sign is associated with effective control (that is, the disclosure of total debt should moderate further capital outlays

if constituents understand the relationship of new debt to increased future taxes (Giroux & Shields, 1993)), a positive sign with bureaucratic strategy.

Two variables test the impact of the financial audit on government spending. The value of the audit is "as a deterrent against distortion of information" (Breton & Wintrobe, 1975, p. 199). Thus, the audit should have a moderating effect on bureaucratic behavior. In the U.S. high quality audits are associated with using Big Six accounting firms (De Angelo, 1981). A Big Six dummy variable is used for testing. Following Giroux (1989) cities using high quality auditors should have lower spending levels. Most British government audits are conducted by District Auditors. However, about 30% are private accountants selected by the Audit Commission. It is not known if they provide higher quality audits and no sign is predicted.[6] The second variable is audit timing, the number of days from the end of the fiscal year to the audit report date. Early report dates are considered "good news," a combination of an efficient audit and few accounting difficulties to be resolved before the audit report is submitted (Dwyer & Wilson, 1989). The relation to spending levels is not clear. A positive sign indicates that longer audit timing results in greater spending, probably associated with increased financial complexity. A negative sign would indicate higher efficiency associated with reduced spending.

Accounting variables are significant in earlier tests by Giroux (1989) and Giroux and Shields (1993), based on U.S. cities. However, it is less likely that they will be effective for U.K. districts, since most of the financial process is controlled by the central government. Bureaucrats are more likely to dominate the budget process when control is split between central and local elected officials and local officials have limited ability or incentives to reduce tax levels. Studies by Jones and Pendlebury (1991) and Pendlebury and Jones (1985) indicate marked non-compliance of U.K. local districts with accounting requirements accompanied by clean audit opinions and little if any public comment. It is not clear if standard monitoring and control techniques are useful for promoting more efficient government spending under these circumstances.

DESCRIPTIVE ANALYSIS

Panel A of Table 2 presents descriptive statistics for the U.K. sample. Capital spending, on average, is over 10% of net revenue expenditures, and both spending measures have a large standard deviation. Population (POP) ranges from 27,000 to over one million. Large urban areas such as London are divided into separate boroughs. Although the U.K. has the highest population density in Europe, some Welsh counties have the lowest; consequently, PD has a large range. Population change averages a small 6,300 (2.6%) increase, but the range is from −67,000

Table 2. Descriptive Statistics for Samples of 64 U.K. Local Districts for Fiscal Year-Ended 1995 or 1996 and 165 U.S. Cities With a Population in Excess of 100,000 for Fiscal Year-Ended 1996.

	Mean/ Frequency	Standard Deviation/ Percentage	Minimum	Maximum
Panel A: U.K. data				
Dependent variables				
Net revenue expenditures (NRE) (£000)	149,024	166,374	4,039	579,036
Capital spending (CS) (£000)	16,369	19,587	0	104,624
GM base				
Population (POP)	243,675	218,059	27,100	1,035,500
Population density (PD)	12.6	17.8	0.2	90.2
Mean income (INC) (£)	14,625	3,328.9	10,300	27,900
Population change (PC)	6,336	15,906	−66,600	54,300
Dependent population (DP) (%)	60.6	0.21	57.6	70.4
Accounting				
Appropriations (APPROP) (£000)	−2,789	2,784	−11,818	1,920
Total borrowing (DEBT) (£000)	106,294	159,739	0	801,893
Audit timing (TIMING) (Days)	247.7	39.4	157.0	300.0
Public accountant (AUDITOR)	13	33%		
Panel B: U.S. data				
Dependent variables				
Current expenditures (TCE) ($000)	345,205	561,475	44,788	4,026,960
Capital outlays (CO) ($000)	41,104	56,549	166	334,829
GM base				
Population (POP)	312,661	410,778	100,000	3,554,000
Population density (PD)	3.9	2.6	0.15	15.7
Income per capita (IPC) ($)	14,246	3,329	6,284	27,092
Population change (PC)	12,582	30,095	−108,000	175,000
Nonwhite population (NW) (%)	28.6	16.1	2.0	82.7
Accounting				
Actual surplus-deficit (ASD)	1.03	0.086	0.69	1.38
Debt per capita (DPC) ($)	903.7	626.2	80.3	4,357.6
Audit timing (TIMING) (Days)	125.1	36.1	57.0	229.0
Big six (AUDITOR)	88	53%		

to +54,000. The dependent population averages over 60%, with relatively little variation. The extent to which current spending exceeds revenues (APPROP) indicates substantial deficit spending (averaging 2% of revenue expenditures). Given the balanced budget requirement, this is somewhat surprising. Thirteen (33%) of

the audits are conducted by private accounting firms, rather than district auditors. All are Big Six firms. On average, the time to issue an audit report is 248 days (over eight months).

Panel B of Table 2 presents descriptive data for U.S. cities. The spending relationships are similar to U.K. districts. Capital spending is over 10% of operating spending and standard deviations are large. Population is slightly larger than U.K. cities (because of sample selection) and population density considerably lower. Population change is somewhat higher and with a larger range. Average income (stated in dollars) is considerably lower than in Britain. Non-white population is under 30%. On average, U.S. cities have a 3% surplus, rather than the substantial deficits of U.K. districts. Debt per capita is less than $1,000 (the comparable figure for U.K. districts is £431, about $700). Just over half the cities (53%) are audited by Big Six firms. It takes 125 days (over four months) to issue an audit report, about half the time for British governments.

Correlation matrixes are presented in Table 3. Correlations of dependent variables to independent variables suggest expected relationships. Thus, population is highly correlated to all definitions of spending. A severe multicollinearity problem is present between POP and governmental grants with the U.K., with a correlation above 0.9. Because of this problem (which is corroborated by other tests), grants were eliminated from the model. Several other independent variables are significantly related to spending definitions. No other multicollinearity problems across independent variables are detected.

REGRESSION RESULTS

Regression results are summarized in Tables 4 and 5. Table 4 presents the U.K. models and Table 5 the U.S. results. The GM model is a log model. However, several variables have zero or negative values in the current samples. Consequently, a semi-log model is used for this analysis. Logs are used for the dependent, money-denominated, and skewed variables. Both full and reduced U.K. models are run, where the reduced models include the audit variables.

Regression diagnostics are performed for all regression models. These include an analysis of correlation coefficients and variance inflation factors (multicollinearity); Glejser Test and residual plots (heteroscedasticity); stem and leaf and box plots (normality of residuals); studentized residuals and Cook's D (extreme values). As previously stated, multicollinearity is detected between POP and government grants and grants is eliminated from the model. Heteroscedasticity is detected for the full U.K. NRE model. White's correction is run. The correction does not significantly change the *t*-values for the independent variables

Table 3. Descriptive Statistics (Pearson's Correlations) for Samples of 64 U.K. Local Districts for Fiscal Years-Ended 1995 or 1996 and 165 U.S. Cities With Populations in Excess of 100,000 for Fiscal Year-ended 1996.

Panel A: U.K. Model ($n = 64$)[a]

	CS	POP	PD	INC	PC	DP	APPROP	DEBT	TIMING	AUDITOR
NRE	0.720*	0.942*	0.182	−0.018	0.163	0.114	−0.586*	0.524*	−0.274***	0.148
CS		0.995*	0.311***	0.016	0.163	0.223***	−0.411**	0.798*	−0.234	0.252
POP			0.022	0.009	0.347**	0.035	−0.569*	0.422**	−0.272***	0.110
PD				0.310***	−0.085	0.596*	−0.092	0.386**	−0.182	0.279
INC					−0.129	0.692*	−0.051	−0.089	−0.321***	0.325***
PC						−0.140	−0.103	0.019	0.089	−0.235
DP							−0.062	0.220***	−0.329***	−0.385***
APPROP								−0.104	0.395***	−0.193
DEBT									−0.026	0.156
TIMING										0.485**

Panel B: U.S. model ($n = 165$)[b]

	CO	POP	PD	IPC	PC	NW	ASD	DPC	TIMING	AUDITOR
TCE	0.827*	0.902*	0.472*	−0.005	−0.472*	0.394*	−0.088	0.302*	0.274**	0.168***
CO		0.774*	0.336*	0.093	0.083	0.280**	−0.107	0.333*	0.189***	0.129
POP			0.287**	−0.026	0.188***	0.297*	0.002	0.168***	0.203**	0.149***
PD				−0.029	−0.373*	0.388*	−0.174***	0.168***	0.223***	0.081
IPC					0.107	−0.244**	0.095	0.021	−0.307*	0.101
PC						−0.235**	0.210**	−0.057	−0.133***	0.100
NW							−0.267**	0.320*	0.233**	0.134
ASD								−0.129	0.073	0.004
DPC									0.152***	0.120
TIMING										0.062

Note: TIMING and AUDITOR for U.K. districts are based on $n = 40$.

[a]Where: NRE = Net Revenue Expenditures (£000), CS = Capital Spending (£000), POP = Population, PD = Population Density (population per square mile), INC = Mean Income (£), PC = Population Change%, 1986–1996, DP = Dependent Population (% of population under 18 and over 65), APPROP = Appropriations to (from) Reserves 1996, DEBT = Total Borrowing for 1996, TIMING = Days to Audit Report, and Auditor = 1 if Public Accountant Used.

[b]Where: TCE = Current Expenditures for 1996, CO = Capital Outlays for 1996, POP = Populationf for 1996, PD = Population Density (population per square mile) for 1996, IPC = Income Per Capita for 1989, PC = Population Change%, 1990–1996, NW = Non-white Population% for 1996, ASD = Actual Surplus/Deficit for 1996, DPC = Debt Per Capita for 1996, TIMING = Days to Audit Report, AUDITOR = 1 if Big Six Auditor

*Significant at 0.0001.

**Significant at 0.01.

***Significant at 0.1.

and, therefore, is not presented. Extreme values are found in both U.S. models. Table 5 presents the results after removing these observations. Heteroscedasticity also is found. White's correction does not significantly chance the t-values and therefore not presented. Nine U.K. districts which have no capital spending for the year (four in the reduced model) are deleted from the capital spending model.

Table 4. Empirical Results Using OLS Regression – U.K. Local District Data for Fiscal Year-Ended 1995 or 1996 Coefficients (t-Values).

GM Model	Predicted Sign	Dependent Variables			
		Log of Net Revenue Expenditures (NRE)		Log of Capital Spending (CS)	
		Full	Reducd	Full	Reduced
Intercept		22.4	22.2	18.5	13.5
GM base					
Population (POP)	+	1.61 (14.24)*	1.62 (2.91)*	0.92 (6.43)*	1.07 (5.52)*
Population density (PD)	?	0.05 (0.84)	0.16 (2.09)***	0.11 (1.60)	0.20 (2.39)***
Mean income (INC)	+	−1.66 (−3.41)**	−1.55 (−2.63)***	−1.30 (−2.11)***	−0.84 (−1.18)
Population change (PC)	?	−0.01 (−1.69)***	−0.01 (−1.45)	−0.00 (−0.22)	0.00 (0.04)
Dependent population (DP)	+	−0.10 (−2.06)***	−0.013 (−2.18)***	−0.06 (−1.04)	−0.06 (−0.87)
Accounting related					
Appropriations (APPROP)	+/−	−0.00 (−2.29)***	−0.00 (−1.02)	−0.00 (−1.49)	−0.00 (−0.28)
Total borrowing (DEBT)	+/−			0.05 (1.59)	0.00 (1.29)
Audit timing (TIMING)	+/−		0.00 (−0.48)		0.00 (0.07)
Public accountant (AUDITOR)	+/−		−0.11 (−0.48)		0.14 (0.60)
F-value		76.80*	41.53*	23.48*	21.18*
Adjusted R^2		0.878	0.893	0.745	0.838
Sample size		64	40	55	36

*Significant at 0.0001.
**Significant at 0.01.
***Significant at 0.1.

Table 5. Empirical Results Using OLS Regression – U.S. Cities With Populations in Excess of 100,000 for Fiscal Year-Ended 1996 Coefficients (t-Values).

GM Model	Predicted Sign	Dependent Variables	
		Log of Total Current Expenditures (TCE)	Log of Capital Outlays (CO)
Intercept		5.9	3.8
GM base			
Population (POP)	+	1.21 (17.39)*	1.28 (9.40)*
Population density (PD)	?	0.02 (0.39)	−0.10 (−1.11)
Income per capita (IPC)	+	0.00 (2.98)**	0.69 (2.77)**
Population change (PC)	?	−0.01 (−4.63)*	−0.00 (−1.42)
Non-white population (NW)	+	−0.00 (−0.36)	−0.00 (−1.69)***
Accounting related			
Actual surplus-deficit (ASD)	+/−	−0.86 (−2.57)***	−1.19 (−1.83)***
Debt per capita (DPC)	+/−		0.00 (4.16)*
Audit timing (TIMING)	+/−	0.00 (1.92)***	−0.00 (−0.95)
Big six (AUDITOR)	+/−	0.17 (2.80)**	0.10 (0.86)
F-value		132.64*	31.81*
Adjusted R^2		0.867	0.640
Sample size		163	157

*Significant at 0.0001.
**Significant at 0.01.
***Significant at 0.1.

The first model in Table 4 tests the net revenue expenditures full model using the U.K. sample and has an adjusted R^2 of 88%, significant at 0.0001. Five of six GM base model independent variables are significant. The coefficient for POP at 1.6 indicates that public spending behaves as a quasi-public good. This is much higher than the population coefficient for U.S. governments. The negative coefficients for mean income is surprising, indicating that relative spending declines as incomes increase. Public choice theory predicts that public spending rises with income levels (which is the finding with the U.S. sample). However, much of the revenue from the central government is distributed on the basis of a regression model driven by quantified "need." Therefore, the more demonstrated public need (usually associated with lower incomes), the larger the relative central government grant. Population change has a negative sign, suggesting that spending doesn't keep up with changing population (in both directions), consistent with U.S. results. Dependent population (under 18 and over 65) has an unexpected negative sign and is significant. This suggests that spending declines as the percent of dependent population rises.[7]

The negative sign for APPROP indicates that spending is higher as the deficit increases, which is expected if control rather than bureaucrats dominates the process. The U.S. model has the same result. The implication is that this is an effective control mechanism. Giroux and Shields (1993) have negative signs on similar variables, associated with strategic behavior of bureaucrats (e.g. building financial slack in the original budget).

The reduced NRE model has similar results. Adjusted R^2 is 89% and four of five base model variables are significant. However, population density is significant and population change is not. None of the accounting-related variables are significant. This is disappointing, since no evidence is provided for the effectiveness for government spending efficiency. On the other hand, it is not surprising since Parliament maintains financial controls of the local districts, which has fewer incentives than local elected officials to contain the local bureaucracy.[8]

The capital spending full model has an adjusted R^2 of 75%, also significant at 0.0001. However, only two independent variables are significant, population and mean income. Mean income has an unexpected negative sign (as with the revenues expenditures model). The accounting variables are not significant. The reduced model results are similar. Adjusted R^2 is 84% and only two base model variables (population and population density) are significant. Consequently, the GM model is not descriptive of capital outlays in the U.K. (the U.S. model in contrast is more descriptive).

The first model in Table 5 tests total current expenditures for U.S. cities. The model has an adjusted R^2 of 87%, significant at 0.0001. Three of five independent base model variables are significant, all with expected signs. The negative sign for population change is similar to U.K. model results, indicating operating spending lags changes in population. The three accounting-related variables are significant. Actual surplus-deficit is negative and significant, consistent with the similar variable for U.K. districts, but opposite Giroux and Shields (1993) for 1983 data. The positive sign for audit timing suggests greater financial complexity related to higher spending levels. A Big Six audit is associated with higher current spending, the same result as Giroux and Shields (1993).

The capital outlays model has an adjusted R^2 of 64%, significant at 0.0001, and five of nine independent variables are significant. Non-white population has an unexpected negative sign, similar to the dependent population variable in the U.K. sample. This suggests a consistent conflict with public choice theory. A possible explanation is the shift since 1980 to conservative governments in both countries. Welfare spending is reduced for governments investigated.[9] Actual surplus-deficit is negative and significant, similar to the U.K. net revenue expenditures results, suggesting that control dominates the spending process and opposite Giroux and Shields (1993). Debt per capita is positive and significant, suggesting that

bureaucrats dominate the process; i.e. increasing public output by borrowing long-term. This result is the same as Giroux and Shields (1993). Neither audit variable is significant.

The U.S. results are similar to previous studies, such as Giroux and Shields (1993). Here the model is descriptive and provides some support for the importance of accounting practices in limiting government spending levels based on control and monitoring functions. The results for U.K. local districts are mixed. The base model is reasonably descriptive; however, mean income and dependent population have unexpected negative signs. These can be explained, in part, by unique circumstances in Britain. This suggests that institutions and public choice relationships differ across the two countries. The only significant U.K. accounting-related variable is appropriations in the full NRE model, suggesting that accounting (at least as tested here) may not provide effective controls. This is not unexpected, since the central government provides resources and directions for spending funds.[10]

CONCLUSIONS

The Gonzalez and Mehay (1985) model of public choice works modestly well in describing the level of both British and American public expenditures. Results are somewhat similar across the two countries. A key point is that this model can be compared across countries with reasonable success. However, there are differences across the models and also when compared to the earlier study of Giroux and Shields (1993). Differences suggest that public policy relationships may differ across countries, an important consideration for further cross-country analyses. These differences are not well understood. There are structural differences between the U.S. and U.K. and incentives may differ between elected officials and bureaucrats across the countries. The role of Parliament for British local districts is much different (e.g. they exert more direct control) than the role of the federal and state governments over U.S. cities. The development of public choice empirical models and the effectiveness of accounting and auditing controls may differ somewhat across countries.

There are substantial limitations to this study. First is the model comparison across countries. The U.K. model differs from both the original GM model and the current U.S. model. Although the models are comparative, there are no direct statistical tests of differences. The local governments are not identical and the model development differs, suggesting possible difficulties with statistical comparisons. The tests represent limited samples and only a single point in time. There may be structural changes over time that have policy implications. For example, % of non-white population is positive and significant in Giroux and Shields (1993)

based on 1983 data, but negative in the current analysis. Surplus/deficit variables are consistently negative for both U.K. and U.S. samples, but positive in Giroux and Shields (1993). Finally, only limited testing of control and monitoring factors has been conducted.

NOTES

1. Public output is defined as the goods and service provided by a government unit, usually measured by total expenditures. This is sometimes called public goods, but in the GM framework "publicness" is measured from "pure public goods" to "pure private goods," associated with the coefficient of population rather than a measure of expenditure levels.

2. Niskanen (1971) predicts that the utility of the bureaucrat is based on maximizing the budget. Migue and Belanger (1974) assume that the bureaucrat is concerned with managerial discretion and it's the discretionary budget being maximized. The GM model is based on the Migue-Belanger perspective.

3. An alternative to accounting monitoring and control is legislative agenda control as proposed by Bendor et al. (1985) and Miller and Moe (1983). In the Niskanen framework (1971), a bureau exchanges a lump-sum budget for a promised amount of output. However, the legislature sets the agenda and can demand certain price-quantity relationships. This agenda lets the authority of the legislature dominate and, potentially, overcome the information monopoly of the bureaucracy. The Bendor et al. (1985) model is based on the U.S. federal government and it is not clear that it will work effectively at the local level.

4. Most municipal debt in the U.S. is exempt from income tax and pays a lower interest rate than commercial counterparts. Most long-term local government debt in the U.K. is borrowed from the Public Works Loan Board, a government agency that borrows from the financial markets and then lends to local governments. About 10% of U.K. local debt comes from bank borrowing.

5. Most geographic areas in the U.K. have two local governments ("two-tier"), one at the city or town level and one at the county level. This is similar to U.S. governments. A unitary district is a geographic area in which there is only one local government ("single-tier"), essentially abolishing one level of government.

6. All private accounting firms in the U.K. sample are Big Six. The AUDITOR dummy variable attempts to measure the impact of differences (implicitly related to audit quality) between private firms and District Auditors.

7. U.K. policy experts contacted expected this finding, because of a policy shift by conservative governments toward the private sector, especially for seniors. Also, the National Health Service pays for medical costs, not the local districts.

8. Only a small percentage of revenue is under local control in the form of a local property tax. The central government has the legal authority to cap the size of local revenues. The same regression model used to distribute grants, determines the "standard spending assessment" for each authority. If the local district revenue is greater than the standard assessment, the central government can issue a cap and limit local spending.

9. Other governments may pick up some of the slack. School district spending has increased, as has public medical payments. However, these are associated with Medicare

and Medicaid in the U.S. (federal and state programs) and the National Health Service in Britain.

10. Also, the versions of the GM model are not identical. For example, the auditor variables test different things. The Big Six/non-Big Six variable is a common "brand name" or quality measure. However, British local audits are conducted either by District Auditors or Big Six firms. This dummy tests for differences in these two groups.

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