LOCAL PUBLIC UTILITIES' PROFITS AND MUNICIPAL EXPENSES IN GERMANY: AN EMPIRICAL ANALYSIS

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INTRODUCTION

Based on our empirical findings in previous work (Haug and Nerré, 2006) one can state that German cities and municipalities have faced rising expenses over the last years. According to Karrenberg and Münstermann (2005, p. 5), the only way for German local governments to avoid budgetary bottlenecks has been to postpone infrastructure investments and increase short-term borrowing. We have been able to show, though, that German municipalities have tried to overcome these bottlenecks also by additionally increasing local public utilities' profits (Haug and Nerré, 2006).

As for existing literature, there has been no influential empirical work on revenue diversification in Germany. Some U.S. authors have dealt with this topic more intensively, but mainly focused on the diversification of tax revenues. Carroll (2005) examines factors leading to a diversification of U.S. local governments' tax revenue portfolios over 15 years from 1977-1992. Pagano and Hoene (2005) investigate the revenue structure (including state aid) of the 40 biggest U.S. cities over the same period as Carroll. Outside the United States (e.g., Rühling, 2005) shows (negligible) substitution effects on property tax revenues through fiscal transfers in Peru. Neither of the above-mentioned studies takes user charges or revenues from municipal enterprises into account. We try to fill this gap with our data set.

Our paper is structured as follows. First, some empirical facts on German local public utility profits will be presented. Then, we derive a per capita expenditure function from several positive theories of public choice for the estimation of interdependencies between local utility profits and local government expenses. Finally, some conclusions will be drawn and an outlook on future research work will be given.

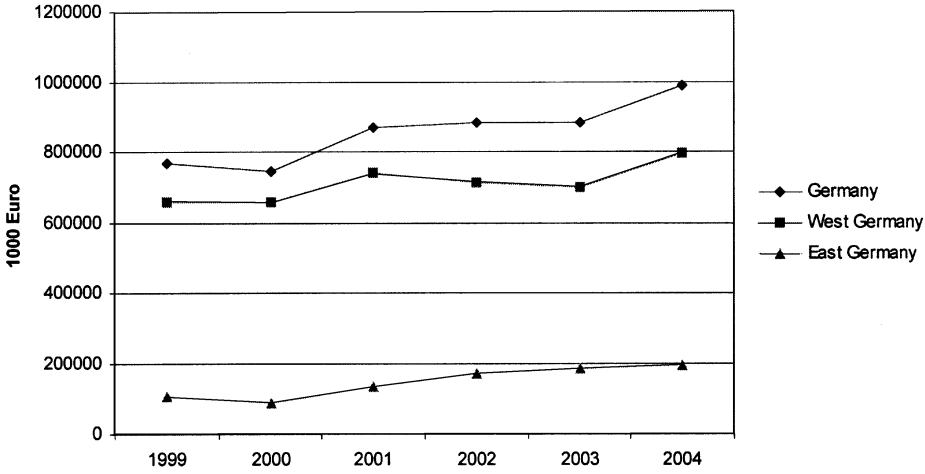
INCREASING PROFITABILITY OF LOCAL PUBLIC UTILITIES IN GERMANY

Besides redistribution of local tax revenues, for vote-maximizing politicians it is attractive and necessary to find alternative ways of funding that minimize the resistance of voters. We have already mentioned that in the third section we discuss transferring profits from local public enterprises to other loss-making local services are a very attractive way to reduce the resistance of citizens. To find out if this hypothesis can be confirmed for German local governments, Figure 1 shows how the aggregated profits of selected utilities have developed over time. Thirty-six cities, mostly large cities (over 200,000 inhabitants) are included, but appropriate data was not available for all of them.

The aggregated profit curve in Figure 1 indicates a significant increase in both West and East-German utilities' profits between 1999 and 2004 although this trend might cease in the future. The increase in profits of local public utilities made in the energy sector is remarkable for three reasons. First of all, liberalization of German electricity (and to some extent gas) markets since 1998 should have reduced profits in these sectors. Second, an increasing number of private national and international utility companies hold shares in local public utilities which reduces disposable profits for local governments. Third, electricity prices have increased due to increasing tax rates on electric power since 1999 as a part of the German "ecological tax reform."

There might be several explanations for the more or less steady increase in (nominal) profits, especially in East Germany. First, even without private shareholders, public enterprises (especially in the former GDR) had to increase their efficiency, for example, by drastic cuts in labor force: the Stadtwerke Leipzig reduced their staff from 2,280 in 1993 to 1,175 in 2004 despite annual turnover rising from 306 million Euro in 1993 to 670 million in 2004.[1] The second and more popular way was the extension of existing markets and the entering of new markets. As a consequence of the liberalization of the German electricity markets the local public providers tried to acquire new customers outside the city boundaries to compensate for loosing customers within the city area. Furthermore, they became active in other fields such as wholesale trade of electricity, telecommu-

Figure 1: **Aggregated Profits of Selected German Local Public Utilities 1999-2004**



Number of enterprises included: 36 (West Germany: 26, East Germany: 10)

Source: Authors' calculation based on annual reports.

nications, consulting, energy-related services, or asset management. In general, they extended their activities on a national and international level. To get an impression of their multifarious business areas, the interested reader may turn to the annual reports of the "local" public utilities in Leipzig or Mannheim.[2]

ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN LOCAL GOVERNMENTS' EXPENDITURES AND UTILITY PROFITS

The descriptive results in the fourth section indicate that the profitability of German local public utilities has increased over the last 10 years, especially in East Germany. Now the following questions arise: are utility profits and local expenditures totally independent? do the local public utilities just have to cover any financial requirements fixed by the local governments? or, are utility profits and local public expenditures mutually interdependent?

Estimation Procedure

For the empirical analysis we estimate an aggregated municipal expenditure function to model the possible interdependence between local governments' expenditures and utility profits. The model is based on the ideas of Deno and Mehay (1988); but, for specific reasons, we use the modified OLS-approach for panel data instead of their logit model. Furthermore, certain variables that are not relevant for German municipalities are skipped and others included instead. Local expenditures are determined by demand and supply factors. Unfortunately, no comprehensive theory including all determinants of public spending exists and it is beyond the scope of this paper to develop such a theory. The public choice literature of the past decades offers a number of theories that all focus on special determinants of governmental spending but none of them covers them all. Therefore, according to the proceedings in other studies such as Henrekson (1988) or Deno and Mehay (1988), we choose the variables to be integrated in our regression functions from several partial models in the literature.

For the demand side, we refer to a modified version of the median-voter model. Borcherding and Deacon (1972) and Bergstrom and Goodman (1973) suggest the following function assuming constant elasticities:

$$\textbf{(1)} \quad G^D = At^{\theta} p^{\theta} N^{\phi(1+\theta)} Y^{\varepsilon} \prod_i m_i^{\beta_i},$$

G^D represents the demand for a composite public good in quantities of a composite private good. A is a constant, t represents the median voter's tax share (net of per capita state and federal government payments), that is, the fraction of the cost of public expenditures, N the number of inhabitants, Y the income of the median voter. Political or social parameters influencing the demand for local public goods are included in the vector m. The model assumes constant price elasticity θ, income elasticity ε, social/political elasticity β and a constant degree of publicness of the relevant good ϕ.

Shift variables that are commonly included are age structure, population density, the number of welfare recipients (increasing demand for certain goods), the degree of unionization or other indicators for a significant presence of interest groups in the municipality. Furthermore, local differences in fiscal illusion of the citizens should be integrated (e.g., by the complexity of the structure of local public enterprises and departments). Finally, as we have already mentioned, the portion of tax revenues from the local business tax may indicate how much of the tax revenues have been raised from nonvoters.

The implicit assumption of the original median voter model that governmental expenses are simply a reaction to market failure is surely not accepted any longer by most authors. It would be naïve to think that benevolent politicians solely provided goods and services that are not or insufficiently supplied by private providers. Therefore, the extent of public expenditures can also be explained by vote-maximizing and rent-seeking activities of local politicians and bureaucrats, respectively. For simplicity, one could assume the following general supply function of local public goods:

$$\textbf{(2)} \quad G^S = B\prod_i v_i^{\delta_i}.$$

B is a constant and v_i the ith determinant of the quantity G^S supplied. One of the main determinants of supply is bureaucrats' rent-seeking activities. According to Niskanen (1971), bureaucrats have incentives to act as budget maximizers. In case they were also resident voters, they would not be interested in reducing local public output. Therefore, the number of local public employees per inhabitant is used as an indicator for the bureaucrats' influence on public spending.

The availability of financial resources may also affect public spending decisions. It seems reasonable to assume that local politicians and bureaucrats have no problems with spending any given amount of money, especially from sources that do not burden their voters. Revenues of that kind include free and earmarked transfer payments from the federal and state level or the European Union (e.g., ERP). Another indicator for the scarcity of revenues are the debts per capita or alternatively the share of interest payments per capita in the expenditures.

A special financial resource is the local public utility profits, although the expenditures and revenues of those utilities are generally not included in the core budget. Instead, their profits are transferred (to avoid local business tax and national corporation tax) to cover the losses of public transportation. The local public transportation firms are also separate organizational entities with their own budgets and accounting systems not included in the local governments' core budget. We have tried to show in our previous work (Haug and Nerré, 2006) that for German local governments other sources of revenues are restricted, or can not be influenced directly by the single municipality (redistribution of local business tax revenues), or are not used in order to avoid additional burdens on the resident voters. Thus, local public utilities' profits seem to be the only endogenous source of revenues for German local governments.

Most empirical studies about local government spending – not only for the United States – seem to assume implicitly that local governments are completely free in their spending decisions. In fact, in most countries severe restrictions on spending exist and the local governments have to carry out a large number of tasks on behalf of the national or regional governments. In Germany, local governments do receive only insufficient financial compensations from the higher levels of government. Unfortunately, the exact share of expenditures resulting from tasks carried out for higher levels of government cannot be estimated from the budget. Instead, the share of expenditures for cultural and leisure activities, which are definitely non-obligatory expenditures, could be used for empirical purposes. A positive sign of the coefficient in the estimated expenditure equation would indicate that total expenditures are not as exogenous for municipalities as they always declare.

To complete our list of potential determinants of local public spending, ideologies and regional differences in attitudes towards government spending have to be taken into account. First, it is quite common to assume that communities governed by socialist parties have higher expenditures than those with a majority of conservative or liberal parties. Second, people from different regions may value local public spending differently. On the one hand, residents of the southwest of Germany are said to be very economical – or even stingy - in their private spending decisions and that they also would expect this from their local politicians. On the other hand, people from East Germany have been used to 40 years of a political system that provides total public care "from the cradle to the grave" and, therefore, may have developed a more distinct sense of entitlement than the West Germans. These ideological and social determinants are included into the expenditure function by ideology and regional dummies.

In reality, neither the quantity of demand nor the supply quantities can be observed. The only data available is local governments' expenditures. Furthermore, public output is not sold on markets and therefore, no price mechanism exists to coordinate supply and demand for public services. Consequently, no equilibrium condition exists to obtain two reduced-form equations for quantity and price as for the usual demand-supply models. Thus, according to the common method proposed in the literature, we integrate demand and supply factors into one expenditure equation combining demand- and supply-related determinants of local public expenditures.

(3) $$E_i = F(G_i^S, G_i^D, PU_i)$$

To compare municipalities of different size, most components of the function have to be expressed in per capita terms. The public utility profits *PU* as well as the other supply and demand factors included are considered exogenous for the local government, at least in the short run.

The following equation will be used for the estimation of the expenditure function (average expenditures per inhabitant):

(4) $$e_{it} = \acute{a}_0 + \acute{a}_1 \cdot in_{it} + \acute{a}_2 \cdot pd_{it} + \acute{a}_3 \cdot tr_{it} + \acute{a}_4 \cdot wr_{it} + \acute{a}_5 \cdot d_{it} + \alpha_6 \cdot l_{it} + \alpha_7 \cdot tt_{it} + \acute{a}_8 \cdot s_{it} + \acute{a}_9 \cdot r_i + \acute{a}_{10} \cdot pu_{it} + u_{it} + v_i.$$

Symbols:
e: current expenditures
in: average household income
pd: population density
tr: transfers received by the local government
wr: number of welfare recipients
d: debts
l: number of municipal employees
tt: portion of tax revenues resulting from net trade tax revenues
s: percentage of members of left-wing parties in the city council
r: regional dummy East Germany
pu: portion of the utility profit that can be attributed to the relevant city
u: group and time independent component of the disturbance term
v*:* time invariant group-specific component of the disturbance term

For practical reasons we prefer a linear function instead of the functions described in equations (1) and (2). First, a loglinear model implies that expenditures would be zero if only one of the independent variables was zero. Second, it would prevent us from integrating cities without own public utilities (and zero profits) into the sample because the logarithm of 0 is not defined.

Several potential variables that have been described before either have to be skipped due to lack of data (expenses on culture and leisure activities, tax prices, indicators for fiscal illusion) or have to be replaced by approximations (average household income instead of the median voter income).

Although the popularity of dynamic models has increased for investigating local public spending, see for example the studies of Holtz-Eakin, Newey, and Rosen (1989) for U.S. data or Dahlberg and Johansson (2000) for Swedish municipalities, we prefer the panel data perspective. As Dahlberg and Johannson point out, the general problem of time-series and dynamic panel data models is their rather atheoretical approach: it is hard to find any theoretical arguments to explain the lags and intertemporal linkages between the variables. Furthermore, their results turned out to be very sensitive to changes in the period of study.

Consequently, according to equation (4) we estimate the expenditure function as a single-equation panel data model using the GLS random effects approach (REM) with i = 1, 2,…I groups

and $t = 1, 2,\ldots T$ periods. Therefore, we are able to include some time-invariant or approximately time-invariant variables (at least in the short run) such as population density, regional dummies, or other social, political, or demographic variables.

Description of the Sample

At the local level, Germany is divided into about 323 counties *(Landkreise)* and 114[3] cities not belonging to a county *(kreisfreie Städte)*.We use sample data for 49 German cities not belonging to a county that cover a period of three years from 2001 to 2003. The counties are neglected because their structure of tasks, revenues, and expenditures is different from single municipalities. The approximately 12,000 municipalities belonging to a county (*kreisangehörige Städte und Gemeinden*) had to be left out due to missing data. The necessary financial data for local governments or the data about public employees, population, age structure, or household incomes were easily available and could be extracted from several official publications of the Federal Statistical Office or the German Association of Cities and Towns (*Deutscher Städtetag*). The annual financial statements of the relevant local utilities turned out to be the bottleneck of our study. Unfortunately, the German Association of Local Public Enterprises *(Verband Kommunaler Unternehmen)* stopped their comprehensive database some years ago and our application for access to the official statistics provided by the federal and state statistical offices containing the financial statements of German public enterprises has not been decided yet. At last, we were able to set up a sample for 49 cities, 3 of them without local public utilities, 1 of them selling them in 2002, and the remaining 45 with local public utilities. In at least 80 percent of these local public utilities the city held more than 50 percent of the shares. In about 20 percent of the cases more than 50 percent of the shares are held by external owners, private or public. In about 10 percent of the sample utilities, private owners – usually large energy providers – held a majority of the capital. Table 1 shows that bigger cities, especially cities with more than 200,000 inhabitants, might be overrepresented in our sample. This is mainly due to the fact that local public utilities in big cities are usually large enough to be subject to the German company disclosure law (*Publizitätsgesetz*) and therefore are obliged to publish their financial statements.

The descriptive statistics of the data used for the estimation are shown in Table 2.

Estimation Results

The results shown in Table 3 confirm to some extent our hypothesis that some positive relationship between local public utility profits and municipal expenditures exists.

The second to the fifth column from the left contain the results of the standard GLS random-effects procedure for panel data. Apart from those for population density and welfare most of the variables are statistically insignificant at the 95 percent level. The utility profits are significant at the 90 percent level. Some variables included in Table 2 have been excluded from the estimation because inclusion either did not increase the goodness of fit measure or involved serious correlation problems with other variables (net trade tax revenues, debt, and transfers received).

The relatively small R^2 suggests that there might be other relevant determinants of local spending

Table 1
Representativeness of the Sample

	Total population[a]		*Sample*	
Inhabitants in 2003	*Number of cities*	*%*	*Number of cities*	*%*
< 50,000	17	14,9%	4	8,2%
50,000-100,000	28	24,6%	4	8,2%
100,001-200,000	33	28,9%	12	24,5%
200,001-500,000	27	23,7%	21	42,9%
> 500,000	9	7,9%	8	16,3%
Total	114	100,0%	49	100,0%

[a]All German cities not belonging to a county (*kreisfreie Städte*) excluding Berlin, Hamburg, and Bremen.
Source: Landesamt für Datenverarbeitung und Statistik NRW (2006) and authors' calculations.

Table 2
Descriptive Statistics

	Unit	*Mean*	*Standard deviation*	*Median*	*Minimum*	*Maximum*	*N*
Current expenditure	1000 Euro per inhabitant	2.14384	0.494546	2.06019	1.38034	4.08113	147
Utility profits	1000 Euro per inhabitant	0.0826666	0.0527151	0.0763294	0	0.298677	147
Portion of net trade tax revenues	Net trade tax revenues : total net tax revenues	0.345697	0.0865238	0.34186	0.152817	0.692419	147
Population density	Inhabitants per km^2	1677.86	684.654	1534.27	458.661	3389.63	147
Average household income	1000 Euro	16.3681	1.85268	16.442	12.927	20.602	147
Socialist influence	% of members of left-wing parties in the city council	0.394785	0.099824	0.394366	0.15	0.641509	147
Net trade tax revenues	1000 Euro per inhabitant	0.27565	0.197844	0.227836	0.0470142	1.22755	147
Municipal debt	1000 Euro per inhabitant	1.45904	0.604392	1.35696	0.194257	2.92633	147
Municipal employees	Number per inhabitant	0.0239728	0.00716518	0.0236701	0.0105597	0.0442278	147
Welfare recipients	Number per inhabitant	0.0474267	0.0166971	0.0457489	0.0213796	0.100741	147
Dummy East Germany	1: City located in East Germany, 0: otherwise	0.22449	0.418672	0	0	1	147
Transfers received	1000 Euro per inhabitant	0.429657	0.188574	0.425282	0.0485044	0.856848	147

Source: Landesamt für Datenverarbeitung und Statistik NRW (2006), Association of German Cities (several years), annual reports and authors' calculations.

Table 3
Estimated Local Expenditure Function
(One-Way Random Effects Model and Hausman Taylor IV)

Dependent variable: current expenditure	*GLS/RE*				*HT/IV-GLS*			
	Coefficient	*Standard error*	*Coeff./ standard err.*	*P-value*	*Coefficient*	*Standard error*	*Coeff./ standard err.*	*P-value*
					time varying variables uncorrelated with v_i			
Population density	0.0002387	0.000867646	2.751	0.0059	0.00037324	0.00011524	3.239	0.0012
Socialist influence	-0.0663771	0.51714105	-0.128	0.8979	-0.68695843	0.62556662	-1.098	0.2721
Profits per inhabitant	0.826144	0.47988769	1.722	0.0852	1.00366626	0.48912095	2.052	0.0402
Portion of net trade tax revenues	0.0587962	0.31902522	0.184	0.8538	-0.01613331	0.32260667	-0.050	0.9601
					time varying variables assumed correlated with v_i			
Average household income	0.00014363	0.000340694	0.422	0.6733	0.06721153	0.04542513	1.480	0.1390
Municipal employees	1.11502	4.39827985	0.254	0.7999	1.68712468	4.45257385	0.379	0.7048
Welfare recipients	9.2508	2.77926568	3.329	0.0009	10.8493815	3.06864426	3.536	0.0004
					time invariant variables assumed correlated with v_i			
Dummy East Germany	-0.0803121	0.17194958	-0.467	0.6405	0.5608504	0.39328413	1.426	0.1538
					time invariant variables uncorrelated with v_i			
Constant	0.998397	0.6985685	1.429	0.1529	-0.06962299	0.93059526	-0.075	0.9404
N = 147	i = 1,2,…49	t = 2001, 2002, 2003						
	R^2= 0.409095	Breusch and Pagan LM test statistic: 92.87						

decisions not included in the regression. Another shortcoming of our estimation is the value of the Hausman test statistic (neglecting the time invariant East Germany dummy) rejecting one basic assumption of the random-effects model: unobserved group-specific effects v_i included in the disturbance term are uncorrelated with the regressors. But the fixed-effects model turned out to be no suitable alternative. The additional 49 group dummies reduced the degrees of freedom and involved significant multi-collinearity problems.

To overcome the problems of the standard REM, we applied the instrumental variable GLS approach suggested by Hausman and Taylor (1981). The time varying variables were grouped into variables correlated with the group-specific component of the disturbance term and variables uncorrelated with it by regressing them one by one with the dependent variable and applying the Hausman specification test to the resulting fixed- and random-effects estimations. The East Germany dummy was assumed correlated with v_i. The results shown in Table 3 confirm the positive and statistically significant effect of population density, utility profits and number of welfare recipients on current local expenditures though the coefficient value for population density is rather negligible. Oddly enough, the number of municipal employees do not influence the current expenditures, although the personnel expenses are a significant part of the current expenditures and correlate with the number of employees. The effect of regional or political characteristics, the average household income, or the relative importance of trade tax revenues turned out to be insignificant.

CONCLUSIONS AND OUTLOOK

Our estimation results indicate a positive relationship between current expenditures and disposable local public utility profits. Hence, one could conclude that the cities in the sample have used the additional revenues to cover their rising expenses, burdening inhabitants as well as "outsiders" with implicit taxes. The negative welfare effects caused by the excess burdens as well as the negative distributive effects might be considerable.

But one has to keep in mind that the results of the estimation are not totally robust. This is probably a result of some shortcomings in our data set. As Reidenbach (2006) correctly points out, the official data does not show the complete picture, at all. In fact, German municipalities have been (materially or only formally) outsourcing activities over the last decade in huge proportions. Privatization included turning former municipal departments into municipally owned companies under private law. Consequently, although the relevant expenditures still exist and have to be borne by the municipalities, they do not show up in the core budget nor the financial statistics. Neither do their assets nor their labor force. Thus, for example, the share of infrastructure investment showing up in the official public budget makes up only about one-half of total infrastructure investment in a municipality.

Unfortunately, the para-fiscal data is not publicly provided by the statistical offices and availability depends on the goodwill of the individual city or municipality. Our data set therefore lacks this important information, which has not been examined by any other work to our knowledge. We hope to close this empirical gap in future work.

The only way to reduce incentives of local politicians to camouflage real costs of local public services and to choose methods of financing according to minimum resistance instead of efficiency considerations would be a fundamental reform of the local revenue system. Although, it would be beyond the scope of this paper to discuss current German reform proposals. Our investigation also revealed that a reform of the German public statistic is urgently needed. The reform should aim at integrating the official budgets as well as the financial statements of public enterprises into one comprehensive accounting system.[4] This seems to be the only way to display some (approximately) true picture of the financial situation of the municipalities.

Notes

[1] See Stadt Leipzig (1994, 2004) for further information.

[2] See Stadtwerke Leipzig (2004) or MVV Energie AG (1999, 2004).

[3] Excluding the city states Berlin, Bremen and Hamburg and including Göttingen and Hannover.

[4] In 2003 the conference of the ministers of the interior passed a resolution, which requested the German states to reform their municipal budget laws. Since then, most German states have passed appropriate laws and initiated projects to transform the former cash-flow based municipal accounting systems into resource-based, double-entry systems. First results will be expected at the end of this decade.

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