

Haug, Peter

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Shadow Budgets, Fiscal Illusion and Municipal Spending: The Case of Germany

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Autor: *Dr. Peter Haug*

Forschungsabteilung Stadtökonomik

E-Mail: Peter.Haug@iwh-halle.de

Telefon: (0345) 77 53-409

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Prof. Dr. Dr. h. c. Ulrich Blum (Präsident), Dr. Hubert Gabrisch (Forschungsdirektor)

Das IWH ist Mitglied der Leibniz-Gemeinschaft

Hausanschrift: Kleine Märkerstraße 8, 06108 Halle (Saale)

Postanschrift: Postfach 11 03 61, 06017 Halle (Saale)

Telefon: (0345) 77 53-60

Telefax: (0345) 77 53-8 20

Internetadresse: <http://www.iwh-halle.de>

Shadow Budgets, Fiscal Illusion and Municipal Spending: The Case of Germany¹

Abstract

The paper investigates the existence of fiscal illusion in German municipalities with special focus on the revenues from local public enterprises. These shadow budgets tend to increase the misperception of municipal tax prices and seem to have been neglected in the literature. Therefore, an aggregated expenditure function has been estimated for all German independent cities applying an “integrated budget” approach, which means that revenues and expenditures of the core budget and the local public enterprises are combined to one single municipal budget. The estimation results suggest that a higher relative share of local public enterprise revenues might increase total per capita spending as well as spending for non-obligatory municipal goods and services. Empirical evidence for other sources of fiscal illusion is mixed but some indications for debt illusion, renter illusion or the flypaper effect could be found.

JEL classification: H72, L32, H71

Keywords: fiscal illusion, municipal enterprises, panel data regression

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Zusammenfassung

Der Beitrag untersucht die Existenz von fiskalischer Illusion auf der Ebene der deutschen Gemeinden, und zwar mit besonderem Schwerpunkt auf den Einnahmen kommunaler Unternehmen. Diese Nebenhaushalte begünstigen unter Umständen die Fehlwahrnehmung der kommunalen Steuerpreise, ein Effekt der bisher in der Literatur eher vernachlässigt wurde. Zur Überprüfung dieser Hypothese wurde eine aggregierte Ausgabenfunktion für alle kreisfreien deutschen Städte geschätzt. Dabei kam ein „integrierter Haushaltsansatz“ zum Einsatz, d. h. die Einnahmen und Ausgaben des Kernhaushalts sowie der kommunalen Unternehmen wurden in einem einzigen Gemeindehaushalt zusammengefasst. Die Schätzergebnisse deuten darauf hin, dass ein höherer Anteil von Erträgen aus kommunalen Unternehmen sowohl die gesamten städtischen Ausgaben pro Einwohner als auch die Ausgaben für freiwillige Selbstverwaltungsaufgaben erhöht. Die empirischen Befunde für andere Arten der Fiskalillusion sind uneinheitlich, doch konnten zumindest einige Anzeichen für Schuldenillusion, Mieterillusion und den so genannten „Fliegenfängereffekt“ gefunden werden.

JEL-Klassifizierung: H72, L32, H71

Schlüsselbegriffe: Fiskalillusion, Kommunale Unternehmen, Paneldatenregression

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1 Introduction

There has been a long and still ongoing discussion in the literature about the existence and the empirical verification of fiscal illusion. The voluminous literature seems to have focused on the misperception of tax burdens (e.g. the Mill hypothesis) or the flypaper effect. For useful surveys of the earlier but still relevant literature see for example Oates (1988) or Dollery and Worthington (1996).

Other methods of making revenues or expenses less visible to the voters and taxpayers have been stressed less in the literature – such as the establishment of “shadow” budgets at the local government level. This mainly refers to the possibility of shifting revenues, expenses and debt from the core budget to local public enterprises and therefore, veiling the actual extent of the local governments’ financial transactions. This may also have stimulating effects on expenditures because it is easier for the vote-maximizing local politicians to increase debts or to cross-subsidize certain public services. Furthermore, public utilities, but also other local public enterprises facilitate some kind of “tax-exporting” because they often provide services to customers outside the boundaries of their municipality. Especially the effects of public utility profits on local government spending have been investigated by Di Lorenzo (1982), Deno and Mehay (1982), Stumm (2000) or Haug and Nerré (2008). Dollery and Worthington (1999) included in their regression analysis a dummy variable indicating the reliance on public utility revenue among other potential indicators for fiscal illusion in Australian municipalities.

This paper presents a systematic analysis of the effects of “shadow budgets” and several other causes of fiscal illusion on local public spending for German cities, similar to that of Dollery and Worthington (1999). This is the first empirical study of this kind for Germany – at least to the author’s knowledge – especially with respect to what might be called the “integrated budget approach”. The expenditures and revenues both of the local core budget and of the local municipally-owned enterprises are taken into account. This is necessary because especially in larger cities local public enterprises (public utilities, municipal housing companies, public transport companies, theatres, opera houses etc.) of considerable size exist. According to Reidenbach (2006), these units sometimes carry out up to 50% of a city’s total public investment.

The number of empirical studies dealing with fiscal illusion problems in Germany is very limited. Nam (2005) examined the effects of fiscal illusion on economic development for Germany and South Korea. Empirical studies considering the German local

government level focused on local tax competition (e.g. Büttner 2003) or effects of fiscal equalization systems. Other studies deal with the efficiency analysis of local public service provision in Germany (Geys, Heinemann and Kalb 2008 or Kalb 2008). All of these empirical studies for the German local level include only the core budget and neglect the expenditures and revenues of local public enterprises.

This paper is not intended to proof or reject the adequacy of the popular median voter model for German local governments. In this context it seems to be of minor importance that the key assumptions of this model – the median voter’s vote is decisive and the median voter is also the voter with the median household income – have been repeatedly challenged in the literature (e.g. Epple and Romano 1996, Aronson and Wikstrom 1996, Fletcher and Kenny 2008, Brunner and Ross 2009). In the German case, the main obstacle for the application of the median voter model at the local level is that actually no counterpart to the property taxes in several Anglo-Saxon countries or the local income taxes in the Scandinavian countries or in Switzerland exists. Thus, there is no local tax which could be interpreted as a tax price for specific or bundles of different local public goods. Consequently, the regression equation used in the empirical section of this paper represents rather an expenditure function assembling demand and supply determinants of municipal spending than a demand function for local public services. Despite of the problems applying the median voter model to German local governments this does not mean that there is no connection between voter preferences and public expenditures.

The focus of this paper lies on the following main research questions: 1) What effects has the relative importance of shadow or secondary budgets represented by municipal enterprises on the local government’s total spending decisions? 2) Are there any indications for other kinds of fiscal illusion at the German local level? 3) What other determinants of local public spending are relevant?

The paper is structured as follows: First, a condensed overview of certain kinds of fiscal illusion and the problems of their empirical analysis will be given. In section three the estimation method, the potential indicator variables and the data set will be described and the empirical results will be presented. Finally, some conclusions will be drawn and an outlook on future research work will be given.

2 Fiscal Illusion: Definition and Previous Research Work

According to Mueller (2003, p. 527), fiscal illusion means that government by disguising the burden of financing can extend the budget more than people would like to pay voluntarily. Usually fiscal illusion refers to the revenue side of the budget: The taxpayers are assumed to underestimate the true tax prices of public services. Nevertheless, there might be some illusion on the expenditure side as well (Oates 1988, p. 78). For example, the fragmentation and complexity of the expenditure structure may also add considerably to the misperception of the budget size (Turnbull 2007).

Therefore, the main causes for fiscal illusion are information asymmetries between voters and politicians as well as between politicians and bureaucrats. Hence, fiscal illusion might be either demand-side or supply-side driven: It is not only the underestimation of the tax prices that causes excessive demand for local public goods. The budget-maximizing bureaucrats of the Niskanen-type or alternatively, the slack-maximizing bureaucrats (Wyckoff 1999) might abuse their information advantage to increase the supplied quantity of certain public services or at least the cost of a given quantity (and therefore the expenditures).

It is quite useful for the following empirical investigations to adopt the classification of fiscal illusion suggested by Wallace Oates. Oates (1988) identified five categories or hypotheses of fiscal illusion tested in the empirical literature:² 1) *Complexity illusion*: Misperception of the tax prices results from the complexity or fragmentation of the revenue system. 2) *Renter illusion*: Renters are unaware of the property taxes or other local taxes or fees for local public goods embodied in their rents and might therefore support higher public spending than homeowners. The degree of fiscal illusion depends on the proportion of homeowners in a given jurisdiction. 3) *Income elasticity illusion*: Tax payers do not perceive built-in tax increases due to progressive income tax rates (or more general: income-elastic revenue sources) as clearly as legislative changes in the revenue system. 4) *Debt illusion*: Except for a world consistent with the Ricardo-Barro equivalence theorem of public debt, citizens tend to underestimate the future burdens of public debt. 5) The “*flypaper*” effect or money sticks where it lands first: Public expenditures are increased much more by grants (conditional or unconditional) to the corresponding levels of government than by an equivalent increase of the citizens’ income.

The main focus of interest of this paper lies on the first category complexity illusion because it directly relates to municipal enterprise operations (Stumm 2000, p. 62) and the illusions caused by outsourcing of expenditures and revenues to municipal enterprises. The other potential causes or categories of fiscal illusion will also be examined, except for 3). This type of fiscal illusion seems to be more important for the national level. Actually, it has been neglected so far in the studies dealing with local government spending.

² See also Dollery, Worthington (1996, pp. 263-264), or Dollery, Worthington (1999, p. 38).

The existing international empirical literature usually perceives fiscal illusion as a revenue or expenditure side problem without consideration of the benefits of publicly provided goods. According to Oates (1988, p. 68) and Dollery and Worthington (1996, p. 262) empirical studies in the field of fiscal illusion have either taken the form of estimations of ad hoc expenditure functions or apply demand functions for public goods. Both approaches include variables that are assumed to capture the illusion effects. Examples of the first are Wagner (1976), Breeden and Hunter (1985), Misiolek and Elder (1988) or Stumm (2000). Median voter demand functions for public goods were estimated by Bergstrom and Goodman (1973), Pommerehne and Schneider (1978), Wildasin (1989), Campbell (2004) or Turnbull (2007). More recently, some experimental studies have tested for fiscal illusion (e.g. Sausgruber and Tyran 2005).

3 Empirical Analysis

3.1 The Empirical Model

For the empirical analysis an aggregated per capita municipal expenditure function is estimated to model the possible relationship between local governments' expenditures and their various determinants of the usual reduced form spending function. Turnbull's (2007, p. 763) equation (slightly modified) is used as a starting point:

$$\ln\left(\frac{E}{N}\right)_{it} = \alpha_i + \beta_0 + \beta_1 \ln Tp_{it} + \beta_2 \ln Y_{it}^M + \beta_3 \ln N_{it} + \sum_{h=4}^{J+3} \sum_{j=1}^J \beta_h \ln Tr_{it}^j + \sum_{h=J+4}^{J+K+3} \sum_{k=1}^K \beta_h \ln \phi_{it}^k + \sum_{h=J+K+4}^{J+K+L+3} \sum_{l=1}^L \beta_h \ln z_{it}^l + e_{it} \quad (1)$$

The operational per capita spending E/N is assumed to be a function of the perceived tax price, Tp ; median household income, Y^M ; population, N ; J sources of transfer- or quasi-transfer payments, Tr^j ; K index numbers indicating the potential misperception of several revenue sources, ϕ^k and L socioeconomic or political variables z^l . The subscript $i = 1$ to I marks the number of groups (local governments) and $t = 1$ to T the time period, e_{it} is the disturbance term. The time-invariant unobserved group-specific effect of each local government is captured by α_i . It seems reasonable to assume that there might be significant and time-invariant differences between cities or municipalities affecting local government spending. These differences do not only result from different city sizes or different legal frameworks. It is mainly the "personal heterogeneity" – different people with different mentalities, preferences etc. – which makes each city incomparable even to its neighbors.

Deviating from Turnbull's approach no equilibrium tax price will be integrated in the model. Following Henrekson (1988, pp. 107-108), there is little reason to believe that the perceived price for local public services on the demand side and the price fixed on the supply side by the local government should ever adjust to equilibrium. Furthermore, as previously mentioned unlike for example the USA, Switzerland or the Scandinavian countries there is no suitable local tax in Germany which is a) paid by the majority of the voters and b) reasonably high to act as a sort of comprehensive tax price for a specific local public good (e.g. educational services in the U.S. school districts) or a bundle of local public goods. The German local property tax (*Grundsteuer*) on agricultural and non-agricultural land as well as on residential and non-residential buildings is extremely low because the assessed property value is based on imputed rents or construction prices of the years 1964 (West Germany) or even 1935 (former GDR).³ Therefore, the proper-

3 The fact that – to the author's knowledge – no official or commercial data on the average property tax burden on residential or non-residential buildings in German cities is available indicates that owners and renters consider the property tax to be a rather negligible cost factor. For example, according to a colleague's tax bill, the current annual property tax in Dresden levied on an owner-

ty tax revenues cover only a very small fraction of the total local government expenditures.

Furthermore, some of the elements included in the median voter model might have demand as well as supply-side effects in Germany. This refers particularly to the median or average household income. On the one hand, we have the usual income elasticity of demand for local public goods which is expected to be positive, but could be negative as well. On the other hand, a rising median or average household income increases ceteris paribus the national income tax revenue of which the local governments receive approximately 15%. This additional tax revenue might enable them to further extend the supply of local public services.

All in all, (1) represents rather an expenditure function including demand and supply components simultaneously than a demand function for local public goods resulting from the median voter model despite of including some of its elements.

Unlike in the United States, Switzerland or other countries neither data for the median household income nor for the median tax price was available for German municipalities. Instead, the average property tax revenue per inhabitant $\frac{PT}{N}$ and the average disposable household income $\frac{Y}{N}$ per inhabitant had to be used. To avoid collinearity problems, N was removed from the regression equation. According to the literature, a positive effect of the household income on local per-capita public spending might be expected, whereas the effect of the average property tax is rather undetermined.

To test for the different categories of fiscal illusion listed in Section 2, the following indicators have been used:

Complexity illusion and the effect of local shadow budgets: In other empirical studies in the field of fiscal illusion the authors usually employ some Herfindahl indices of tax revenues or expenditures as indicators for the misperception of the revenue or expenditure structure. This has been avoided here for two reasons. First of all, the main focus of this paper lies on the potential effects of shadow budgets represented by local public enterprises and not on the effects of the fragmentation of the revenue or expenditure side.

But even more important is the fact that calculating a Herfindahl index would involve an unjustifiable arbitrariness in grouping the revenues and/or the expenditures. Actually, the official categorization system for municipal revenues and expenditures in the core budget, which has to be applied (with little regional modifications) by all German municipalities, is much more detailed than the municipal enterprises' profit and loss statements. For example, the operational and financial revenues are grouped into three main groups at the one-digit level with about 26 subgroups at the two-digit level and about 90 sub-subgroups at the three-digit level. In contrast, the average profit and loss statement

occupied house with 120 sqm floor area is about 280 Euro – although the local property tax rate (to be precise: the multiplier fixed by the city) in Dresden is one of the highest in Germany.

of municipal enterprises contains a total of about 25 items (incomes and expenses!). It is also common for municipal enterprises to book grants received (except for investments) as sales revenues, which makes it impossible to identify them like the grants received that are included in the core budget.

Because of these grouping and identification problems another complexity indicator is used instead: the ratio of municipal enterprise revenues (including sales, changes in inventories, capitalized own-account services, other operating income, interests and income from shareholdings) to total municipal revenues. This ratio is highly correlated with the ratio of expenses/expenditures of municipal enterprises to total municipal expenditures. Thus, no separate measure for the complexity of the expenditure structure was used in the regression. All in all, a rising share of revenues from public enterprises might also increase local government spending; the sign of the regression coefficient is expected to be positive.

Debt illusion: To check for the debt illusion hypothesis, debt per capita $\frac{D}{N}$ is included in the regression. D consists of the long- and medium term liabilities of the municipal enterprises and the municipality's "regular" debt. In addition, the ratio municipal enterprise liabilities to total municipal debts is also used. Both indicators are expected to increase public spending and the sign of their regression coefficient should be positive.

Flypaper effect: The per capita values $\frac{Tr^j}{N}$ mostly consist of the grants received by the local government from the German *Länder* or other local governments/associations of local governments. Furthermore, the revenue from the local business tax (trade tax, *Gewerbesteuer*) is treated as a transfer payment. The trade tax is the most important local tax source in Germany. Due to generous exemptions for sole proprietorships and partnerships and its deductibility from personal income tax only a small fraction of enterprises (and inhabitants) effectively contributes to the trade tax revenues. This makes it very suitable for shifting the costs of local public services to a minority, whereas all citizens share the benefits. On the other hand, the most important trade tax payers might gain significant influence on local government policy, for example by threatening the local politicians with the relocation of their production activities. The latter could lead to insufficient tax rates and therefore insufficient local public spending. This aspect is a core subject of the abundant literature on tax competition and beyond the scope of this paper.⁴ Hence, while the effect of increasing per capita grants received on local public spending should be positive (as well as the sign of the coefficient in the regression equation), the total effect of high trade tax revenues on local public spending is not determined ex ante.

Renters' illusion: The first-best solution would have been to use the share of homeowners at the total number of eligible voters or inhabitants. Due to the lack of adequate data

⁴ See for example *Wilson* (1999), or *Batina, Ihori* (2005, pp. 329-352) for a survey of the literature.

the percentage of residential buildings with up to two accommodation units serves as a proxy for the percentage of homeowners among the inhabitants. The expected effect of this proxy variable on municipal spending should be negative as well as the expected sign of the coefficient in the estimated regression equation.

The relevant modified regression equation is

$$\ln\left(\frac{E}{N}\right)_{it} = \alpha_i + \beta_0 + \beta_1 \ln\left(\frac{PT}{N}\right)_{it} + \beta_2 \ln\left(\frac{Y}{N}\right)_{it} + \beta_3 \ln\left(\frac{D}{N}\right)_{it} + \sum_{h=4}^{J+3} \sum_{j=1}^J \beta_h \ln T_{it}^j + \sum_{h=J+4}^{J+K+3} \sum_{k=1}^K \beta_h \ln \phi_{it}^k + \sum_{h=J+K+4}^{J+K+L+3} \sum_{l=1}^L \beta_h \ln z_{it}^l + e_{it} \quad (2)$$

It has been already mentioned that at the local level in Germany the core budget does not contain all the operational expenditures and investments of a municipality. To neglect the expenditures and revenues of municipal enterprises, would distort the regression results. For example, the local public utilities are no isolated items because their profits are usually shifted to the local public transportation companies to cover their losses (and avoid the local trade and the national corporation tax). Although these profits often do not appear in the core budget, the cities consider them as additional revenues to finance other important local goods and services. Therefore, deviating from e.g. Stumm (2000) the net revenue transfers from municipal enterprises to the municipal core budget are not considered to be the only or main cause for fiscal illusion in this context. Even more important seems to be the fact that outsourced revenues and expenditures are less visible to voters and even to local politicians – whether they result in revenue transfers to the municipal core budget or not.

Furthermore, expenditures of different municipalities are incomparable if there are different “outsourcing” levels of expenditures to municipal enterprises. To illustrate the problem, let us have a look at cultural services. According to the statistics of the German Theatre and Opera Association (2008) on the legal structures of 143 public (i.e. not privately owned) German theatres and opera houses, in 2006 37 (25.9%) were municipal departments (*Regiebetrieb*), 28 (19.6%) semi-autonomous municipal agencies (*Eigenbetrieb*), 46 (32.2%) public limited companies (*GmbH*). 22.4% consisted of special purpose associations (*Zweckverband*), public law incorporations (*Anstalt des öffentlichen Rechts*), registered associations (*eingetragener Verein*) or public-law foundations (*Stiftung des öffentlichen Rechts*). The often rather subtle differences between these organizational forms do not really matter in this context. But it is important to know that only for the municipal departments the total expenditures and revenues are included in the core budget of the municipality. For all other organizational forms, only transfer payments (grants, compensations) between municipality and organizational unit are incorporated in the core budget. Therefore, if only the expenditures on theatres etc. in the core budget were taken into account, the expenditures in cities with theatres that are not organized as municipal departments would be systematically underestimated. This problem occurs more or less for all kinds of local government activities in Germany.

Thus, the dependent variable total operational expenditures E included 1) all operational (non-investment) expenditures of the core budget (the „*Verwaltungshaushalt*“) except for purely financial transactions and interest payments and 2) the operating expenses (excluding interest expenses as well as depreciation and amortization) of local public enterprises⁵. Interest payments and financial transactions have been neglected because they only account for the source of financing for public capital. Depreciation and amortization have not been taken into consideration, too because they are capital costs and only expenses – not expenditures. The core budget does not include expenses that are not also expenditures and adding the core budget expenditures and the municipal enterprise expenses (including depreciations) together would lead to a serious bias in favor of the municipal enterprises.

A major challenge in this context was to eliminate the transactions between the core budget and the municipal enterprises to avoid double counts. This was mainly achieved by subtracting the compensations for goods and services provided from/to municipal enterprises as well as the transfer payments for non-investment purposes from/to municipal enterprises in the core budget.

Last but not least, several socioeconomic and political variables, which are exogenous for the local governments – at least in the short run – and are expected to have significant effects on demand or supply of local public goods, have been included in the regression. They all have in common that their effect on public spending and therefore the expected sign in the regression analysis cannot be predicted *ex ante*.

- *Population density*: Usually correlates significantly with city size and might have a negative effect on per capita spending due to scale effects. On the other hand, increasing population density might lead to negative agglomeration effects such as crime, poverty or pollution and therefore increase per-capita spending on public safety, welfare etc.
- *Political significance of “left-wing” parties*: Left-wing politicians are supposed to be more generous in government spending than conservative or liberal politicians. But they often gain majorities in communities with severe economic problems, low tax revenues and below average household incomes and are therefore subjected to rigorous budget constraints. In Germany, clusters of cities with left-wing majorities can be found in the Ruhr area and in Eastern Germany. The share of left-wing city councilors (including Social Democrats as well as members of the Party of Democratic Socialism and the Greens) is employed for the regression.
- *Political fragmentation*: In city councils with fragile majorities depending on multi-party coalitions any party might abuse its power of breaking up the coalition by obtaining extra public expenditures to please their favorite lobbyists.

⁵ Municipal hospitals have not been considered for the analysis. Although the independent cities as well as the rural districts in Germany are legally obligated to provide these services, hospitals do not affect their budgets significantly: The statutory or private health insurance compensate them for most of the operational expenses and the responsible *Bundesland* finances the investments.

Consequently, the total per capita expenditures of politically fragmented cities are expected to be higher than e.g. in cities with one party holding the majority of the seats in the city council. But similar to the significance of left-wing parties the political fragmentation tends to be significantly higher in economically depressed cities facing severe budget constraints in Eastern Germany, especially due to the presence of the Party of Democratic Socialism (since 2007 “The Left”) which attracts potential voters of the Social Democrats. In the following regression the political fragmentation of a city council is measured by a Herfindahl index using the squared shares of six different political parties in the city council.⁶

- *Fraction of elderly people*: A higher fraction of elderly persons might decrease the demand for educational services but increase the demand and therefore the expenditures for certain social services like old people’s homes. The total effect cannot be predicted ex ante.
- *Fraction of young people*: A higher fraction of inhabitants under 20 increases demand (at least their parents’ demand) for educational services or certain leisure services but reduces the demand for services consumed primarily by grown-ups.

This selection certainly does not include all possible structural variables which might determine local public spending. One could think of other variables such as the unemployment rate, the share of foreigners, the share of people of a certain religious denomination or the presence of private non-profit organizations⁷ which offer substitutes for local goods and services. Fortunately, these group-specific effects are captured by α in the regression equation.

In addition to the effects on total operational spending, it would also be interesting to analyze the effects of fiscal illusion on the local government’s “voluntary” or at least not obligatory spending on culture, sports, science (not schools!) or leisure services. This differentiation is important for countries – like Germany – where local politicians and their lobbyists usually complain that most of their spending was determined by EU, national or state laws and regulations. Therefore, a second regression was estimated employing the operational expenditures on the aforementioned goods and services as the dependent variable. These expenditures were calculated analogously to the total expenditures. The recreational area per inhabitant was added to the regression as a further possible determinant with a positive effect on the voluntary expenditures.

⁶ These are the Christian Democratic Union (CDU)/Christian Social Union (CSU), the Social Democrats (SPD), the Greens, the Liberal Democrats (FDP), the Party of Democratic Socialism (PDS) and “others”. The category “others” is very heterogeneous because it contains all other minor parties ranging from the extreme right to the extreme left of the political spectrum as well as the members of local voters associations.

⁷ It should be noted that the presence of e.g. kindergartens run by churches or other private non-profit organizations does not necessarily reduce municipal spending on those services. In fact, German municipalities are obliged to provide and finance certain services at a given quality and quantity. They have to compensate the non-municipal providers for their expenditures. Things might be different for voluntary expenditures. But even privately organized clubs are often heavily subsidized by the municipality.

It was implicitly assumed for equations (1) and (2) that the standard One-way Fixed Effect Model (FEM) with group dummies and a log-linear regression would be most appropriate for the panel data regression of the expenditure function. The results of the standard test procedures carried out for the data set described in Section 3.2 supported these assumptions with respect to the FEM but not for the functional form. The F-Test comparing the pooled OLS-model and the FEM rejected the hypothesis that all α_i are 0 (F[109,500] = 25.24). The Breusch-Pagan Lagrange-Multiplier test ($\chi^2[1] = 719.92$) suggested to avoid the pooled OLS-model in favor of the random effects model. The Hausman test statistic ($\chi^2[13] = 42.18$) rejected one basic assumption of the random effects model (REM): Unobserved group specific effects included in the disturbance term are uncorrelated with the regressors. Therefore, the FEM seemed to be the best choice.

But the log-linear model is not the appropriate functional form – at least not for the total expenditures. According to a test suggested by Box and Cox, the sum of squared residuals (SSR) divided by the squared geometric mean of the dependent variable for the linear model (1.722) is significantly lower than the SSR of the log-linear model (2.307), which is supported by the relevant test statistic ($\chi^2[1] = 39.93$). Thus, the linear FEM fitted the data better than the log-linear model.⁸

Furthermore, the Wald Test (F [1, 110] = 11.34) suggested by Wooldridge (2002, pp. 282-283) rejected the hypothesis that no first order autocorrelation between the disturbances was present at the 1% significance level. Consequently, the appropriate model to be estimated was a linear fixed-effects model with an AR(1) process

$$\begin{aligned} \left(\frac{E}{N}\right)_{it} = & \alpha_i + \beta_0 + \beta_1\left(\frac{PT}{N}\right)_{it} + \beta_2\left(\frac{Y}{N}\right)_{it} + \beta_3\left(\frac{D}{N}\right)_{it} + \sum_{h=4}^{J+3} \sum_{j=1}^J \beta_h \ln Tr_{it}^j \\ & + \sum_{h=J+4}^{J+K+3} \sum_{k=1}^K \beta_h \ln \varphi_{it}^k + \sum_{h=J+K+4}^{J+K+L+3} \sum_{l=1}^L \beta_h \ln z_{it}^l + e_{it} \end{aligned} \quad (3)$$

with $e_{it} = \rho e_{it-1} + \varepsilon_{it}$ as the error term.

Things turned out a bit different for the voluntary expenditures, although the F-Test and the LM-test showed similar results. But the basic assumption of the REM was not rejected by the Hausman-Test ($\chi^2[14] = 11.97$) for the log-linear model and with similar results for the linear model. Furthermore, the log-linear function turned out to be the more adequate functional form: The SSR divided by the squared geometric mean of the dependent variable for the linear model (27.67) was significantly higher than the SSR of the log-linear model (15.54). The corresponding test statistic strongly ($\chi^2[1] = 181.5$) supported this finding.⁹ Finally, the Wooldridge-Test (F[1, 106] = 8.4) suggested the presence of a first order autocorrelation process for the log-linear model. Equation (4) shows the log-linear REM including an AR(1) process for the disturbance term.

⁸ See *Griffiths et al.* (1993, pp. 345-346) for further details.

⁹ This test could not be applied to the REM so the FEM was used instead. However, the cross-sectional OLS-estimation led to similar results for each period.

$$\ln\left(\frac{E}{N}\right)_{it}^{vol} = \beta_0 + \beta_1 \ln\left(\frac{PT}{N}\right)_{it} + \beta_2 \ln\left(\frac{Y}{N}\right)_{it} + \beta_3 \ln\left(\frac{D}{N}\right)_{it} + \sum_{h=4}^{J+3} \sum_{j=1}^J \beta_h \ln Tr_{it}^j + \sum_{h=J+4}^{J+K+3} \sum_{k=1}^K \beta_h \ln \varphi_{it}^k + \sum_{h=J+K+4}^{J+K+L+3} \sum_{l=1}^L \beta_h \ln z_{it}^l + e_{it} \quad (4)$$

with $e_{it} = \rho e_{it-1} + \mu_i + \varepsilon_{it}$ as the error term including the unobservable and time-invariant group-specific effect μ_i .

3.2 Data

A dataset of all 112 German cities¹⁰ not belonging to a district (independent cities, *kreisfreie Städte*) was constructed for the years 1998 to 2003 including 672 observations. (See Table 1 for the descriptive statistics.) This restriction was necessary because data for local public enterprises was not available before 1998 and after 2003. Unfortunately, for two German *Länder* (Rhineland-Palatinate 1998, Schleswig-Holstein 1998 to 2000) and one town in Bavaria 1998 no data was provided to or collected by the statistical offices. This reduced the number of observations suitable for the regression to 647¹¹. Furthermore, one small town in Southern Bavaria (Kempten) turned out to be an extreme outlier (probably due to some erroneous data) and was also excluded from the regression. The number of observations declined further for the log-linear model (voluntary expenses) because observations with obviously implausible or negative values for some variables have not been incorporated in the regression.

The financial statements of municipally-owned enterprises and the data on local public expenditures and revenues included in the municipal core budget were provided by the statistical offices of the German *Länder*. Data pooling and adjustment was conducted by the Research Data Centre of the Federal Statistical Office in Berlin and the necessary data aggregation was made in cooperation with the Statistical Office of Saxony-Anhalt.¹² Additional public finance or socioeconomic data such as the average household income, population, age structure, residential buildings, area, political majorities, etc. were extracted from the database regiostat (edited by the Federal Statistical Office and the statistical offices of the German *Länder*) and the statistical yearbook of the German Association of Cities and Towns (Association of German Cities, several years).

¹⁰ The city states Berlin, Bremen and Hamburg were excluded because they are both German states (*Bundesländer*) and local governments. It is not possible to attribute certain expenditures to one of these levels of government.

¹¹ In fact with regard to debts it was further reduced to 645 observations because for reasons unknown no debt figures even for the core budget were available for Solingen (Northrhine-Westphalia) and the years 1998 and 1999.

¹² I would like to take this opportunity to thank all of these institutions for their corporation and assistance.

Table 1:
Descriptive Statistics

Variable	Unit	Obs.	Mean	SD	Max	Median	Min
Dependent variables							
Total operational expenditures	Euro per inhabitant	647	2430.60	655.674	4909.98	2351.68	1175.71
Operational expenditures voluntary municipal tasks	Euro per inhabitant	646	203.28	88.703	721.80	190.98	49.52
Independent variables							
Household income	Average disposable income of private households in Euro per inhabitant	672	15974.02	2034.835	23027	15910	11481
Property tax ("tax price")	Property tax revenue in Euro per inhabitant	672	125.10	32.949	274	125	49
Grants received	Euro per inhabitant	672	368.20	193.709	864	326	-0.36
Trade tax revenue	Euro per inhabitant	672	289.54	211.161	1619.06	241.90	-64.40
Total municipal debt	Euro per inhabitant	651	3215.82	1351.393	8164.23	3056.40	401.46
<i>Indicators of misperception</i>							
Municipal enterprise revenue	Ratio municipal enterprise revenue to total revenues	645	0.3415	0.1543	0.7106	0.3555	0
Local public enterprise debt	Ratio long- and medium term liabilities of municipal enterprises to total local government debt	645	0.5238	0.2358	0.9912	0.5506	0
Owner-occupied houses	Ratio buildings with up to two accommodation units to total residential buildings	672	0.649	0.1063	0.8765	0.6531	0.3441
<i>Socioeconomic and political variables</i>							
Population density	Inhabitants per square kilometer	672	1334.77	708.87	3968.54	1182.46	331.29
Left	Percentage of councilors belonging to left-wing parties	672	0.4704	0.1055	0.8298	0.4667	0.20
Political fragmentation	Herfindahl index of squared party shares in the local council	672	0.3303	0.0545	0.4811	0.3335	0.1919
Recreational area	Hectares per inhabitant	672	0.0030	0.0016	0.0113	0.0026	0.0004
Elderly	Ratio of people older than 65 to total population	672	0.1809	0.0190	0.2417	0.1811	0.1091
Youth	Ratio of people younger than 21 to total population	672	0.1911	0.0153	0.2304	0.1900	0.1542

Source: Author's calculations.

The currently about 323 German rural districts (*Landkreise*) had to be neglected for this study, because they have no right to levy taxes and their main sources of finance consist of transfer payments from the municipalities belonging to the particular district. The size and structure of the district budget is therefore rather a matter of negotiations between different levels of local governments than of fiscal illusion. The approximately 12,000 German towns or municipalities belonging to a district (*kreisangehörige Städte*

und Gemeinden) have been also omitted – mainly because some necessary structural data was available only for the district level. A positive side-effect of this restriction to the independent cities is that no effects of spatial autocorrelation had to be taken into account for the regression analysis.

3.3 Results

According to the results of the FEM-estimation (Table 2), the average household income has some positive effect, but not the proxy for the tax price. The complexity of the

Table 2:
Estimated Local Expenditure Function
- Total Expenditures per Capita -

	One-way FEM with AR (1) disturbances		
	Coefficient	Standard Error	t-value
Property tax revenue per inhabitant	2.0421	1.2457	1.64
Household income	0.0721	0.0247	2.92**
Total municipal debt	0.0375	0.0183	2.05*
Trade tax revenue per inhabitant	0.2464	0.0682	3.61 **
Grants received	0.5290	0.1484	3.56**
<i>Indicators of misperception</i>			
Municipal enterprise revenue	2809.903	127.3193	22.07**
Municipal enterprise debt	-112.2647	135.6141	-0.83
Owner-occupied houses	-1185.144	2100.54	-0.56
<i>Socioeconomic and political variables</i>			
Population density	-0.0961	0.2845	-0.34
Elderly	4035.488	3175.638	1.27
Youth	3270.541	4191.642	0.78
Political fragmentation	477.313	476.3385	1.00
Left	96.0451	289.9588	0.33
Constant	-934.1055	1596.201	-0.59
Number of observations = 527	i = 1 to 111 t = 1998 to 2003	F(13, 403) = 53.57	Adj. R ² = 0.5216

Notes: The dependent variable is total operational expenditures per inhabitant; * significant at the 5% level. ** significant at the 1% level.

Source: Author's calculations.

revenue system seems to increase local public spending because of the significant and positive effect of the relative importance of municipal enterprise revenues. The same applies to the grants received and the trade tax revenues which possibly indicate the fly-paper effect. The positive impact of total per capita debts seems to confirm the existence of debt illusion. The homeownership-rate proxy is not significant in the AR(1)-model so no indications for the presence of renter illusion could be confirmed. All other variables

and especially the socioeconomic and political variables are also not significant. Probably the structural variables did not fluctuate very much over this period of six years and therefore their impact might have been absorbed by the group dummies.

Table 3:
Estimated Local Expenditure Function
- “Voluntary” Municipal Expenditures per Capita -

Independent variables	One-way REM with AR (1) disturbances		
	Coefficient	Standard error	z-value
Recreational area	0.0449	0.0478	0.94
Property tax revenue	0.2567	0.1209	2.12*
Household income	0.4207	0.2480	1.70
Total municipal debt	-0.0174	0.0551	-0.32
Trade tax revenue	0.0056	0.0299	0.19
Transfer payment received	0.0388	0.0334	1.16
<i>Indicators of misperception</i>			
Municipal enterprise revenue	0.0596	0.0285	2.09*
Municipal enterprise debt	0.0468	0.0344	1.36
Owner-occupied houses	-1.0012	0.2146	-4.67**
<i>Socioeconomic and political variables</i>			
Population density	-0.1640	0.0659	-2.49**
Elderly	-0.7361	0.2685	-2.74**
Youth	-1.608	0.3069	-5.24**
Political fragmentation	-0.0488	0.1199	-0.41
Left	0.0526	0.0967	0.54
Constant	-3.5666	2.3839	-1.50
N = 606	i = 1 to 110 t = 1998 to 2003	Wald $\chi^2(15) = 113.17$	

Notes: Dependent variable is total operational expenditures on science, culture, leisure, sport per inhabitant; all dependent and independent variables are in logarithmic form; * significant at the 5% level, ** significant at the 1% level.

Source: Author's calculations.

Table 3 shows that a significantly positive effect could be found for the ratio revenues of municipal enterprises to total revenues but also for the property tax revenue per inhabitant. Even more significant (and stronger) effects were detected for the share of owner-occupied houses, the population density and the shares of old and young people. The positive effect of the property tax revenue illustrates the difficulties in finding an adequate tax price proxy at the German municipal level. The variable is rather an indicator for municipal own tax revenues. Renter illusion seems to be present due to the negative sign of the homeownership proxy, at least with regard to expenditures for cultural or leisure services.

Unlike for the total expenditures, demographic factors such as population density or the share of young or elderly persons have a negative impact on voluntary spending decisions. Adolescents (or their parents on their behalf) or senior citizens seem to demand less of the selected cultural or leisure services than citizens of the 20 to 65 age bracket.

The negative sign for the population density variable might indicate positive scale effects, but might also reflect the fact that in more densely populated cities the German *Länder* often run their own theatres (“*Landestheater*”). This reduces – ceteris paribus – the city’s own expenses on cultural services. But the significance of the negative effect of population density disappears if additional dummies for city size were included in the regression as well as a dummy for Eastern Germany. It turned out that only cities with a population lower than 50,000 have significantly lower per-capita expenditures – and only compared to cities with more than 50,000 and less than 500,000 inhabitants. Furthermore, per-capita expenditures were significantly higher in Eastern Germany than in Western Germany. But as these findings do not alter the general results, the estimation results of the modified equation have not been presented here.

Oates (1988, 78) points out that some of the variables used in empirical models in order to test for fiscal illusion might not be exogenous to the local government’s spending decisions. This seems reasonable for the municipal tax revenues (especially the trade tax) and the municipal enterprise revenues because the local governments might be able to adjust the revenues from these sources to their planned expenditures by raising the tax rates or by forcing their municipal managers to increase the profitability of the local public enterprises. The total municipal debts and the relative share of the municipal enterprise debts are most probably exogenous in the short run as well as the grants received. The latter mainly consist of transfers from the respective *Bundesland* – allocated according to a special key – to its local governments. Although, these transfers are supposed to cover the difference between expenditures and revenues there is not much leeway for strategic behavior of the local governments. Neither overspending nor “under-taxing” would alter the grants received significantly.¹³

It should be noted that German local governments are under very strict supervision of the municipal supervisory authorities considering their budget deficits. Actually, debt increase is only allowed for investment purposes, not to cover operational expenses. Local governments which are permanently unable to balance their budgets have to face something similar to private enterprises under liquidation: The local council and the mayor will be more or less disempowered and the municipal supervisory authority will

¹³ The allocation procedure is quite complex and cannot be discussed here in detail. See for example *Haverkamp* (1988) for further details. But there are three basic characteristics to mention: First, the calculated financial needs for each community have nothing to do with their actual expenditures; they simply depend on the total funds the *Bundesland* can share amongst its local governments. Second, larger cities receive higher grants per inhabitant than smaller cities and third, the hypothetical financial power is calculated by multiplying the municipal tax bases (property and trade tax) with a harmonized tax rate.

have to approve every major spending decision. This treat probably enhances local government budget discipline significantly because no mayor or city council driving a community in such a situation could expect to be reelected.

A Hausman procedure¹⁴ was applied to test three variables for endogeneity: property tax revenue per inhabitant, trade tax revenue per inhabitant and the relative share of municipal enterprise revenues. In addition to the total expenditures per inhabitant as the endogenous variable, the local gross value added (per capita) was used for the trade tax and the total living space per inhabitant was used for the property tax as exogenous explanatory variables. The relative proportion of municipal enterprise revenues was expected to depend on the population number, the local gross value added (per capita) and the local governments' total per capita expenditures. According to the results of the F-Test for all three variables, the exogeneity hypothesis could not be rejected for the fixed effects model. A similar estimation for the "voluntary" expenditures showed the same results.

¹⁴ See for example *Gujarati* (2003, pp. 756-757) for further details.

4 Conclusions and Outlook

The general target of this paper was to analyze the presence of fiscal illusion at the local government level in Germany. The special focus lay on the complexity illusion caused by the activities of municipal enterprises and their shadow budgets. It was assumed that not only the net revenue transfers from these enterprises to the municipality's core budget cause fiscal illusion because for example public utility profits are often shifted directly to the municipal public transportation units. Even more important might be the fact that the mere "outsourcing" of municipal services from the core budget to the municipal enterprises increases the complexity of the municipal expenditure and revenue system and therefore enhance the misperception of local tax prices.

Similar studies do not exist for German local governments, mainly for two reasons: First, the popular median-voter model or other demand-driven models cannot be used as the theoretical basis because there is no German local tax to serve as a tax price for the bundle of different goods and services provided by the municipality. Second, a significant share of the local government spending is not included in the municipal core budget (*Verwaltungs- und Vermögenshaushalt*) but can be attributed to local public enterprises. Therefore, municipal spending and revenues could only be compared between cities and over time if the core budget and the local public enterprises were integrated into one single budget. While the first problem could not be solved sufficiently in this paper, an attempt was made to integrate the core budget and the budgets of local public enterprises.

The estimation results of the simultaneous analysis for the various categories of fiscal illusion listed in Section 2 were mixed, but the panel data regression analysis for German cities not belonging to a district revealed at least some evidence. Indications for the relevance of the complexity illusion hypothesis could be found because the ratio municipal enterprise revenues to total revenues had a quite robust positive effect both on the total and the "voluntary" expenditures. Therefore, shadow budgets might probably intensify the misperception of local government expenditures and revenues. Furthermore, at least with regard to the total per capita expenditures indications for the debt illusion and the flypaper hypothesis could be found. Unlike for the total expenditures, the share of owner-occupied houses had a negative and significant effect on the "voluntary expenditures" (renter's illusion hypothesis).¹⁵

But the city's expenses on sport, cultural or leisure services seem to be influenced also by demographic factors such as age structure or city size. On the other hand, political constellations seemed to be of no importance for municipal spending decisions.

¹⁵ As the burden of the German local property tax is hardly perceptible for homeowners the renter illusion refers to the prices of other public goods provided by the municipality: water, energy, waste and sewage disposal, street construction and -cleaning etc.

Although the study did not primarily aim at confirming or rejecting the median voter model the findings showed that this popular approach might not be suited as a theoretical base for countries without local tax sources with broad tax bases. Therefore, it is necessary to apply alternative theoretical models to explain the interaction of demand and supply of local public goods and services. But this has to be left to future research work. Until then a certain degree of “*ad hocery*” (as Dollery and Worthington 1999, p. 40, put it) involved in the selection of independent variables for the regression analysis will be inevitable.

The investigation also revealed that a reform of the German local public finance statistic is urgently needed. The reform should aim at integrating the official budgets as well as the financial statements of public enterprises into one consolidated budget.¹⁶ This is the only way to display a (approximately) true picture of the financial situation of the municipalities.

¹⁶ Actually, most German states have already initiated projects to adapt their municipal accounting systems. First results will be expected at the end of this decade.

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