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THE POLITICAL ECONOMY OF THE SUBSIDIZATION OF CULTURAL INSTITUTIONS: EMPIRICAL EVIDENCE FROM GERMANY

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Abstract

Municipal support for public libraries, museums, music schools, orchestras, and theaters in Germany is extensive. The funding decisions of these cultural institutions remain largely a local responsibility, decided by members of the parliament, who are elected by the citizens of that representative democracy. This study analyzes the public expenditures of these five cultural institutions – public libraries, classical orchestras, music schools, theaters, and museums – to discover the essential determinants of municipal cultural expenditure towards the various arts. This paper, which consists of a cross-sectional analysis of all 518 German municipalities with a population size of at least 20,000 inhabitants, offers the largest database study on public expenditure in the economic literature to date. Also unlike prior economic literature in this field, a Tobit censored regression model is utilized in order to include those municipalities that opt to spend nothing on certain cultural instutions. The empirical results in this study support the hypotheses that subsidization levels depend positively on the income and population size, and depend negatively on the tax share within each municipality. The proportion of women in the municipal parliament is shown to significantly increase the municipal expenditure on all cutlural institutions examined except orchestras, and the crowding parameter estimates of most cultural institutions indicate diseconomies of scale in the consumption of cultural goods.

1. Introduction

> *The formal precision of modern economics, with its theoretical abstraction, its mathematical analytics and its reliance on disinterested scientific method in testing hypotheses about how economic systems behave, might suggest that economics as a discipline does not have a cultural context, that it operates within a world that is not conditioned by, nor conditional upon, any cultural phenomena.*
>
> *David Throsby* (2001, 7-8)

The word 'culture' today often lacks a generally agreed upon central meaning. The connotation of the word originally referred to the tillage of the soil and nothing more. It was not until the sixteenth century that the term 'culture' began to also refer to the cultivation of the mind and spirit of individuals, expanding beyond its literal denotation. Then, beginning as recently as the nineteenth century, the term began to sprout new branches of significance. In 1835, Hegel is recorded in his *Lectures on Aesthetics* as defining art and culture as "the ways that societies represented themselves to themselves and thereby constructed their identities" (Gagnier 2000, 186-187). People used 'culture' to describe the intellectual and spiritual development of entire civilizations rather than single individuals, and an etymological analysis clearly determines that shortly thereafter the term began to encompass the entire lifestyle of a society, no longer confined to describing only intellectualism (Throsby 2001, 3). Still, for the purpose of this particular paper, it will be necessary to eliminate much of the ambiguity that now surrounds the term 'culture'.

In many cultural economic analyses, and for the purposes of this study, the term 'culture' shall be more narrowly defined as pertaining to activities undertaken by individuals that are associated with the artistic and intellectual aspects of human life (Throsby 2001, 3). Under this narrower definition, the arts – such as literature, poetry, music, visual art, and the crafts – still easily qualify as cultural activities, embodying both creativity and intellectualism (Throsby 2001, 112). It is therefore logical to deduce that 'cultural institutions' include public libraries, classical orchestras, music

schools, theaters, and museums, among others.[1] While this may seem to be an obvious inference, defining culture and cultural institutions is a necessary step.

Cultural economics – the economics of the creative and performing arts – is a relatively new and quickly emerging branch of economic study. William J. Baumol and William Bowen, in their 1966 book Performing Arts—The Economic Dilemma, are frequently acknowledged as the first economists to penetrate and embark upon the field, now also referred to as contemporary cultural economics. Still, many other pioneers deserve acknowledgment, including John Kenneth Galbraith (1960), Lionel Robbins (1963), and Alan Peacock (1969) (Frey 2000, 3).

Given the prominence of cultural institutions in any society and given that the philosopher Adam Smith, generally credited with being the father of economics, published *The Wealth of Nations* in 1776, it should seem odd to the attentive reader that these cultural economic pioneers did not arise until recently. After all, Alfred Marshall explained in his Principles of Economics (1890) that "Economics is the study of mankind in the ordinary business of life" (Nicholson 2004, 2). Unfortunately, many people –artists and art historians in particular – have held a fervent conviction that art, with its unique expressions, lies beyond any mathematical calculations and models that economics could ever invoke (Frey and Pommerehne 1989, 8). People possessing this opinion argued that many successful artists have pursued art for intrinsic reasons, regardless of monetary incentives (Frey 2000, 7). It took economists almost two centuries after Adam Smith to significantly alter this view that economic study holds no place in cultural institutions.

Since the inception of cultural economics, the expanding theoretical and applied literature within the field has legitimately established itself as a distinctive area of specialization, so much so that the *Journal of Economic Literature* – often deemed the authority on the classification of specialties within economics – regards cultural economics as its own sub-discipline (Throsby 2001, 11-12). By 1976, Blaug had collected the first book of readings in the field and, in 1979, Throsby and Withers wrote the first textbook on The Economics of the Performing Arts (Frey 2000, 3). Today, cultural economics has its own international association, called the *Association for Cultural Economics International* (first held in 1979), and its own scholarly journal, suitably titled the *Journal of Cultural Economics* (first published in 1977).

The emerging field has successfully built upon conventional economic analysis, adding some innovative adjustments and additions in order to provide a

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[1] The classification of other public institutions, such as sports stadiums, as part of the cultural sector of the economy is an ongoing debate amidst several fields of study, and it is beyond the scope of this paper.

theory, albeit still far from perfect, that can be applied to the special circumstances raised in the demand and supply of cultural goods. The approach involves a methodical study of the interaction between the behavior of individuals and cultural institutions in a society (Frey 2000, 1).

While the number of factors influencing artistic creation and consumption may be exceptionally large and their relationships unusually complex, the arts do not defy economic theory (Economics 2004, 208). Like all goods and services, art and culture are subject to scarcity and, thus, are not free. As a result, it becomes possible for an economist to analyze the behavior of suppliers and demanders of cultural goods.

Frequently, cultural demand is witnessed through the demand placed on governments to provide public subsidies to these cultural institutions. Requests for government funds places cultural institutions in competition for funding against other public goods such as welfare, roads, and defense, as well as in competition against each other (Frey and Pommerehne 1989, 8). This existence of scarcity and, by necessity, the emergence of preferences, offers a way to examine what economic variables cause governments to widely vary in their allocation of subsidies amongst cultural institutions.

The study presented in this paper will contribute further to the growing cultural economic literature. Using microeconomic theory in combination with econometric analysis, this study methodically builds a cross-sectional model for 518 German municipalities in an attempt to reveal the primary determinants for the allocation of public subsidies amongst the various cultural institutions. Unlike any prior published study, this paper will examine why some municipalities do not provide subsidies for certain cultural institutions while other municipalities designate large public expenditures to promote those same types of institutions.

The paper is organized as follows: the next section discusses the standard applied microeconomic theory of estimating the demand for public expenditure and the problems that this theory confronts in examining the demand function of individuals for cultural goods. A review of the published literature on the theoretical and empirical models on this topic, which extends to what is known today, follows the theoretical discussion. Section Four presents an econometric cross-sectional model in which public expenditure on public libraries, classical orchestras, music schools, theaters, and museums are analyzed in 518 German municipalities with a population greater than 20,000 inhabitants. The model will be appropriate for the purpose of identifying the determinants of the widely different allocations of public funding amongst the cultural institutions. The study's empirical results are discussed in

Section Five and the paper ends with conclusions and extensions presented in Section Six.

2. Economic Theory of Estimating Public Expenditure

2.1 *Public Subsidies*

Within Europe and some countries abroad, the 1950s and 1960s are classified as the time period in which the arts, particularly the elite arts, became popularly regarded as an influential force in urban life, vital for both personal and community development (Throsby 2001, 125). People nourished egalitarian views of culture, and the arts quickly became a means for education and for the encouragement of creativity within communities. Local governments initiated methods to promote artistic production and participation in the cities. Simultaneously, a fear of losing cultural heritage instigated a strong push to perserve historic artifacts and to restore local art collections. By the 1970s, local governments recognized the employment potential as well as the benefits of tourism gained by a wide promotion of the arts (Trosby 2001, 145). A number of non-mutually exclusive roles for culture were rapidly observed by cities throughout Europe and other developed nations. Not only could investment in cultural institutions create symbols and attractions that aided the urban economy via tourists and reputation, such as the Alhambra Palace in Granada, but smaller towns or cities with cultural districts often delightedly recognized their function as thriving centers for constant development and growth. Pittsburgh and Dublin provide prominent examples (Throsby 2001, 124). Additionally, especially pertaining to orchestras and theaters, cultural institutions frequently became a noteworthy portion of the city's total economy.

Local politicians turned a keen eye toward the promotion of culture, recognizing its social desirability and its usefulness as an instrument of policy. Local governments established subsidies to support cultural institutions deemed especially valuable in the city. Often, government support for cultural institutions would come in the form of lump sum subsidies, and this remains the case in many areas worldwide. Still evident today, the politicians' eye has never lost its focus (Throsby 2001, 137).

The question of whether the state should even support the arts, particularly in regard to lump sum subsidies, abounds in the economic literature.[2] In general, economists who believe market failures exist among the arts favor state support of cultural institutions, while proponents often emphasize political failures instead, frequently rejecting the notion of market failures (Throsby 2001, 148).

Supporters of public subsidies argue that private markets fail to consider the positive externalities offered by cultural institutions. By undervaluing the benefits of cultural institutions, purely market-financed cultural goods will not provide suppliers

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[2] For examples, see Hansmann (1981), Hillier and Malcomson (1984), and Throsby (1994).

of these goods with a sufficient portion of society's benefits to cover costs and, consequently, the provision of the cultural goods in the community will be lower than the allocatively efficient amount (Frey 2000, 101). Figure 1, partially reproduced from Santorsola (2005, 12), illustrates this argument well.

In a perfectly competitive market with no externality problems, the market demand curve represents both the marginal private benefit (MPB) and the marginal social benefit (MSB) and the market supply curve represents both the marginal private cost (MPC) and the marginal social cost (MSC). Allocative efficiency is defined as maximizing net social benefit (NSB) and occurs where MSB equals MSC.

Government intervention, such as public subsidies, is deemed necessary if the public, including those who are not direct consumers of cultural institutions, gains

Figure 1. Subsidization in a Market with Positive Externalities in Consumption.
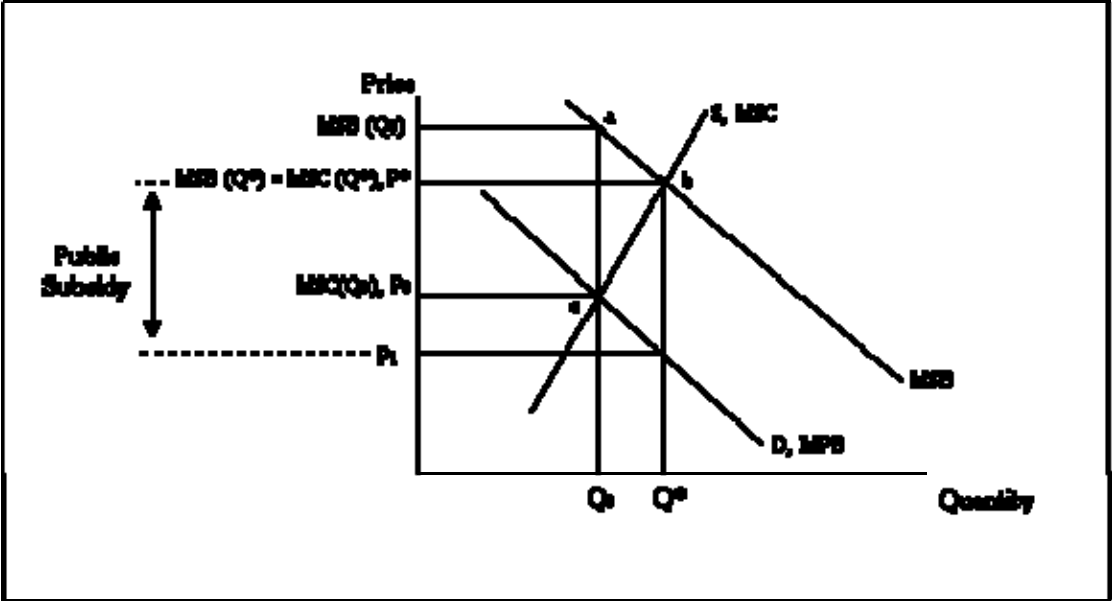
significant positive external effects from culture (Frey 2000, 105). If one believes that cultural industries yield positive externalities to consumers of cultural goods, as supporters of public subsidies often argue, then it can be shown that purely market-financed cultural institutions fail to produce the cultural good at the efficient level. Since a given cultural industry provides positive externalities, the amount of benefits that society as a whole recieves for any additional unit of the cultural good will, by definition, exceed the marginal private cost that a consumer is individually willing to

pay for that additional unit.[3] Individual consumers often do not fully recognize or appreciate the marginal social benefits of cultural goods, and they will consequently underconsume them. Therefore, the marginal social benefit (MSB) will be greater than the MPB. In this case, a purely market-financed cultural instution will only privide Q_0 units of the cultural good, where the MPB equals the supply curve and MSC. At this quantity (Q_0), note that the MSB obtained by consuming an additional unit of the cultural good exceeds the MSC of producing the additional unit. The loss of the NSB in the market is thus equal to the triangular area *abc* (Santorsola 2005, 7).

The argument by supporters of public subsidies concludes that in order for cultural institutions to supply cultural goods at the allocatively efficient level of Q*, the government must provide each cultural institution with a subsidy of the amount equal to the external marginal benefit. The external marginal benefit is depicted in Figure 1 as the price difference from the MSB minus the MPB when the cultural institution is producing goods at the efficient quantity, Q*. Thus, consumers of the cultural good pay P_1 and the government subsidy makes up the rest of the cost, thereby enabling the market participants to produce and consume the allocative efficient quantity of the good.

Most of the recent findings have concluded that, on the whole, official support of the arts and culture should be maintained in at least some way, such as through public subsidies (Frey 2000, 104). Survey results, including various surveys in the Federal Republic of Germany on the theater[4], repeatedly show that the majority of those surveyed "are in favor of government support to art and culture" (Frey 2000, 103). While it is true that other studies, such as those by DiMaggio, Useem and Brown (1978), have demonstrated that those individuals who consistently consume the cultural arts still fervently advocate the idea of public funding for art support due to self-interest, these active demanders compose only a small fraction of the population (Frey 2000, 103). This suggests that the rest of the surveyed participants who advocate increased government support to cultural institutions feel strongly about supporting the arts because the total perceived benefits of public support exceed the total perceived costs of the tax burden the citizens face (Frey 2000, 104). The results of these surveys, therefore, indicate that art and culture provide positive external effects.

The notion that the arts produce positive external effects on a society, rather than just providing the consumption value, is becoming widely accepted. In

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[3] Recall that an "externality" is defined as "the effect of one party's economic activities on another party that is not taken into account by the price system" (Nicholson 2004, 322).
[4] See Marplan (1968) and Biermann and Krenker (1974), among others.

particular, it is held that three externalities exist, which are also called "non-user benefits" because these benefits accrue to all people in the society regardless of whether a person consumes a particular cultural activity (Frey 2000, 2). These three commonly accepted externalities are as follows: "existence value", "option value" and "bequest value".

"Existence value" simply holds that people benefit from culture existing in their society even if they do not participate in any cultural activities (Frey 2000, 2). Cultural activities can promote education, creativity, a sense of identity, jobs, and even tourism within a city. All members, or at least the great majority, of the city will reap these benefits even if they are not directly involved in the consumption. The second positive externality, "option value", maintains that citizens benefit from having the option to attend cultural events, even if they do not presently partake in them. For example, perhaps many of the people are extremely busy most days of the year. These individuals still benefit by being able to attend a cultural activity on those rare days when they are able to take a break and enjoy time off. The third widely accepted non-user benefit, known as the "bequest value", simply contends that people benefit from culture even if they do not consume any of the art because they are still able to pass the culture on to future generations. Culture creates a sense of community and helps to inculcate a regional sense of identity; many people, if not most, fervently wish to pass this identity down through future generations.

Unfortunately, government support of art and culture is not free of problems. For example, the well-known political economist Bruno S. Frey does not agree that market failures in the arts should automatically trigger government intervention (Frey 2000, 10). Some economists point out that government subsidies are often small and that no economic rationale exists behind public support for the arts (The Value 1996, 16 − 17). Critics of public subsidies stress that government support removes any incentive for cultural institutions to strive for market efficiency. Instead, the public subsidies allow art institutions to pursue other objectives, such as higher incomes for employees or the production of excess quality, that are beyond the efficient market level.

Some economists who oppose government subsidies for the arts suggest that public support does not encourage innovation or creativity. In order for large, private performance-art institutions (like the New York Metropolitan Opera House) to survive financially, these institutions must consistently come as close as possible to selling out at every performance. They cannot afford to experiment with risky, new acts that might challenge common social views or open controversial social dialogue on important issues − actions that may contribute to society's benefit. In theory, only

highly-subsidized institutions have the opportunity to perform modern pieces and experiment with new art without concern of survival; but in practice this never actually happens anyway. In a study of highly government-subsidized opera houses in the Federal Republic of Germany, Frey (2000, 98) points out that not even one-tenth of all performances were written within the whole of the twentieth century.

Although lump sum subsidies are still popular with governments worldwide, much argument focuses on other effective methods for government support of the arts. Some economists have argued that a streamlining of bureaucratic regulations and other harmful restrictions would create more support for art and culture than an increase in government lump sum subsidies (Frey 2000, 114).

This debate is fully recognized by the author, and its importance requires note. However, it has been argued that a positive approach relaxes the assumption that a benevolent public decision-maker will attempt to maximize welfare and, thus, allows closer consideration of the collective decision-making process (Economics 2004, 206 – 207). The study presented in this paper, therefore, will present a positive analysis in regards to public expenditure on cultural institutions. This study will not delve into normative economics; it will not attempt to answer whether the government should subsidize performing arts and, if so, to what extent. The study uses lump sum subsidies as data on public expenditures for the purpose of estimating the individual demand function, as will be further explained in Section 3.1. Public support for the arts is neither endorsed nor discouraged.

2.2 *Estimating the Demand Function of Individuals*

Jevons, Menger, and other famous early theorists asserted that, once the minimum necessities to support life are satisfied, humankind's desire for variety in both the necessities and in leisure goods is inexhaustible. This new view of the bounds of human taste as limitless deposed the idea of finite needs (Gagnier 2000, 94). In basic economic theory, it is the tastes and preferences of consumers that constitute the demand (Throsby 2001, 114).

Cultural economists, in stressing the social value of art and its uniqueness, face an unusually difficult challenge in estimating a demand curve composed of individual taste and preference for art. A simplistic business view of art is not appropriate (Economics 1996, xiii). The value given to any commodity is associated with the relationship between utility, price, and the worth that individuals assign to the commodity. In cultural economics, the values assigned to the arts range from the tone value of a musical note and the color value of a painting to the amount of intrinsic worth an individual decides that a given artistic piece possesses (Throsby 2001, 19).

Culture, of course, is assumed to be a superior good: additional spending is allocated to cultural goods, such as orchestra tickets, only after such basic needs as food and shelter are satisfied and the marginal utility of these basic goods diminishes (Schulze 2000). However, there is an additional force in determining individual demand associated with tastes for the arts. An individual's indulgence in literature, music, drama, and the visual arts is extensively tied to the individual's comprehension of, and familiarity with, those arts. Essentially, artistic taste increases with additional consumption. The amount an individual wishes to spend on the arts escalates the more the individual is exposed to the arts (Throsby 2001, 115). Capturing this cultivation of taste in a demand equation for art is essential, and most models take education and cultural experience into account for this purpose. Still, measuring individual demand for the arts remains a challenge.

Individual demand for the arts and culture are expressed to varying extents in several ways. At ticket sales, art auctions, book purchases, and other direct markets for the arts, individuals express their demand in monetary terms, akin to numerous other markets. However, direct markets fail to show any positive externalities that are believed to exist. Preferences for the arts are also indirectly expressed. People may choose to accept a lower income or forgo other opportunities in order to live in a city with a larger cultural atmosphere. Similarly, in a democracy, voters express their opinions on the arts through the officials they elect to office and through their votes over the use of public expenditure (Frey and Pommerehne 1989, 7). Still, these indirect expressions cause measurement problems as well. While the relationship

between economics and art is believed to be best represented via public policy and the political sphere, problems with this method must be recognized (Throsby 2001, 137). For instance, the principal-agent relationship between the voters and the relevant agencies of the representative governments is impaired by monitoring costs, and the government is relatively free to exercise policy discretion over funding towards the arts and the type of arts emphasized. Thus, the funding for different types of arts might be correlated with the political party in power and whether elections are fast approaching.

The methods and economic models for evaluating individual demand will be thoroughly discussed in Section 3.1. But first, a few other difficulties faced in modeling individual demand for the arts must be recognized.

2.3 *Lindahl versus Bowen Equilibriums*

In order to finance public subsidies that support the arts, governments institute some form of a tax measure. In this way, all members of a city are required to pay a tax share. This is deemed a sensible method of raising the funds for public expenditures since every individual in the society will enjoy nonexclusive benefits from the existence of additional cultural goods, as explained in Section 2.1. Also, obligatory taxes avoid the free-rider problem that is otherwise inevitable for public goods and merit goods, including the arts. Due to the nature of the three nonexclusive positive externalities of culture and art in a city, the free-rider problem refers to the situation in which individuals living in the city have an incentive not to pay for the cultural institutions in the hopes that other citizens will fund the arts instead. In this way, the free-riders will enjoy certain benefits from the provision of the arts that others are funding. Unfortunately, determining the efficient quantity of a public good is problematic.

Within economics, substantial progress has been made in analyzing tax and expenditure problems in an effort to discover Pareto efficient levels for public goods. In 1919, Lindahl first revealed that a Pareto efficient equilibrium in people's demands for public goods theoretically exists for obligatory taxation. This equilibrium, referred to as the Lindahl equilibrium, occurs when the tax shares exactly equal the level of public good production undertaken by the government (Foley 1970). Lindahl showed that if a public good exists at a level below that of the efficient quantity level, then the totality of all residents in the city would be willing to pay more than 100 percent of the public good's cost in the form of total taxes and the citizens would vote to increase the level of production. Conversely, if a public good exists beyond its efficient level, then residents as a whole would not be willing to pay the total cost of such high production

of the cultural good, and they would vote for reductions in the amount of government subsidies being provided (Nicholson 2004, 551).

In achieving the efficient level of output for the arts, the tax shares set in the Lindahl equilibrium are analogous to prices set in a perfectly competitive market. Unfortunately, the Lindahl equilibrium is not practical. Achieving Lindahl equilibrium requires that all individual demands for public goods (or cultural goods) may be calculated (Nicholson 2004, 551). As explained in Section 2.2, measuring individual demands for public goods is problematic. The Lindahl equilibrium is highly restrictive in that it requires both an efficient output of the public good and an equitable distribution of tax shares among individuals.

A model developed by Bowen in 1943 relaxes the equitable tax share restriction, allowing more room to use this model in practical circumstances. Bowen (1943) attempted to develop economic theory that may be used normatively to solve the problem of attaining an efficient level of production of social goods under some of the more common voting methods, including simple majority voting and plurality voting. The Bowen Equilibrium is originally Pareto optimal, although not necessarily equitable. However, the Bowen Equilibrium is often slightly manipulated in ways such that it is generally not Pareto optimal, but still highly useful in combination with the median-voter theorem, as Bergstrom and Goodman demonstrate in a 1973 paper (Angier and McCaleb 1977). This will be discussed more thoroughly in Section 3.2.

2.4 *Tiebout Bias*

In econometric analysis, an estimation bias results whenever economic agents select options on the basis of the dependent variable (Tresch 2002, 914). It must be noted that one particular form of this bias, commonly known as the Tiebout bias, may affect the results presented in this paper.

The Tiebout model holds that citizens can always "vote with their feet." When choosing a place to live, households may take into account the number of local public services in each municipality and choose the municipality that provides their ideal level of local public goods. Likewise, if a household becomes unsatisfied with how much of a local public good is being provided in the community with which they reside, the household may simply move to another municipality with like-minded people (Tresch 2002, 914-916). For instance, if household A really values public libraries but does not like the theater, then household A will probably move to a municipality that has chosen to spend much of its total expenditure on public libraries and nothing on theaters, rather than pay taxes in a municipality that directs much of its expenditure away from public libraries. In this way, the residents of a municipality

may be partially determined by a self-selection process, by households who move as a result of having similar, unobserved preferences.

While some of the assumptions of the Tiebout model, such as the assumption of perfect information and mobility, may not hold in reality, economic literature has reported evidence that households do in fact "vote with their feet" (O'Sullivan 2007, 328).[5] Nonetheless, Rhode and Strumpf (2003) developed an extension of the Tiebout model and found that a decline in mobility costs led to a decreasing heterogeneity across communities of individual public good preferences and of public good provision, rather than the weak increase predicted in the Tiebout model.

Given that the study presented in the following pages attempts to estimate the amount of public expenditure demanded for several cultural institutions, it must be acknowledged that a self-selection process by citizens implies that any sample drawn from the municipalities may not be entirely random in regards to the underlying population. If an empirical study is estimated on the demand for public expenditures on a local public good, then the Tiebout bias threatens to bias the coefficients of the independent variables (Tresch 2002, 913-914).

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[5] For evidence of the Tiebout model, see Heikkila (1996), Fisher and Wassmer (1998), and Panizza (1999).

3. Review of the Empirical Literature

3.1 *A Comparison of the Theoretical Models*

Solely based on presumptions for the study at hand, without any supporting theory, Fabricant (1952) used multiple regression analysis to estimate the determinants of publicly supplied goods and services (Pommerehne and Frey 1976). He was able to statistically explain more than 70 percent of the variance of per capita expenditures, and his study quickly initiated an array of ad hoc empirical studies which utilized average values of per capita income with no supporting theory. This method of estimation without theory became so popular that it has sometimes been referred to as "the traditional method," such as in a paper by Pommerehne and Frey (1976).

Four years prior to Fabricant's study, Black (1948) had developed a broad theory applicable to voting behavior. His study demonstrated that a median voter position is decisive in a majority vote direct democracy over the quantity of public goods to be provided by the government. The value and the use of the median voter theory was further shown by Barr and Davis (1966) and then generalized by Rae and Taylor (1971) (Pommerehne and Frey, 1976). However, a perusal through the economic literature makes it clear that this theory did not take a firm hold in economic research as an estimation technique until the mid-1970s.

In a novel paper, Bergstrom and Goodman (1973) present a model of the demand for public goods which they use to estimate certain parameters of the demand function (Angier and McCaleb 1977). Three years later, in a 1976 study, Pommerehne and Frey report on the two competing approaches to the problem of estimating public expenditures: the traditional regression approach which uses the average values of per capita income and other variables for explanatory variables, and a theoretically based public choice model of the median voter which uses median values of income and other voter characteristics. Their study compares the performance of the two models by applying each model to the same set of 1969 data taken from a cross-section of 74 townships in the canton of Baselland, where the insitutional framework was acceptable for each. While the R-squared values were 0.990 and 0.991 for the traditional model and median voter model, respectively, only the parameters estimated with the median voter model resulted in many of the theoretically expected signs and were found to be statistically significant. Very few of the parameter estimates by the traditional model were significant. Ultimately, Pommerehne and Frey (1976), concluding that the median voter model is much better suited to explain the demand for publicly supplied goods than is the traditional approach, strongly recommend the move away from estimation without theory.

The study presented in this paper will proceed with an explicit politicoeconomic model in the explanation of public expenditures. This paper will utilize the theoretical methodology and mathematical formulas originally developed by Bergstrom and Goodman (1973) using the median voter model, applying a limitted number of modifications to this initial approach.

3.2 *Bergstrom and Goodman (1973) and the Median-Voter Approach*

As noted by Bowen (1943), the most accurate substitute for consumer choice of a publicly funded good is voting. Since each individual will vote in favor of a program which provides a quantity at which her marginal rate of substitution of the good for other goods is equal to or greater than her marginal cost in terms of tax payments, the possible use of voting as a means of determining the ideal output should be explored. For local expenditures decided by direct vote, the median-voter model has been demonstrated to be the most appropriate model, as long as the tax system remains unchanged (Pommerehne and Frey 1976). Additionally, the median-voter approach can also apply to a representative democracy, where decisions about budgets are made by elected officials.

The median-voter approach in a representative democracy might work as follows: Imagine a municipality that provides a single local public good, such as public libraries. There are two candidates, Jane and Anne, running for office and the only platform pertains to the amount of expenditure directed to subsidize public libraries. Jane runs for office with the promise to spend $1,000 on public libraries, whereas Anne promises to spend $500 on public libraries. Each citizen will clearly vote for the candidate whose proposal is closest to the his or her preference.

Assuming that the voters' distribution of budget preferences is a normal distribution and the median voter prefers $750 be spent on public libraries, then a tie in votes would occur between the candidates. All citizens prefering less than $750 be spent would vote for Anne, all citizens prefering that more than $750 be spent would vote for Jane, and those preferring that exactly $750 would split, half voting for Anne and the other half for Jane. This gives each candidate an incentive to inch her platform closer to the $750 mark, because the candidate who is closest to the $750 mark will win the votes of the median voter, thus winning the election. As a result, Jane and Anne will continue to revise their proposed budgets until they reach the desired budget of the median voter. At this budget, the median voter has determined the amount allocated to libraries, the candidates are in equilibrium, and it doesn't matter who wins with regards to how much money gets allocated to subsidize libraries (O'Sullivan 2007, 335-337).

The biggest implication of the median voter approach for this paper is that the results of elections can be used to estimate the elasticities of demand for local cultural goods. In their 1973 paper, Bergstrom and Goodman developed a median voter model for estimating the demand function of individuals for municipal public services.

While individual demand for a local public good cannot be directly observed by varying the price or the profit levels of a public good, the choices made by a number of distinct municipalities can be observed. Acknowledging this, Bergstrom and Goodman (1973) provide five simple assumptions on the nature of the political process within each municipality that would enable such a cross-sectional analysis. Their five assumptions, some parts quoted from their paper in order to maintain accuracy, are listed as follows:

I. Each municipality j is able to provide a given commodity at constant unit cost q_j.[6]

II. "For each consumer i there is a tax share t_i such that i must pay the fraction t_i of the total cost of municipal expenditures in his community" (281). Although consumer i's tax share may be dependent on his or her wealth, income, or other individual characteristics, the tax share remains independent of the amount of municipal expenditures and the preferences regarding municipal services that he or she expresses.

III. Each consumer i living in municipality j is aware of his or her "tax price," $t_i q_j$, and is able to determine his or her preferred quantity of the municipal commodity with the realization that he or she must pay the fraction t_i.

IV. "In each municipality, the quantity supplied of the municipal commodity is equal to the median of the quantities demanded by its citizens" (281).

V. "In each municipality the median of the quantities demanded is the quantity demanded by the citizen with the median income for that municipality" (281).

Assumption II is noteworthy because people, recognizing that their tax shares will increase if they demand more public goods, often do not divulge their true demand for

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[6] Regardless of whether unit costs differ between municipalities, as long as there is a constant returns to scale for the production function of all municipalities, a change in output results in a proportional change in total costs. Thus, unit costs remain constant with respect to output.

municipal goods (Foley 1970). Also, Bergstrom and Goodman (1973) go on to define a Bowen equilibrium as an allocation of a municipal service that satisfies Assumptions I – IV, although here the Bowen equilibrium is not always Pareto efficient.[7] By mentioning this, Bergstrom and Goodman (1973) are able to suggest that the Lindahl equilibrium could then be used in their model as a normative criterion to measure the efficiency of their outcome, since the Lindahl equilibrium requires Pareto efficiency (as discussed in Section 2.3). Assumption V is added because, combined with Assumption IV, it means that consumer i with the median income is also the median voter (prefers the median quantity of the municipal good) and consumer i's preferred quantity equals the quantity of municipal goods that the municipality j chooses.

In using Assumption I – V to model the quantity of a municipal good demanded by one of its citizens, it is necessary to consider the type of municipal good being supplied. In larger cities, costs of providing municipal commodities are divided amongst more citizens so that tax shares would tend to be smaller. Since a pure public good, as defined by Paul Samuelson, is both nonrival and nonexclusive, larger cities will tend to vote for larger quantities of the commodity.[8] Conversely, if the municipal good is an impure public good, then the commodity exhibits rivalry; its usefulness to others is reduced when an additional individual uses the good, and cities may demand less of the municipal good as the municipal population increases (Bergstrom and Goodman 1973).

The usefulness of a public facility, such as a public library, to any individual can be modeled by a function of the form $Z^* = Z \cdot n^{-\gamma}$, where n signifies the number of people sharing the good and Z is the quantity of the public good. The symbol γ is the crowding parameter, such that $\gamma = 0$ if the public good is a Samuelsonian pure public good and $\gamma = 1$ if the good is fully divisible in consumption, where n citizens consume only $1/n$ portion of the good. Thus, the equation shows that a crowding parameter (γ) greater than 1 indicates diseconomies of scale in the consumption of the good, while a crowding parameter less than 1 would indicate economies of scale in

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[7] It has not escaped this author's attention that there exists controversy over Bergstrom and Goodman's definition of the Bowen equilibrium. Agnier and McCaleb (1977) argue that assumptions III and IV do not match with those published by Bowen (1943). Agnier and McCaleb contest that Bergstrom and Goodman significantly adjusted the conditions of the Bowen equilibrium to fit their objective by turning the originally normative Bowen equilibrium into a purely positive use. Further, the Lindahl equilibrium would be too restrictive to be used. Agnier and McCaleb declare that Bergstrom and Goodman should use the original normative Bowen equilibrium, which is Pareto efficient, as a criterion to measure the efficiency of their outcome. While this controversy is necessary to acknowledge, there is no reason for further concern about this for the purposes of this paper.

[8] Nonrival means that use of the commodity by one individual does not reduce its usefulness to others. Nonexclusive means that individuals cannot be prevented from using the commodity (Nicholson 2004).

consumption. This equation can also be rearranged using simple algebra to $Z = Z^* \cdot n^\gamma$ (Bergstrom and Goodman 1973).

Each individual i has a fixed endowment of income, Y_i, that can be spent on goods X_m and Z. If the utility function of individual i is $u_i(X_m, Z^*)$, where X_m is the quantity of private goods in which individual i consumes and Z^* is still the usefulness of the locally produced public good to individual i, then the demand function of individual i will be equal to the maximization of his or her utility, max $u_i(X_m, Z^*)$ (Bergstrom and Goodman 1973).

If the unit cost of the private good is p_m, the unit cost of the public good is q, and the tax share of the consumer i is t_i, then consumer i's tax price for the public good is given by $(t_i \cdot q)$ and his or her budget constraint is

$$\hat{Y}_i \geq p_m \cdot X_m + t_i \cdot q \cdot Z$$

where $\hat{Y}_i$ is equal to the median income in municipality$_j$ since the fixed income of consumer i is assumed to be the median income from the initial assumptions of the model. Remembering that $Z = Z^* \cdot n^\gamma$, the budget constraint can also be written as

$$\hat{Y}_i \geq p_m \cdot X_m + t_i \cdot q \cdot n^\gamma \cdot Z^*$$

To determine the demand function of individual i for the usefulness of the locally produced public good (Z^*), suppose that there are constant price and income elasticities δ and α for the commodity Z^*. Since the price is functionally equal to $(t_i \cdot q \cdot n^\gamma)$, the demand function for Z^* is given by

$$Z^* = c \cdot [t_i \cdot q \cdot n^\gamma]^\delta \cdot \hat{Y}_i^\alpha \qquad \textbf{(Eq. 1)}$$

where c is a constant, δ is the price elasticity of demand for the public good, and α is the income elasticity of demand for the public good. Again recalling that $Z = Z^* \cdot n^\gamma$, individual i's demand for Z is given by

$$Z = c \cdot [t_i \cdot q \cdot n^\gamma]^\delta \cdot n^\gamma \cdot \hat{Y}_i^\alpha = c \cdot t_i^\delta \cdot q^\delta \cdot n^{\gamma(1+\delta)} \cdot \hat{Y}_i^\alpha. \qquad \textbf{(Eq. 2)}$$

Take the double-log function form to get

$$\log Z = a + \delta\log(t_i) + \delta\log(q) + \gamma(1+\delta)\log(n) + \alpha\log(\hat{Y}_i) + \varepsilon \qquad \textbf{(Eq. 3)}$$

where a is the constant, equal to log(c), and ε is the estimated error term (Bergstrom and Goodman 1973).

Considering that defining the output of a cultural institution is ambiguous, it is important to make the dependent variable of the estimating equation be expenditures per capita using the equation

$$E/n = (qZ)/n \qquad \textbf{(Eq. 4)}$$

where E is total expenditures in municipality j, n is still the number of people sharing the public good, Z is still the quantity of the public good, and q is still the unit cost of the public good (Tresch 2002, 909). This is equivalent to

$$\log(E\,/\,n) = \log(q) + \log(Z) - \log(n) \qquad \textbf{(Eq. 5)}$$

Substituting for $\log(Z)$ from Equation 5 into Equation 3 and rearranging the terms yields

$$\log(E\,/\,n) = a + (1 + \delta)\log(q) + \delta\log(t_i) + \alpha\log(\hat{Y}_i) + [\gamma(1 + \delta) - 1]\log(n) + \varepsilon \qquad \textbf{(Eq. 6)}$$

Finally, the utility functions of citizens differ by a set of taste parameters, T_j, that can reflect relevant municipality characteristics (Tresch 2002, 910). These taste parameters can be added to the estimated equation, Equation 6, maintaining the double-log form:

$$\log(E\,/\,n) = a + (1 + \delta)\log(q) + \delta\log(t_i) + \alpha\log(\hat{Y}_i) + \beta\log(n) + \sum\varphi_j\log(T_j) + \varepsilon \qquad \textbf{(Eq. 7)}$$

where β is defined as equal to $[\gamma(1 + \delta) - 1]$, so that the coefficient of β represents the elasticity of demand with respect to population.

The median-voter model, as expressed in double-log form in Equation 7, allows econometricians to estimate the price, income and population elasticities in the demand for cultural goods via cross-section analysis (Pommerehne and Frey 1976). The error term, ε, is assumed to be normally distributed with a mean of zero and constant variance. The tax share elasticity is given by δ, the income elasticity is given by α, the population elasticity is given by β, and the crowding parameter is given by γ, which is equal to $[(\beta + 1)\,/\,(1 + \delta)]$.

3.3 *Recent Studies*

There have occasionally been reports concerning the detrimental effects of leaving decisions about the arts to citizens via popular referenda or through a representative democracy. The argument holds that people do not understand good art and, thus, will not support it (Frey 2000, 8-9). However, studies have shown otherwise. According to the current cultural economics literature, people value the

arts for five reasons: the consumption value, the option value, the existence (or prestige) value, the education value, and the bequest value (Schulze 2000; Frey 2000, 32). Smolensky (1986) specifically concludes that education externalities was the justification for municipal involvement in the finance of fine arts museums, according to a study on scattered data from the 1880s and 1890s. More generally, support of people valuing the arts via direct democracy has been demonstrated through a referendum where 54 percent of voters voted for the Swiss Canton of Basle City to purchase two Picasso paintings, to be funded using tax funds. If citizens do not understand art and if narrowly defined motives of self-interest are only taken into account, this vote on public expenditure for extremely expensive art would be difficult to explain (Frey 2000, 101-102).

Whatever the reasons, the importance of cultural goods is evidenced in every society. The consumption of cultural goods is considered to be "positively addictive;" the more cultural goods consumed, the higher the marginal utility (Throsby 1994). Culture, of course, is assumed to be a superior good, as explained in Section 2.2.

In many countries, especially in continental Europe, the performing arts are heavily subsidized, and this makes them ideal for cultural economic analysis. In Germany, for example, Schulze (2000) reports that public funds amount to over 80% of the budget for orchestras and public theaters, and this support is based on direct public subsidization rather than on taxes.[9] In fact, public expenditures on the arts accounts for 0.21 percent of the German GDP. These arts, including public libraries, orchestras, music schools, theaters, and museums, are predominantly supported by municipal governments in Germany, rather than the federal or state government. Thus, local politicians are the relevant decision-makers on issues of public funding, and cultural policy is one of the few areas where local politicians enjoy such authority (Schulze 1998; Frey and Pommerehne 1989, 21).

A number of studies have attempted to examine voter preferences for the arts in a given community. Borcherding and Deacon (1972) offers one of the first models of public spending derived from the median-voter approach. Their model was groundbreaking in that it not only conformed with the economic theory of majority rule (rather than an ad hoc model that lacked theory, as was the traditional approach at the time, explained in Section 3.1), but for the first time it also estimated the price elasticity of demand and the "degree of publicness" of the goods produced. Borcherding and Deacon (1972) found income elasticities to be positive and

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[9] In contrast, the United States primarily supports the arts via taxes rather than lump sum subsidies, and the U.S. provides relatively little support of the arts compared with Europe (Schulze 2000; The Value 1996, 77).

statistically significant, usually between 0.2 and 1.0; most of the price elasticities to be negative and statistically significant; and the "degree of publicness" of the goods produced to be near unity or even positive, suggesting private rather than public goods. The authors advised extreme caution in interpreting their "degree of publicness" parameter.

The "degree of publicness" parameter according to the median voter demand has often been reported in the literature as suggesting that local governments provide non-public goods. In response to this problem, Seaman (1981) stresses careful model construction in empirical studies on the finance of the arts. Seaman argues that there is no rationale for using the number of performances or actual ticket sales as output measures, and suggests that it is better to view the product most directly provided by the government as simply money grants. If other output measures are used, Seaman explains that the crowding test will fail because the attempt to estimate the degree of publicness with a crowding parameter will be misleading. Still, the problem persists according to Edwards (1986), who used New York State data and the original Bergstrom and Goodman (1973) model to find that there is even less evidence of publicness in small towns compared to large towns.

Another issue sometimes cited by economists is that the principal-agent relationship between the voters and the relevant agencies of the representative governments is impaired by monitoring costs, and the government is relatively free to exercise policy discretion over funding towards the arts and the type of arts emphasized. However, Wittman (1989) argues that the markets of a representative democracy work as well as economic markets and contests that previous studies have exaggerated the principal-agent and informational problems that exist in electoral markets.

Schulze and Ursprung (2000) analyze the support for operas in the Canton of Zurich in a study of direct democracy, investigating a referendum held in 1994. Their results strongly support the notion that "public support for the arts is coupled to the stable preferences of the electorate" in democracies, at least to some extent (131). They find that voters' preferences are closely tied to the variables typically used in empirical studies attempting to explain individual demand for public support for the arts in representative democracies: income, tax share, and population.

Although the results of Schulze and Ursprung (2000) endorse the view that public support for the arts reflects the electorate's preferences, a 1998 study by Schulze and Rose found that conservative politicians tend to support classical orchestras more than Social Democratic and Green politicians. Municipalities with a longer history of conservative compared to liberal governments tend to fund orchestras

more heavily than communities governed by either the Social Democratic Party or Green Party (Schulze and Rose 1998). Although the reasons for this are not known, it is plausible that this emerges as a result of the parties' own ideological goals and interests in well-established cultural institutions. Schulze and Rose (1998), however, analyzed only high-brow orchestras, called Kulturorchester, that included a mere 42 symphony orchestras and seven chamber orchestras, a rather small and exclusive sample.

3.4 *Gaps in the Literature*

No study has yet methodically examined a large database of all German municipalities (with and without subsidies to the arts) in an effort to reveal the main determinants of the subsidization. No study has considered why some municipalities do not pay anything for some cultural institutions while other municipalities designate large public expenditures for those arts. No study has yet directly and extensively examined the amount of public spending allocated to a cultural good – such as the public library, classical orchestra, music school, theater or museum – based on the political party currently in power and the year until the next upcoming election in a cross-sectional analysis. No study has significantly examined whether spending on the arts increases immediately before elections or whether spending by some parties emphasize public libraries and music schools while others emphasize orchestras and theaters. Aside from simply adding to the literature on the discussion of issues such as the potential diseconomies of scale of cultural commodities, these are additional areas where this paper contributes to the rising branch of cultural economics.

4. Theoretical Model and Empirical Estimation

4.1 *Model Equations and Data Specification*

This study analyzes public expenditures on five cultural institutions: public libraries, classical orchestras, music schools, theaters, and museums. The study consists of a cross-sectional analysis of all 518 German municipalities with a population size of at least 20,000 inhabitants.[10,11] This database is exceptionally large and, as of the date submitted, remains the largest study on public expenditure. The data used in this study are from the year 1991, one of the most recent years in which detailed cultural subsidies are reported by municipality. All of the data are available from <u>Statistisches Jahrbuch Deutscher Gemeinden</u>, edited by Deutscher Städtetag and published in 1992.

Municipalities with populations of 20,000 or greater were chosen in order to provide more accurate estimated coefficients. It seems probable that most citizens have a rather imprecise perception of their tax shares, and these independent errors of perception could statistically distort regression estimates. However, Bergstrom and Goodman (1973) show that in large populations ("large" is defined here as municipalities with at least 10,000 inhabitants) the effects of independent errors of perception tend to cancel out in such a way that distortions in the estimated regressions from citizens' misperceptions of their tax shares are likely to become negligible.

The study presented here uses the theoretical model first introduced by Bergstrom and Goodman (1973) with the slight modifications, such as expenditure per capita rather than just expenditure as the dependent variable, described in Section 3.2. Economic theory now holds that price, income, and population are important determinants of the demand schedule of the median voter (Borcherding and Deacon 1972; Schulze and Ursprung 2000). Furthermore, Schulze and Rose (1998) demonstrate the significance of public debt and the incumbent political parties in influencing the level of public support for the arts. Taking these and a few additional variables that logical reasoning suggests might significantly influence public expenditure on the arts, the total list of dependent and independent variables used in this study is provided in Table 1 and Table 2, respectively. In all relevant cases, the

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[10] Note that a cross-sectional data set is defined as a set of observations that represent different economic entities from the same point in time (Studenmund 2006, 22).
[11] Berlin, Bremen, and Hamburg were excluded from this study because of their unique status as both municipalities and their own federal states. Such status skews the analysis of public expenditures on the arts for these municipalities.

variables are in terms of per capita to avoid heteroskedasticity problems due to variation in the sizes of the municipalities.

Table 1. List of the Dependent Variables

Variable	Description
LIBRARY	Subsidy (in DM per capita) municipality$_j$ spent on public libraries in 1991
MUSEUM	Subsidy (in DM per capita) municipality$_j$ spent on museums in 1991
MUSIC SCHOOL	Subsidy (in DM per capita) municipality$_j$ spent on music schools in 1991
ORCHESTRA	Subsidy (in DM per capita) municipality$_j$ spent on orchestras in 1991
THEATER	Subsidy (in DM per capita) municipality$_j$ spent on theaters in 1991

Table 2. List of the Independent Variables

Variable	Description
INCOME	1991 Net taxes (in DM per inhabitant) in municipality$_j$, serving as a proxy
TAX SHARE	Fraction of total expenditures covered by tax revenue (in DM) in municipality$_j$
POPULATION	Total population of municipality$_j$ in 1991
DEBT PER CAPITA	Amount of 1990 debt (in DM) per inhabitant in municipality$_j$
WOMEN IN PARLIAMENT	Fraction of women councilors in the municipality$_j$ parliament in 1991
CDU	Fraction of CDU Party councilors in the municipality$_j$ parliament in 1991
FDP	Fraction of FDP Party councilors in the municipality$_j$ parliament in 1991
FREE PARTY	Fraction of Free Party councilors in the municipality$_j$ parliament in 1991
GREEN PARTY	Fraction of Green Party councilors in the municipality$_j$ parliament in 1991
SPD	Fraction of SPD Party councilors in the municipality$_j$ parliament in 1991
BADEN-WÜRTTEMBERG	Dummy equal to 1 if municipality$_j$ is in Baden-Württemberg (and 0 otherwise)
BAYERN	Dummy equal to 1 if municipality$_j$ is in Bayern (and 0 otherwise)
HESSEN	Dummy equal to 1 if municipality$_j$ is in Hessen (and 0 otherwise)
NIEDERSACHSEN	Dummy equal to 1 if municipality$_j$ is in Niedersachsen (and 0 otherwise)
NORDRHEIN-WESTFALEN	Dummy equal to 1 if municipality$_j$ is in Nordrhein-Westfalen (and 0 otherwise)
RHEINLAND-PFALZ	Dummy equal to 1 if municipality$_j$ is in Rheinland-Pfalz (and 0 otherwise)
SCHLESWIG-HOLSTEIN	Dummy equal to 1 if municipality$_j$ is in Schleswig-Holstein (and 0 otherwise)
SAARLAND	Dummy equal to 1 if municipality$_j$ is in Saarland (and 0 otherwise)

CAPITAL	Dummy equal to 1 if municipality$_j$ is a state capital (and 0 otherwise)
YEARS TO ELECTION	Number of years remaining until the next election in municipality$_j$ ("0" if the next election will be held in 1991, "1" if next election will be held in 1992, "2" if next election will be held in 1993, and so forth)

Two aspects of the explanatory variables must be noted. First, because data on income is not readily available for German municipalities, the measurement of net taxes per inhabitant in each municipality serves as a proxy variable. While the net taxes per inhabitant variable theoretically has a very high correlation with income per inhabitant, this variable does not yield the value of the median-income individual in each municipality. This leads to the second point, which is that data on the median-voter is unavailable and could not be used. Thus, the tax share measures the average, or mean, tax share rather than the tax share of the median voter. Still, it is unlikely that this will impair the results.

A number of empirical cross-sectional studies on voter turnout report that individuals with relatively higher income vote more frequently than those with a lower income (Ashenfelter and Kelley, 1975; Cebula and Murphy, 1980; Crain and Deaton, 1977). As Filer *et al.* (1993) and Stigler (1970) note, the government is often perceived as a means for the redistribution of income and, for this reason, elections are considered battlegrounds over income redistribution. Since individuals with relatively high incomes have more to gain or lose from the outcome of an election, Filer *et al.* (1993) conclude that those with relatively high incomes will exhibit the highest turnout rates in voting. Therefore, the median voter might not have the median income but, rather likely, a higher income. Since it can be assumed that the mean income is higher than the median income, using taxes per inhabitant as a proxy for the mean income will not worsen the outcome of the results in this study. Additionally, regardless of this particular argument, the variables in this estimation are the best approximations of the theoretical variables that are available.

Since cultural goods are superior goods, it is postulated that income (represented by tax as a proxy) will have a positive impact on the demand for public expenditure on cultural institutions. Moreover, because income frequently correlates with education level and because art is believed to require the cultivation of taste that often correlates with education level (discussed in Section 2.2), income should have a positive impact on individual demand. Tax share, which essentially represents the price to inhabitants of public expenditures on cultural institutions, is expected to have a negative impact on the demand for public expenditure. Population, like income, is expected to have a positive impact on the demand for public expenditure, although the reasoning is somewhat more complex than that for income and tax share. If cultural goods are pure public goods, an increase in the number of inhabitants will not reduce the usefulness of these institutions to others and will only affect the quantity of municipal goods demanded indirectly. Since costs would be divided among more citizens and tax shares would tend to be smaller, more public commodities are

expected to be voted for with increasing population size. Of course, if crowding of cultural institutions occurs, population size may have a direct effect on individual demands as well. A crowding parameter will also be calculated for each regression. While the externalities associated with cultural commodities suggest a crowding parameter much less than 1, much of the previous literature has, surprisingly, reported crowding parameters near unity.[12] Additionally, debt (per capita, to account for the size differences in this cross-cultural study) is included as an explanatory variable because it seems logical that municipalities with larger debt will be likely to have lower expenditure on cultural institutions – superior goods – until the debt is decreased. Debt is thus expected to have a negative impact on public expenditure on cultural institutions.

Given that the cultural institutions are predominantly supported by municipal governments in Germany, the local politicians are the relevant decision-makers on issues of public funding (Schulze 1998; Frey and Pommerehne 1989, 21). Since cultural policy is one of the few areas in which local politicians can exercise authority, it is not unreasonable to assume that the political parties competing for office run with platforms that differ on the types of cultural institutions that they support.[13] Voters elect the parties they prefer into office, so the fraction of each political party in a municipal government might significantly affect the amount of public expenditure allotted to particular arts, which reflects the voters' preferences. Parties generally associated with educated and upper-class voters – the conservative/liberal party governments rather than the Social Democratic/Green party governments – will likely allocate more spending for orchestras and the high-class arts. Therefore, a variable for each fraction of a political party in the municipal parliament has been included as independent variables, as well as a variable for the fraction of women in the municipal parliament. The fraction of women in power may also influence public expenditure. For instance, studies have shown that females are significantly more likely to use public libraries than males. The Book Marketing Limited (BML) uses an existing panel of 7000 households designed to be representative of households in Great Britain and reports that approximately seven out of ten women visited libraries in the previous 12 months, compared to about six out of ten men (Book 1998, 3.2). While this study

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[12] Recall that the crowding parameter is equal to zero, $\gamma = 0$, then the public good is a Samuelsonian pure public good (nonrival and nonexclusive). If the crowding parameter is equal to one, $\gamma = 1$, then the cultural commodity essentially acts like a good divided equally among all citizens, where "the individual's preferences are as if he received and enjoyed only the fraction $1/n$ of the total amount of the public good" (Bergstrom and Goodman 1973, 282).

[13] As described in Section 3.3, Schulze and Rose (1998) found that conservative and liberal politicians tend to support classical orchestras more than Social Democratic and Green politicians in German municipalities.

occurred in Great Britain, it seems likely that there would be little difference in Germany. It is thus predicted that a higher fraction of women in parliament will positively affect the public expenditure for libraries, while this variable may negatively affect public expenditure allotted toward some other cultural commodities, like orchestras.

Additionally, the principal-agent relationship between the voters and the relevant agencies of the representative governments strongly suggests that the funding for different types of arts may likely depend upon the proximity of the next election. As described in Section 2.1, additional public expenditure on the arts is particularly appealing to local politicians hoping to provide a favorable economic boost upon the community, to leave lasting marks of accomplishment, and to use the theater or the orchestra as sites for making positive appearances before citizens. Since cultural policy is one of the few areas that local governments can directly affect, it is predicted that politicians will often use cultural events as an important stage for favorable appearances in an effort to gain votes. If this is so, the time until the next election will have a negative impact on public expenditure (public expenditure on the arts will increase as the time to the next election falls, drawing nearer).

The variable measuring the years to the next election, however, was statistically insignificant in all regressions performed. When adding the variable YEARS TO ELECTION to a regression as an explanatory variable, the adjusted R-squared failed to increase and the coefficients of the other explanatory variables were hardly affected. While the theory for the variable YEARS TO ELECTION is sound, the fact that this study is purely cross-sectional, examining the 518 municipalities at only one point in time, proved problematic. Since municipal election dates vary between states but are identical within each state and since this study only involves one point in time, variations in the time left until the next elections in any given municipality$_j$ could only be drawn from state dummy variables. Hence, given the perfect multicorrelation between state dummies and the YEARS TO ELECTION variable, this result of insignificance should not be surprising. Such an analysis cannot work when using state dummies and, as a result, the variable YEARS TO ELECTION has been dropped entirely from the estimated regressions.

Intercept dummies are vital in these regression estimations to avoid bias. Regressions using microeconomic data often include dummies representing regions, such as federal states or state capitals, in order to account for any varying conditions in external factors between the communities (Kennedy 2003, 254). Thus, an intercept dummy variable has been included for every German federal state, except one:

Saarland.[14]   One of the dummy variables must be ommitted from the estimated equations in order to avoid perfect multicollinearity, to avoid the sum of all included dummy variables from creating a column of pure ones identical to the implicit intercept variable (Kennedy 2003, 249-250).   This simply means that the omitted dummy variable, Saarland, serves as the base to which the other German federal states will be compared when interpreting the coefficients of each federal state dummy variable (Kennedy 2003, 250).   Furthermore, an intercept capital dummy variable equal to one if the municipality is a state capital is included in the regression since it is logical to assume that capitals are expected to provide higher expenditures for the arts due to their elevated status within their respective German federal state. Of course, it is also likely that this higher expenditure is funded more than usual from federal state funds rather than municipality funds, so it is not clear whether the expenditure of state capitals actually spend more or less of their own municipal funds on cultural institutions. It seems likely that less funds will actually come from the municipality that is a state capital, simply because capitals often receive increased state funding to spend. This reasoning suggests a negative coefficient for the dummy variable of state capitals.

Taking Equation 7 from Section 3.2 and plugging in the variables defined here yields the following functional form:

$$\log(E/n) = a + \delta\log(\text{Tax Share}) + \alpha\log(\text{Income}) + \beta\log(\text{Population}) + \varphi_1(\text{Debt per Capita})$$
$$+ \varphi_2(\text{Women in Parliament}) + \varphi_3(\text{CDU}) + \varphi_4(\text{FDP}) + \varphi_5(\text{Free Party}) + \varphi_6(\text{Green}$$
$$\text{Party}) + \varphi_7(\text{SPD}) + \varphi_8(\text{Baden-Württemberg}) + \varphi_9(\text{Bayern}) + \varphi_{10}(\text{Hessen}) +$$
$$\varphi_{11}(\text{Niedersachsen}) + \varphi_{12}(\text{Nordrhein-Westfalen}) + \varphi_{13}(\text{Rheinland-Pfalz}) +$$
$$\varphi_{14}(\text{Schleswig-Holstein}) + \varphi_{15}(\text{Capital}) + \varepsilon \qquad \textbf{(Eq. 8)}$$

where (E/n) is equal to Library, Museum, Music School, Orchestra, or Theater, for a total of five separate regression equations, and where the error term ε is normally distributed with mean zero and is uncorrelated with the independent variables (Tresch 2002). However, before running these regressions, a look at the descriptive statistics of the variables is necessary to ensure completeness and accuracy of the data.

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[14] Again, recall that Berlin, Bremen, and Hamburg have been excluded from the data because of their unique simultaneous status as a municipality and their own German federal state.

Table 3. Descriptive Statistics of the Variables

Independent Variable	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis
LIBRARY	12.760	11.793	46.631	0.000	8.095	0.732	3.580
MUSEUM	5.879	2.907	81.363	0.000	8.360	3.069	19.414
MUSIC SCHOOL	9.126	7.130	39.029	0.000	8.816	0.844	2.999
ORCHESTRA	2.038	0.000	51.612	0.000	5.423	5.159	36.566
THEATER	14.786	4.446	223.35	0.000	27.916	3.322	16.872
log(INCOME)	7.152	7.135	9.105	6.326	0.266	1.220	9.318
log(TAX SHARE)	−1.099	−1.121	1.487	−3.186	−0.305	1.791	23.106
log(POPULATION)	10.664	10.455	14.022	9.905	0.742	1.651	5.839
POPULATION	65030	34719	1229026	20040	105598	5.841	47.888
DEBT PER CAPITA	1689.5	1612.2	7162.8	45.243	902.158	1.230	6.424
WOMEN IN PARLIAMENT	0.206	0.205	0.439	0.051	0.070	0.235	2.889
CDU	0.400	0.400	0.697	0.216	0.087	0.436	3.015
FDP	0.048	0.051	0.244	0.500	0.208	0.703	5.000
FREE PARTY	0.084	0.054	0.500	0.000	0.101	1.415	4.839
GREEN PARTY	0.0593	0.0667	0.208	0.000	0.041	0.094	2.866
SPD	0.392	0.400	0.703	0.044	0.110	0.060	2.657
YEARS TO ELECTION	2.677	3.000	5.000	0.000	1.333	−0.628	3.460

An analysis of the descriptive statistics of the variables, provided in Table 3, shows that the data appears to be acceptable. The mean and the median measurements did not raise concerns, especially given the close values between the mean and the median in log(INCOME) and log(TAX SHARE) since average values for those variables have been used because the median values remain unavailable.

For each variable, the skewness should be near zero and the kurtosis – the measure of the peakedness of the probability distribution of a real-valued random variable – should be near 3, which is the case for all variables except POPULATION and TAX SHARE. The skewness of POPULATION at 5.84 is corrected for in the regressions by dividing the relevant independent variables by the population to obtain the variables per capita. The high kurtosis distribution in POPULATION and LOG(TAX SHARE) signifies that more of the variance in the data is due to infrequent extreme deviations, as opposed to frequent modestly-sized deviations.[15]

It is also important to check the data for severe multicollinearity, defined as a correlation coefficient greater than 0.80 in absolute value amongst the independent variables. Simple correlation was checked for by using a basic – and admittedly incomplete – correlation table (data table not shown). The highest correlations observed occurred between log(INCOME PER CAPITA) and log(TAX SHARE), at 50.9%; between CDU and SPD, at –46.1%; and between POPULATION and DEBT PER CAPITA, at 41.7%. All other correlations were well under 40% between any two of the independent variables. Hence, severe multicollinearity is unlikely to be a problem.[16] The variables appear acceptable and are ready for use in the regression coefficient estimations.

4.2 *Regressions with the Ordinary Least Squares Method*

The empirical model, as specified by Equation 8, is estimated using the Ordinary Least Squares (OLS) method. Separate regressions were run for the amount of municipal expenditure (in DM per capita) allotted to public libraries, museums, music schools, orchestras, and theaters. A White test was performed on each

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[15] The problem of high kurtosis was witnessed in the residual graphs of the estimated regressions and the issue is resolved by including specific dummy variables, as will be described in footnotes on the regression tables in Section 4.2.

[16] A variance inflation factor (VIF) could be calculated for each and every independent variable to formally test for multicollinearity amongst groups of independent variables. However, although multicollinearity increases the variances and standard errors of the estimated coefficients, the estimated coefficients remain unbiased. As is the common response to this severe multicollinearity in econometrics, nothing would be done to remedy this anyway (Studenmund 2006, 413).

regression to account for any heteroskedasticity in the model (White 1980). Estimation results are summarized in Table 4, on pages 45 and 46.

The OLS method is a linear regression technique that minimizes the sum of the squared residuals. As it is the Best (as in minimum variance) Linear Unbiased Estimator according to the Gauss-Markoff theorem, the OLS method is utilized throughout the empirical literature where regressions have been run in order to estimate the demand function of individuals for cultural goods.[17]

Table 4 shows the statistical significance of the estimated coefficients at the 2%, 5%, and 10% significance levels.   The adjusted R^2 – the coefficient of determination adjusted for degrees of freedom – ranges from 19.1% to 49.1% in the five regressions, which is adequate given this type of cross sectional analysis. Because double-log functional forms offer the benefit that the coefficients represent population elasticity is positive and significant at the 2 percent level for public expenditure on all cultural institutions examined but music schools.

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[17] See Bergstrom and Goodman (1973), Schulze and Rose (1998), and Schulze and Ursprung (2000)

Table 4. Determinants of Municipal Cultural Expenditure per Capita OLS Results

log(DEPENDENT VARIABLE):	LIBRARY	MUSEUM	MUSIC SCHOOL	ORCHESTRA	THEATER
Sample Size	518	518	518	518	518
Included Observations	510	378	396	209	418
Tax Share Elasticity (δ)	– 0.066 (– 0.397)	– 0.616 (– 1.199)	– 0.073 (– 0.329)	– 0.057 (– 0.144)	– 0.518* (– 1.786)
Income Elasticity (α)	0.625*** (3.19)	0.744 (1.535)	0.866*** (3.344)	0.391 (1.024)	1.118*** (3.472)
Population Elasticity (β)	0.465*** (7.10)	0.577*** (3.260)	– 0.044 (– 0.572)	0.915*** (5.784)	1.199*** (12.500)
Crowding Parameter $\gamma = [(\beta+1) / (1+\delta)]$	1.57	4.11	1.03	2.03	4.56
Debt per Capita	– 3.52E-05 (– 0.766)	1.71E-04 (1.659)	– 2.18E-05 (– 0.341)	– 2.53E-04*** (– 2.525)	3.19E-05 (0.372)
Women in Parliament	1.387** (1.999)	– 0.507 (– 0.415)	2.178*** (2.568)	0.488 (0.308)	0.833 (0.937)
CDU	– 0.345 (– 0.378)	– 0.311 (– 0.166)	1.089 (0.662)	– 0.320 (– 0.144)	– 2.116 (– 1.421)
FDP	2.388* (1.711)	– 2.685 (– 1.173)	0.232 (0.126)	– 1.482 (– 0.520)	– 2.828 (– 1.087)
Free Party	1.496* (1.703)	– 0.771 (– 0.409)	1.400 (0.867)	0.762 (0.348)	– 2.803* (– 1.732)
Green Party	1.745 (1.402)	– 4.038 (– 1.536)	3.714* (1.762)	– 2.000 (– 0.644)	– 2.250 (– 1.028)
SPD	1.464* (1.731)	– 0.713 (– 0.356)	– 0.199 (– 0.120)	– 0.941 (– 0.404)	– 3.585*** (– 2.349)

Baden-Württemberg	0.447	1.079***	0.833	− 0.139	0.075
	(1.392)	(2.582)	(1.243)	(− 0.299)	(0.212)
Bayern	0.220	0.750*	0.627	− 0.524	− 0.198
	(0.662)	(1.885)	(0.939)	(− 1.175)	(− 0.575)
Hessen	− 0.144	0.432	− 0.488	− 0.884*	− 0.329
	(− 0.457)	(1.141)	(− 0.736)	(− 1.848)	(− 1.061)
Niedersachsen	0.079	0.449	0.259	− 1.196***	− 0.218
	(0.253)	(1.242)	(0.396)	(− 2.782)	(− 0.797)
Nordrhein-Westfalen	− 0.156	0.076	0.719	− 0.806**	− 0.491**
	(− 0.508)	(0.219)	(1.106)	(− 2.075)	(− 1.981)
Rheinland-Pfalz	0.165	0.747*	0.159	− 0.741	0.141
	(0.483)	(1.778)	(0.231)	(− 1.542)	(0.464)
Schleswig-Holstein	0.523	0.556	− 0.086	− 1.294***	0.535
	(1.565)	(1.240)	(− 0.115)	(− 2.771)	(1.389)
Capital	− 0.634***	− 1.282*	− 0.334	− 0.292	− 1.135***
	(− 3.298)	(− 1.905)	(− 0.974)	(− 0.775)	(− 2.801)
R^2 **(%)**	33.8	23.2	27.0	38.6	51.3
Adj. R^2 **(%)**	31.4	19.1	23.1	32.1	49.1
S.E.	0.798	1.284	0.912	1.143	1.102
F-statistic	13.927	5.700	6.920	5.923	23.342

Heteroskedasticity consistent *t*-values in parentheses
Level of significance: * (2%), ** (5%), * (10%)**

elasticity values, the size of these estimated coefficients can be interpreted in addition to observing their levels of significance.

The estimate of tax share, or price, elasticity is surprisingly insignificant for four of the five cultural institutions. Only in regards to the municipal expenditure on theaters is the tax share elasticity significantly negative, with a 10 percent level of

significance. Nevertheless, income elasticity is positive and significant at the 2 percent level for municipal expenditure on public libraries, music schools, and theaters, but not significant for museums and classical orchestras. Similarly,

The estimated crowding parameters, γ, for public libraries, museums, orchestras, and theaters are all well above 1, indicating a diseconomies of scale in the consumption of these cultural goods. Music schools, exhibiting a parameter estimate near unity, suggest no economies of scale for the municipal expenditure per capita allotted to music schools.

The coefficient estimate for the fraction of women in parliament is positive and statistically significant at the 5 percent and 2 percent levels for municipal expenditure per capita on public libraries and music schools, respectively. The coefficient estimate for municipal debt per capita was significantly negative at the 2 percent level for municipal expenditures per capita on classical orchestras. In no case is an estimated coefficient both significant and of perverse sign. The dummy variables of the political parties and the states provide only infrequent traces of statistical significance. The dummy variable for municipalities that are state capitals are negative and statistically significant at the 2 percent level for public libraries and theaters, and negative and statistically significant at the 10 percent level for museums.

A significant impediment, however, must be noted regarding these regressions using the OLS method. Observe in Table 4 the significant discrepancies between the sample size and the included observations in the OLS regressions for estimating these demand functions of municipal cultural expenditures per capita. This discrepancy is largely due to the number of municipalities that choose to spend nothing on certain cultural institutions. In using the OLS method to estimate the determinants of municipal cultural expenditure per capita, as the current literature continues to do, all cases in which municipalities have zero expenditures per capita are thrown out of the included observations. For instance, 255 municipalities out of the 518 municipalities sampled choose to spend nothing on classical orchestras. As a result, the OLS method estimates the determinants of municipal expenditure per capita on classical orchestras only using the 209 municipalities that due allot subsidies to classical orchestras out of the original 518 municipal sample.

It is the fervent opinion of this author that an appropriate regression technique applied for the purpose of estimating the determinants of municipal cultural expenditures must take into account the municipalities that choose to spend nothing on certain cultural goods. Omitting the limit observations where expenditures are zero, as well as including these observations as though they are ordinary observations in OLS, creates a bias. Since the dependent variable for many observations takes the value

zero in this study, a maximum likelihood estimation technique should be employed to avoid bias. This is best addressed by a Tobit model, also referred to as a censored regression model (Kennedy 2003, 281-283).

4.3 *Background on Tobit (Censored) Regressions*

When a sample contains observations in which the dependent variable is zero, the linearity assumption no longer holds and the OLS method is inappropriate (Amemiya 1985, 362). Some municipalities in the sample spend nothing on the arts and cultural entities, yielding a public expenditure equal to zero. As a result, the Tobit Maximum Likelihood Estimator will be applied in an effort to more completely estimate the determinants of municipal expenditures for certain cultural institutions.

First introduced by James Tobin (1958) in pioneering work to model household expenditure on durable goods with a limit of zero expenditure, the original Tobit model was referred to as the model of limited dependent variables (Kennedy 2003, 289; Amemiya 1985, 360). Goldberger (1964) coined the term *Tobit models* to include all of the generalizations of Tobin's original model, giving the models a name that highlighted their similarity to probit models (Amemiya 1985, 360). By the 1970s, the Tobit model became widely utilized in econometric applications, known for its ability to appropriately analyze large microeconomic sample data (Amemiya 1985, 360-361).

In the Tobit model, the observed data, y_i, of the dependent variable are such that

$$y_i = \begin{Bmatrix} 0 & if & y_i^* \leq 0 \\ y_i^* & if & y_i^* > 0 \end{Bmatrix}$$

Any observation of the dependent variable, y_i^*, less than or equal to zero is coded as zero. In otherwords, these observed data are left censored at the value zero. The coefficient and scale parameters are then estimated by maximizing a log likelihood function. Thus, in regard to the empirical model presented in this paper, the Tobit model allows all observations of the dependent variable (E/n) equal to zero to effectively be coded as expenditure per capita equal to the value zero.

In order to use the Tobit model in this study, the empirical model cannot be in double-log functional form, since the log of zero is undefined and the log of any value between zero and one is negative. As a result, Equation 8 has been minimally modified. The log of the dependent variable and the log of the population variable have been appropriately dropped, while all other aspects of the original empirical model have been maintained. The adjusted empirical model to be used with the Tobit regression method is given by Equation 9:

$$(E/n) = a + \delta\log(\text{Tax Share}) + \alpha\log(\text{Income}) + \beta(\text{Population}) + \varphi_1(\text{Debt per Capita}) +$$
$$\varphi_2(\text{Women in Parliament}) + \varphi_3(\text{CDU}) + \varphi_4(\text{FDP}) + \varphi_5(\text{Free Party}) + \varphi_6(\text{Green}$$
$$\text{Party}) + \varphi_7(\text{SPD}) + \varphi_8(\text{Baden-Württemberg}) + \varphi_9(\text{Bayern}) + \varphi_{10}(\text{Hessen}) +$$
$$\varphi_{11}(\text{Niedersachsen}) + \varphi_{12}(\text{Nordrhein-Westfalen}) + \varphi_{13}(\text{Rheinland-Pfalz}) +$$
$$\varphi_{14}(\text{Schleswig-Holstein}) + \varphi_{15}(\text{Capital}) + \varepsilon \qquad \textbf{(Eq. 9)}$$

where (E/n) is still equal to Library, Museum, Music School, Orchestra, or Theater, and where the error term ε is still normally distributed with mean zero and is uncorrelated with the independent variables (Tresch 2002).

5. Results

The empirical model, as specified by Equation 9, is estimated using the censored normal (Tobit) regression model. Separate regressions were run for the amount of municipal expenditure (in DM per capita) allotted to public libraries, museums, music schools, orchestras, and theaters. Recognizing that heteroskedasticity violates the distributional assumptions of the Tobit model and that the serious problems this creates can be alleviated by applying a robust estimator, the White test is employed in each regression (Kennedy 2003, 295; White 1980). Estimation results are summarized in Table 5, on pages 52 and 53.

Note that the number of included observations in the regressions is much greater using the Tobit model in comparison to using the OLS model. The number of censored observations (observations of municipalities with zero expenditure per capita) and uncensored observations are recorded in Table 5. Also, the coefficient of determination adjusted for degrees of freedom – the R-bar squared – ranges from 28.3% to 52.5% in the five regressions, a very respectable range for this type of cross-sectional analysis. In only a few cases – the estimated coefficient of population for music schools and the estimated coefficients of debt per capita – is the estimated coefficient both significant and of perverse sign than that hypothesized. All other significant estimated coefficients support the signs hypothesized in Section 4.1.

The coefficient estimate of tax share is negative and statistically significant for libraries, museums, and theaters at the 10 percent level, 5 percent level, and 2 percent level, respectively. The coefficient estimate of income is positive and significant at the 2 percent level for all cultural institutions analyzed except orchestras, where it is

Table 5. Determinants of Municipal Cultural Expenditure per Capita TOBIT Results

log(DEPENDENT VARIABLE)	LIBRARY	MUSEUM[18]	MUSIC SCHOOL[19]	ORCHESTRA[20]	THEATER
Sample Size	518	518	518	518	518
Included Observations	516	517	516	464	512
log(Tax Share)	− 3.412*	− 4.035**	− 2.276	− 2.256	− 14.043***
	(− 1.813)	(− 2.038)	(− 1.017)	(− 1.523)	(− 2.364)
log(Income)	10.835***	7.992***	8.452***	2.647*	22.223***
	(5.339)	(3.574)	(3.297)	(1.669)	(3.250)
Population	1.32E-05***	1.18E-05	− 7.71E-06**	2.90E-05***	1.28E-04***
	(2.476)	(1.558)	(− 2.289)	(3.894)	(3.571)
Debt per Capita	2.11E-04	0.002***	8.49E-04*	− 2.96E-04	0.006***
	(0.500)	(3.999)	(1.649)	(− 0.721)	(3.137)
Women in Parliament	21.636***	14.683**	11.901*	5.730	40.237***
	(4.679)	(2.224)	(1.673)	(1.077)	(2.350)
CDU	− 7.617	− 18.721	9.680	2.104	− 67.815*
	(− 0.895)	(− 1.454)	(0.642)	(0.200)	(− 1.889)
FDP	3.913	− 32.286**	10.620	4.309	− 73.599*
	(0.326)	(− 2.253)	(0.560)	(0.343)	(− 1.674)
Free Party	4.889	− 29.038**	11.503	4.836	− 84.347***
	(0.569)	(− 2.215)	(0.741)	(0.477)	(− 2.329)

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[18] A dummy variable for Schwabisch Hall was created and run because Schwabisch Hall has a large open-air museum that is extremely expensive. As a result, this municipality apportions an unusually high level of expenditure per capita towards museums, skewing the regression if no dummy is added.
[19] Dummy variables for Starnberg and Ibbenbueren were included in this regression, but explanations for the unusually high expenditure per capita on music schools in these two municipalities are not readily available.
[20] Dummy variables for Schweinfurt and Remscheid were included in this regression. Schweinfurt does not have an orchestra, so the expenses this municipality recorded under orchestras in 1991 were extraordinary expenses, which justifies use of a dummy variable. Remsheid merged their classical orchestra with another municipality, Solingen, 1995. It appears that the costs of orchestras were skyrocketing for Remsheid, as evidence in 1991, requiring atypically high expenditures that led Remsheid to merge four years later.

Green Party	9.094	− 35.781**	31.408	− 6.303	− 41.241
	(0.797)	(− 2.003)	(1.620)	(− 0.460)	(− 0.841)
SPD	4.542	− 20.693	3.749	1.654	− 80.415***
	(0.547)	(− 1.563)	(0.239)	(0.1637)	(− 2.332)
Baden-Württemberg	4.716***	12.386***	12.146***	1.292	10.054*
	(2.425)	(4.841)	(3.384)	(0.666)	(1.650)
Bayern	0.293	10.739***	6.726*	0.915	7.602
	(0.162)	(4.446)	(1.825)	(0.477)	(1.189)
Hessen	− 2.138	6.058***	− 2.173	− 2.508	5.782
	(− 1.345)	(2.727)	(− 0.631)	(− 1.348)	(1.021)
Niedersachsen	0.392	6.128***	0.805	− 2.578	2.106
	(0.262)	(2.829)	(0.241)	(− 1.470)	(0.419)
Nordrhein-Westfalen	− 0.073	3.0368	6.767**	− 1.580	1.565
	(− 0.051)	(1.571)	(2.083)	(− 0.980)	(0.337)
Rheinland-Pfalz	2.255	7.223***	− 2.779	− 0.986	7.206
	(1.011)	(2.519)	(− 0.700)	(− 0.493)	(0.987)
Schleswig-Holstein	4.674***	7.831***	1.636	− 0.674	16.519
	(2.718)	(3.441)	(0.398)	(− 0.349)	(2.682)
Capital	− 1.710	− 11.142*	− 4.338	− 7.849*	− 21.932***
	(− 0.606)	(− 1.833)	(− 1.428)	(− 2.057)	(− 1.186)
Left censored (Uncensored)	6 (510)	139 (378)	120 (396)	255 (209)	94 (418)
R² (%)	39.2	42.3	31.2	54.6	48.4
Adj. R² (%)	36.9	40.0	28.3	52.5	46.4
S.E.	6.432	6.479	7.469	3.607	20.298
Log likelihood	− 1676.099	−1422.059	− 1535.279	− 802.280	− 1961.633

Heteroskedasticity consistent *t*-values in parentheses

still significant but at the 10 percent level. The coefficient estimate of population is positive and statistically significant at the 2 percent level for public libraries, classical orchestras, and theaters; but, interestingly, the coefficient estimate of population is negative and significant at the 5 percent level for music schools. Even more intriguing, the estimated coefficient of debt per capita is positive and significant for museums and theaters at the 2 percent level and for music schools at the 10 percent level.

The estimated coefficient of the fraction of women in parliament is positive and significant in all cultural institutions examined except classical orchestras. The dummy variable for capital is negative and significant at the 10 percent level for museums and orchestras, and significant at the 2 percent level for theaters. For the exception of Nordrhein-Westfalen, the dummy variables for the states were positive and significant at the 2 percent level in comparison to Saarland for expenditure on museums. Otherwise, the dummy variables of the states provide only infrequent traces of statistical significance.

The dummy variables of the political parties in parliament illustrate some noteworthy results. The estimated coefficient of the dummy variable for the CDU party is negative and significant at the 10 percent level for public expenditure on theaters. The estimated coefficients of the dummy variables for the FDP party, the Free party, and the Green party are all negative and significant at least at the 5 percent level for municipal expenditure on museums. The estimated coefficients of the dummy variables for the CDU party, the FDP party, the Free party, and the SPD party are all negative and significant at least at the 10 percent level for municipal expenditure on theaters.

6. Conclusion

In Germany, municipal support for public libraries, museums, music schools, orchestras, and theaters is extensive. The funding decisions of these cultural institutions remain largely a local responsibility, decided by members of the parliament who are elected by the citizens in the representative democracy.

In this paper, it was argued that the essential determinants of municipal cultural expenditure towards the various arts, and thus the subsidies allocated to specific cultural institutions, include income, tax share, and the size of the population. It was also argued that municipal cultural support depends on the debt per capita (a budget constraint), the fraction of women in parliament, the party affiliation of the members of the local parliament, and whether the municipality in the sample was a capital in its German federal state.

The empirical results partially support the theoretical hypotheses offered in Section 4.1. Using the OLS method, the estimated coefficients provide the elasticity values for tax share (price), income, and population; and estimates of the crowding parameter are calculated using the estimated elasticities of expenditures with respect to population and tax share. Use of the Tobit censored regression model allowed the inclusion of all municipalities that chose to spend nothing on a cutlural institution. While elasticity values could no longer be obtained, the significance of the estimated coefficients have provided great insight.

The empirical results in this study support the hypotheses that subsidization levels depend positively on the income and population size within each municipalitiy and depend negatively on the tax share within a municipality. As hypothesized, the estimates of income elasticity and population elasticity are usually significant and positive. Although the tax share elasticity was rarely significant in the OLS method, the Tobit regression results showed the estimated coefficients of tax share to usually be significant and negative, as hypothesized. Also, the estimated income elasticities vary around unity, indicating that culture is a non-inferior good.[21] The estimated coefficient of population elasticity was greater than 1 for theaters, suggesting that per capita expenditures increase with population for theaters. On the other hand, the estimated coefficients of population elasticities were positive but less than 1 for libraries, museums, and orchestras. In only rare cases are any of the estimated regression coefficients in this study both significant and of the perverse sign that was initially hypothesized.

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[21] Due to the luxury nature and leisure content involved in the consumption of the arts, as well as the association of tastes with education, income elasticites are found to be relatively higher for the arts than for many other commodities (Throsby 2001, 116).

Music schools, with a crowding parameter near unity (1.03), seems to be the cultural institution with the largest public good characteristc perceived by the voter, but still implies rivalry: when the size of the population increases, the individual citizen seems to experience only a very slight decrease in benefit from the music schools. The crowding parameter estimates of the other cultural institutions are clearly greater than 1, indicating a diseconomies of scale in the consumption of cultural goods. This result is reasonable if one assumes that the larger municipalities have to serve all of the parasitic suburbs. The large municipalities likely provide cultural goods not only to their own citizens, who essentially pay for the subsidies via taxes, but also to the citizens who travel to the big municipalities and consume some of the cultural benefits that are subsidized at no cost to them. This may also explain the unexpected estimated coefficient of population that was significant and negative for music schools: as population grows, citizens recognize the free-rider effect from neighboring suburbs and opt to allocate less money to music schools. This, however, is nothing more than a conjecture.

Counter to that predicted, indebtedness per capita, as an indicator for the budget constraint, was shown to exert a significantly positive influence on the support for public museums, music schools, and theaters. This may be the result of politicians placing strong investments in cultural institutions in efforts to rapidly stimulate the municipal economy, providing more jobs and attractions as well as encouraging increased creativity and education. This reasoning was thoroughly explained in the begining of Section 2.1.

The proportion of women in the municipal parliament is shown to significantly increase the municipal expenditure on all cutlural institutions examined except orchestras, also supporting the hypothesis presented in Section 4.1.

The dummy variables of the states, the results of which were in comparison to Saarland, and for the capitals, in comparison to those municipalities that are not capitals, provided a different intercept for each state and capital, and proved significant in most of the regressions. Even for those independent variables that do not exhibit statistical significance, it is generally ill-advised to drop the variables as long as they are theoretically sound. These theoretically sound but insigificant independent variables have thus been left in the regression in order to decrease the possibility of omitting a relevant variable (Studenmund 2006, 410).

The variables of the political parties, for instance, did not demonstrate any obvious party bias. Admittedly, cultural institutions include assets that are built up over time and can hardly be run down in a single political term. Consequently, incumbents' subsidization decisions will be largely determined by their predecessors'

decisions and changed only at the margin. Unfortunately, this political history cannot be taken into account by the cross-sectional study at a single time period that is undertaken here.

The large sample size of 518 municipalities undertaken in this study is vital in order to analyze socio-economic and political determinants with respect to geographical stratification. Ideally, an analysis of this type would be able to examine these 518 municipalities over a period of many years; however, the large database of this study offers a significant contribution to the literature on the subject. Hopefully, several time periods can be added to this study in the future.

Having employed relatively few of a vast complex of interrelated social variables, it is difficult to provide a causal interpretation to the coefficients of these variables with a large degree of certainty. Still, it seems reasonable to conclude that the variables which are employed have been adequate in eliminating substantial distortions in the estimated coefficients for at least price, income, and population. This is borne out by the current literature.

One is, of course, advised to maintain a degree of skepticism about the values of the coefficients presented in any regression estimates for culture and the arts. Strong assumptions must be made to derive the estimates and it is always possible that more precise measurements of the variables and additional tests of the assumptions could result in varying estimates of the demand function. For instance, aside from the externalities offered by cultural goods, it must be observed that the arts and cultural institutions are often fully excludable from nonpayers, which is not considered in the Bergstrom and Goodman model, and that price rationing is even used at times (Seaman 1981).

Still, the empirical study of demand for the arts across various artforms has found the determining variables of income, tax share, and population, as well as a few others such as the proportion of women in the paliament, to conform broadly to the hypothesized expectations and previous literature.

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As stated succinctly by Schulze and Rose (1998), "The usual disclaimer applies" (243).

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