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Do public transfers "crowd out" private charitable giving? Some econometric evidence for the Federal Republic of Germany

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Working Paper No. 152

Do Public Transfers "Crowd Out"
Private Charitable Giving?
Some Econometric Evidence
for the Federal Republic of Germany.

by

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1. Introduction⁺

In the last two decades, most industrialized western nations have experienced a marked increase of government intervention in economic affairs. This peculiar historical trend is followed by a growing professional interest among economists in the impact which public expenditure and taxation may have on the level of private economic activity, the so-called crowding-out effects. While the bulk of the theoretical and empirical research in this field focuses on the macroeconomic effects of fiscal policy on private investment behaviour, some recent work has turned to specific allocative issues: the long-lasting controversy between Martin Feldstein and Robert Barro on the impact of social security on private saving¹ figures as a prominent case of this new branch of research.

The present paper is aimed at yielding some new econometric evidence on specific allocative crowding-out effects. More precisely, it raises the question whether the growth of particular public expenditure items has exerted any negative (or positive) influence on the level of private charitable contributions in the Federal Republic of Germany during the last twenty years.

The paper is divided into four parts: Section 2 tries to put the empirical crowding-out analysis into some rudimentary theoretical framework. Section 3 develops an econometric approach completely analogous to the model used by Abrams & Schmitz in their study on charity crowding-out in the U.S.². The serious shortcomings of this approach point to a more comprehensive time-series-cross-section analysis which will be presented in section 4. Apart from the evidence on crowding-out, the extended model will yield a few insights

⁺The author is indebted to Klaus-Werner Schatz and Roland Vaubel for helpful comments and to Rolf Knudsen for computer assistance.

¹Feldstein (8, 9), Barro (2).

²Abrams & Schmitz (1).

concerning some socioeconomic determinants of private giving behaviour. Section 5 concludes the paper with a few remarks on the validity of the empirical results.

2. Some Theoretical Aspects of Charity Crowding-Out

Public expenditure growth may exert two distinct influences on the level of private charitable giving, namely

- an income effect through the marginal increase in taxation needed to finance the additional public outlay¹ (i)
- a substitution effect through the provision of specific public services which have previously been financed by private agents (ii).

Both effects will be briefly analyzed in a standard microeconomic setting².

(i) An increase in direct or indirect taxation (cet.par.) reduces disposable income thus causing a parallel shift of the individual taxpayer's budget line towards the origin³; hence the change in the level of charitable contributions simply depends on the income elasticity (ϵ) of charitable giving. As long as charity is not an inferior good (i.e. $\epsilon > 0$) we will expect at least some crowding-out to take place. As the existing econometric evidence indicates income elasticities

¹The complex issue of public borrowing will be neglected here. Of course, the state may intertemporally reallocate the marginal tax burden by resorting to debt financing; depending on the degree of fiscal illusion of the taxpayers, this may postpone the crowding-out via income effects to periods after the expenditure increase.

²See also Abrams & Schmitz (1, pp. 30 ff.) who were the first to develop some theory of crowding-out. The following analysis is a somewhat modified version of their model.

³For the sake of simplicity we restrict the analysis to "pure" income effects of taxation; of course, there may be relative price effects which are - in practice - closely intertwined with the income effects. If, e.g., the increase in taxation changes the structure of marginal tax rates within a system of tax deductible charitable giving, the "price of charity" (one minus the marginal tax rate) will change as well.

undoubtedly greater than zero - around 0.8 for the U.S. and 1.2 for Germany¹ -, there should be no controversy about the empirical importance of the simple crowding-out via income effects. Of course, the econometric studies do not isolate any direct crowding-out effect of (income) taxation since the extremely high collinearity between individual income tax liability and gross income prohibits any separate identification; as long as we accept the realistic assumption that taxation works like any other change in disposable income, there is no reason to doubt the validity of the estimation².

(ii) An increase in public expenditure alters the level of private charitable contributions through changes in the donor's marginal utility of giving. According to the economic theory of charity as developed by D.B. Johnson et al.³, these changes crucially depend on the donors' motives for charitable giving:

¹See among others Feldstein (6), Clotfelter (4), and Paqué (14).

²It must be emphasized, however, that - unlike the price elasticity (Paqué (14, pp. 4 ff.)) - the income elasticity of charitable giving does not yield any reliable information about the efficiency of a substitution between public and private charity. If e.g. $\epsilon = 1$, we simply know that a 1 % decrease in public welfare spending and taxation will increase charitable giving by exactly 1 %. Of course, this substitution will not keep the overall welfare service level constant as charitable contributions amount to only a tiny part of income. To allow for a perfect substitution between public and private charity, the marginal change in disposable income (dY), taxation (dT) and public welfare spending (dW) with $dY=dT=dW$ must equal the marginal change in private giving (dC).

i.e.
$$\frac{dC}{dW} \stackrel{!}{=} 1 \Rightarrow \frac{dC}{dY} / \frac{C}{Y} \stackrel{!}{=} 1 / \frac{C}{Y}$$

Hence the higher the ratio of charitable giving to disposable income prior to the increase of taxation, the lower ϵ needs to be to keep the overall welfare service level (private + public) constant. As C/Y is much higher in the U.S. than in Germany, the U.S. may have more scope for realising "charity income effects" via tax reductions than Germany, despite a lower income elasticity of charitable contributions.

³See D.B. Johnson (11). Later attempts to justify subsidies to charitable giving are of particular importance in this context (see Dean (5), Brennan (3), Hochman & Rodgers (10)).

- If all donors like giving for its own sake without care for the recipients' welfare, their marginal utility of giving will exclusively depend on their own preferences regardless of the transfer pattern among all other economic agents in society, including the state. As charity is a pure private good in this case, the elasticity (γ) of charitable contributions with respect to public expenditure will be zero.
- If, in turn, all donors like seeing the recipients' welfare increased regardless of the donor's identity, any donor's marginal utility of giving will depend on the transfers of other economic agents to the particular recipient whose welfare enters into the donor's utility function. In this pure public good case, all donors will fully adjust their level of contributions to the increased amount of public expenditure going to their recipients. Hence crowding-out will be perfect, i.d.

$$\frac{dC}{dW} = -1 \quad \text{with } C = \text{sum of all charitable giving} \\ \text{and } W = \text{sum of public transfers to recipients of} \\ \text{private charity,}$$

or, in elasticity language,

$$\gamma = \frac{dC}{dW} / \frac{C}{W} = -1 / \frac{C}{W} .$$

In public good terms all marginal donors become free-riders as they begin to rely on the state to provide for "their" recipients' welfare. All prior free-riders simply replace the object of their free-riding: instead of the marginal donors, they now rely on the state to provide for charity. Any prior externality-based subsidy to charitable giving does not alter this pattern of adjustment as long as the per-unit subsidy structure remains unchanged in the process of public expenditure growth.

- If both motives happen to coincide either in any single donor who derives more utility from own than from foreign giving, or in the composite sample of all donors, we meet the realistic case of partial crowding-out: depending on the dominance of either motive, γ will be somewhere between 0 and $-1 / \frac{C}{W}$.

- Finally, the growth of government expenditure may even raise the donors' marginal utility of giving if, at least in the eyes of the donors, the additional public goods supply is complementary to private charitable giving. Public libraries or museums are a good case in point as they may, once established, attract private donations just as the public supply of infrastructure may create new private investment opportunities. This kind of complementarity prevailing would make for a positive γ .

These few theoretical remarks serve as a modest basis for the following empirical analysis: the central purpose will be the estimation of some measures of γ , the elasticity of charitable giving with respect to public expenditure.

3. The Abrams & Schmitz-Model

The first econometric attempt to estimate crowding-out effects of government expenditure on private charitable contributions was made by Abrams & Schmitz for the U.S.¹: drawing on a time-series-cross-section analysis by M. Feldstein² that aimed at estimating income and price elasticities of charitable giving, they introduced some public expenditure variables to account for the intertemporal variation in the overall propensity to spend on charity.

As the author of the present study has recently used an econometric model which methodologically comes very close to Feldstein's study³, an extension of this model along the lines traced out by Abrams & Schmitz seems to be a promising starting-point for our crowding-out analysis.

¹Abrams & Schmitz (1).

²Feldstein (8).

³Paqué (14).

3.1. Data and Specification

The estimates are based on German income tax data for private charitable giving pursuant to § 10b income tax law, disaggregated by fourteen gross income classes. The statistics - usually published in three year intervals - start in 1961 and for the time being end in 1974¹. For these years detailed data on volume and functional allocation of the budget are available for federal, provincial and municipal governments². Hence it is possible to estimate the average level of charitable giving per gross income class as a function of average disposable income, the average "price of charity" and the level of certain public expenditure items in particular years.

The specification of the model will be described briefly³:

- Private charitable giving (C) is defined as the sum of private giving of the i-th gross income class divided by the number of tax returns in this class. For each of the five years, there are fourteen observations of the endogenous variable.
- Disposable income (Y) is defined as average gross income (GI) minus the average income tax that would have been paid if no charitable contribution had been made. The use of this "fictitious" tax liability measure avoids the spurious interdependence between exogenous and endogenous variables which would arise if actual tax liability were used instead⁴. The tax liability measure includes

¹ See Statistisches Bundesamt, Fachserie C: Finanzen und Steuern, Reihe 6 I: Einkommens- und Körperschaftssteuer, for the years 1961, 1965 and 1968; Statistisches Bundesamt, Fachserie 14: Finanzen und Steuern, Reihe 7.1.: Einkommenssteuer, for 1971 and 1974.

² See Statistisches Bundesamt, Fachserie L: Finanzen und Steuern, Reihe 1 II: Öffentliche Finanzwirtschaft, for the years 1961, 1965, 1968 and 1971; Statistisches Bundesamt, Fachserie 14: Finanzen und Steuern, Reihe 3.1.: Rechnungsergebnisse des öffentlichen Gesamthaushalts for 1974.

³ The above mentioned study (Paqué (14)) contains a lengthy discussion of the income and price variable specification (Paqué (14), pp. 9-15) which applies without any qualification to the following model. To avoid needless repetition of technical details, the analysis will focus on the specification of the public expenditure variables.

⁴ For a detailed discussion of this point, see Paqué (14), pp. 10 ff.

a tax surcharge ("Ergänzungsabgabe") levied on income tax liability in the period from 1968 to 1974¹.

- As charitable giving is fully deductible from taxable income under German income tax law, the price of private charitable transfers (P) is defined as one minus the marginal tax rate which a taxpayer with average taxable incomes of class i faces. Once again, the "fictitious" (and not the actual) level of taxable income is chosen to avoid interdependencies between exogenous and endogenous variables².
- According to the crowding-out theory developed in section 2, all public expenditure items relevant to the donors' marginal utility of charitable giving should be included in the analysis. As Feldstein has shown for the U.S., the bulk of private giving goes to religious, educational, health and welfare organisations³. According to § 10b of the German income tax law, private contributions to the advancement of charitable, ecclesiastical, religious, scientific and selected political purposes are eligible for deduction from taxable income⁴. Without further empirical knowledge about the allocation of private giving to different purposes - the German tax data are not disaggregated by type of giving - we select four distinct public expenditure items which are, at least in the eyes of (potential) donors, of particular importance for private charity: the gross expenditures⁵ on social welfare (SOC), health and

¹Alternative income concepts as taxable income and gross income excluding the tax surcharge effect were developed in Paqué (14), pp. 9 ff. They are not used in the present study as the estimation of income and price elasticities is not our prime concern.

²For details, see Paqué (14), pp. 12 ff.

³Feldstein (9), p. 213.

⁴See NWB-Textausgabe: Wichtige Steuergesetze, 21. Auflage, 1980, pp. 35 f.

⁵The term "gross expenditure" corresponds to the German legal term "Unmittelbare Ausgaben" (see Statistisches Bundesamt, Fachserie 14, Finanzen und Steuern, Reihe 3.1.: Rechnungsergebnisse des öffentlichen Gesamthaushalts 1974, p. 11). It is defined as the sum of all expenditure a public authority makes to fulfil its legal task, independent of the source of the public funds. Hence the expenditure is attributed to the level of government which provides the service, not to the level which finances it. This concept makes good sense for crowding-out analysis since it is reasonable to assume that potential donors are primarily interested in the incidence of the service (and not of the costs!).

recreation (HEA), higher education and research (RES) and cultural affairs (CUL).

SOC covers all public assistance to needy persons (including expenditures on programs designed to support young people), the financing of the institutions of social and juvenile aid, subsidies to private welfare organisations and related items¹. Three major items usually summed up under the heading of social welfare expenditure are excluded, however: i) social security payments, ii) compensation for the social consequences of World War II (which both cannot be attributed to any federal, provincial or municipal authority in a cross-region-analysis²) and iii) pure administrative expenditure (which potential donors will hardly regard as a valid substitute for private charity). HEA comprises government expenditure on hospitals, sport facilities and public parks, subsidies to private sport associations and the financing of public measures to raise health standards³. RES covers the public financing of universities and other research institutions⁴. CUL comprises the financing and subsidization of museums, theatres, expositions, the expenditure on the preservation of natural and historical monuments and similar objects⁵. All variables cover federal, provincial and municipal

¹See publication numbers 1026, 1027, 1028 in Statistisches Bundesamt, Fachserie 14, Finanzen und Steuern, Reihe 3.1.: Rechnungsergebnisse des öffentlichen Gesamthaushalts 1979, p. 47.

²This argument only applies for the models of section 3 which form the core of the paper; to avoid a mess of changing definitions, both items were also left out in the aggregate analysis of section 2.

³For details, see Statistisches Bundesamt, op. cit., pp. 49 f. (publication numbers 1034-1037).

⁴See Statistisches Bundesamt, op. cit., pp. 44 f. (publication numbers 1018, 1020).

⁵See Statistisches Bundesamt, op. cit., pp. 45 f. (publication numbers 1021, 1022).

expenditures in each relevant field; as there is no reliable information about the number of beneficiaries from these four types of expenditure, they are measured on a per capita basis¹.

In the case of Germany, there is a fifth exogenous expenditure item to be noted: on behalf of the churches, the state collects an amount equal to a fraction of the church members' income tax liability as a "church tax" (CHU). Of course, CHU cannot simply be regarded as a tax in the economic sense of the term since it lacks the crucial element of coercion: any church member can leave his church and thus avoid the tax burden. CHU is more accurately described as a voluntary club contribution which, however, cannot be marginally varied in a bargaining process between donor (club member) and donee (club authority): either the individual accepts the fixed club fee or he leaves the club altogether². This lack of marginal adjustment may be sufficient theoretical reason for excluding CHU from the measure of endogenous private charitable giving (C). A pure statistical argument supports this view: as in quantitative terms, the amount of CHU is about nine times the amount of C in any given year of the sample, an overall charity measure (CHU + C) would almost exclusively

¹ Even if the relevant data were available, it is not at all obvious that a measure per recipient is preferable to a measure per head, as Abrams & Schmitz (1, p. 32) seem to suggest. Both measures aim at capturing the public outlay per "needy" person, and the relative performance of both depends on whether the implicit assumptions of a constant ratio of needy persons to population or a constant ratio of needy persons to recipients is more realistic. The flaws of both alternative assumptions are easy to identify: the first does not allow for agglomeration (or related) effects resulting in a disproportionately increasing number of needy persons in the process of urbanization; the second simply accepts the government's discretionary decision of extending a welfare program to more persons as an increase in need. In my view, the drawback of the second assumption is far more serious so that even on theoretical grounds a per capita measure should be preferable.

² In practice, there are minor exceptions to this rule: a high income earner may be able to bargain on "terms of trade" with his church.

be determined by the church tax component; the "true" marginal adjustment in charitable giving would hardly affect the aggregate¹. An exogenous CHU, in turn, allows the estimation of a separate effect of church taxes on other charitable contributions: The question will be

- whether potential donors see their charitable needs satisfied by their own contributions to the church², or
- whether, in turn, the individual church tax liability is an indicator for the affinity of the taxpayer to charitable purposes in general, regardless of the way they are financed.

In the first case, we would identify a genuine crowding-out effect; in the second case we would only claim to isolate a particular social (or religious) motivation for private charitable giving.

The ideal measure for an exogenous church tax variable is given by the average church tax liability in gross income class i (CHL). The strong collinearity between CHL and the exogenous income and price variables, however, prohibits any separate identification; a similar problem arises when church tax liability per disposable income unit (CHY) is used since the church tax liability is coupled with the

¹ There may even be a good reason to question the voluntary nature of the church membership decision: for the vast majority of the German population - especially in rural areas -, the "barriers to exit" may be prohibitively high since the church is a quasi monopolist supplier of some services (like the ceremonies of baptism, confirmation, wedding, funerals or even the saving of souls) which are thought to be indispensable in the life of an orderly citizen of a "christian" state. If this view is taken, CHU should be considered as an exogenous earmarked tax outside the individual choice set; if this view is not taken, we are still left with the arguments in the text which also favour an exclusion of CHU from endogenous private giving.

² Hence unlike the case of governmental expenditure which is supposed to enter the economic calculus of the donors as a public good, the church tax will be considered as a private good which may satisfy some desire for charity prior to any contributions. Of course, it is perfectly possible to treat the overall level of church taxes collected as a public good yielding a certain level of public charitable services. In my view, however, the private good aspect is clearly dominant in the economic calculus of (potential) donors.

progressive income tax schedule. Hence the only feasible approach seems to be the use of a variable CHQ which is defined as the average fraction of church taxes in the sum of all direct taxes paid on average in class i if no charitable contributions had been made. CHQ specifies the part of an individual's tax liability which he may consider as devoted to charitable purposes¹.

All variables except P and CHQ are measured in constant 1970 DM by deflating with the consumer price index². For the estimates, a log-linear constant elasticity specification of the form

$$(1) \quad \ln C = \beta_0 + \beta_1 \ln Y + \beta_2 \ln P \\ + \beta_3 \ln CHQ \\ + \sum \delta_i \ln G_i + \epsilon$$

was chosen, with G_i representing the four (or less) different government expenditure items and ϵ being a random error term³. To account for a positive time trend in $\ln C$ over the five years of the sample period which is supposed to stem from an overall rise of the income level not reflected in the grouped data, an additional variable ($\ln YL$) was introduced, with YL being defined as national income per employee in constant 1970 DM⁴. To avoid a pronounced heteroscedasticity and parameter changes between different gross

¹The theoretically superior variables CHL and CHY will be introduced in the cross-state analysis of section 4.

²Separate deflators for different categories of public expenditure are not available in Germany; thus the use of the consumer price index seems to be the best compromise solution.

³On statistical grounds, non-linear specifications did not perform as well as equation (I). Specifications with varying price elasticities (Paqué (14), pp. 19 f.) do not have much additional explanatory power for crowding-out analysis since the expenditure variation is purely intertemporal or, as in section 4, interregional.

⁴For a theoretical justification of this procedure, see Paqué (14), pp. 17 f.

income classes, the sample was restricted to the taxpayers with yearly nominal gross income above 16 000 DM (i.d. GI-classes 7 to 14)¹.

Equation (1) was estimated by ordinary least squares (OLSQ).

3.2. Empirical Results

Table 1 presents a sample of estimates based on some variations of specification (1).

Starting without any crowding-out variables (equation I)², we first introduce a global welfare expenditure variable WF, defined as the sum of the four public expenditure items SOC, HEA, RES and OUL (equation II). The coefficient of WF³ turns out to be wholly insignificant, but very sensitive to a change of the specification: if YL is excluded (equation III), WF explains the trend of C almost as well as YL does in equation I. This result is not surprising if we consider the extremely high collinearity ($R = 0.99$) between YL and WF: the strong positive trend component in public welfare expenditure in the period 1961-1974 throws us back to the purely theoretical question whether this trend can be accepted as a viable explanation for the positive trend in private charitable giving. In their application of the model to the U.S., Abrams & Schmitz found themselves in a similar identification dilemma: they attributed a negative time trend of charitable contributions - previously identified by M. Feldstein⁴ - to the positive trend of public welfare spending, thus claiming to have discovered a crowding-out effect⁵.

¹For statistical details, see Paqué (14), pp. 15 f.

²A detailed discussion of equation (I) can be found in Paqué (14), pp. 18 f.

³In the following discussion of the empirical results, all variables names refer to the natural logarithms of the relevant variables.

⁴Feldstein (9), p. 82.

⁵Abrams & Schmitz (1), p. 36.

Table 1: Estimates of the Abrams & Schmitz-Model

No.	Estim. Procedure	Sample	Const.	Y	P	YL	CHQ	WF	SCC	HEA	RES	CUL	adR ²	SSR	SE	DW _Y
I	OLSQ	n = 40	-11,295	1,249 (0,020)	-1,589 (0,133)	0,201 (0,058)	-	-	-	-	-	-	0,998	0,232	0,080	1,76
II	OLSQ	n = 40	-11,790	1,249 (0,021)	-1,588 (0,135)	0,282 ^o (0,426)	-	0,048 ^o (0,250)	-	-	-	-	0,998	0,231	0,081	1,75
III	OLSQ	n = 40	-10,039	1,249 (0,020)	-1,594 (0,134)	-	-	0,116 (0,034)	-	-	-	-	0,998	0,234	0,081	1,79
IV	OLSQ	n = 40	-23,611	1,252 (0,019)	-1,570 (0,123)	1,778 (0,571)	-	-	0,666 (0,245)	0,000 ^o (0,000)	-0,886 (0,313)	-0,650 (0,247)	0,999	0,173	0,074	1,40 ^{oo}
V	OLSQ	n = 40	-9,077	1,252 (0,018)	-1,570 (0,121)	-	-	-	0,218 ^o (0,197)	1,795 (0,568)	-0,563 (0,223)	-2,215 (0,683)	0,999	0,173	0,072	1,40 ^{oo}
VI	OLSQ	n = 40	-13,437	1,288 (0,026)	-1,566 (0,127)	0,311 (0,073)	0,346 (0,154)	-	-	-	-	-	0,999	0,202	0,076	1,52 ^{oo}
VII	OLSQ	n = 40	-8,870	1,222 (0,025)	-1,703 (0,149)	-	-0,089 ^o (0,139)	-	-	-	-	-	0,998	0,307	0,092	1,78
VIII	OLSQ	n = 40	-9,365	1,262 (0,029)	-1,565 (0,123)	-	0,091 ^o (0,205)	-	-2,070 (0,764)	0,144 ^o (0,259)	-0,481 ^o (0,291)	1,693 (0,619)	0,999	0,172	0,073	1,38 ^{oo}

(Abbreviations, see appendix)

Of course, the explanatory power of an econometric model that simply relies on a common trend component to identify a causal relation between exogenous and endogenous variables must be rather weak: any exogenous variable with a pronounced trend component would do as well, and it is hard to share the optimistic belief of Abrams & Schmitz that such a model offers a firm basis for any serious economic inferences¹. Since there are good reasons to include a variable of the income level (YL) to account for the trend of C in grouped data analysis, we must conclude that for Germany there is no clear evidence of either crowding-in or crowding-out on the basis of this model.

Further specifications in table 1 suffer from the same identification problem. The disaggregated expenditure variables SOC, HEA, RES and CUL are all highly collinear with YL and with each other so that no reliable conclusions can be drawn from equations IV and V. Even the church tax variable (CHQ) reveals a very high sensitivity to the introduction of trend variables (equations VI-VIII) thus allowing no statements about crowding-out effects.

In short, it turns out that the Abrams & Schmitz model does not suffice to answer the question at hand. We must resort to some cross-section analysis which does not exclusively rely on inter-temporal changes of the relevant variables.

4. Time-Series-Cross-Region Analysis

German income tax and public expenditure statistics provide data on the variables of the above model for each of the eleven German states ("Länder") in the five years 1961, 65, 68, 71 and 74. Hence it is possible to pool the data in a time-series-cross-region

¹Of course, Abrams & Schmitz recognize the problem, as their footnote 11 (p. 37) indicates. In my view, however, this central identification problem deserves more than a tiny footnote.

model. This may be done either in a disaggregation by state and time (two-dimensional model) or in a disaggregation by state, time and class (three-dimensional model). Both approaches will be applied in the subsequent analysis.

4.1. Two-Dimensional Model

4.1.1. Redefinitions and New Variables

Some modifications of the previous variables are required to allow for a disaggregation by states:

- C is now defined as the average charitable giving per income tax return of all GI-classes in state i and year j; hence there are 55 observations of the endogenous variable.
- Y is defined as the average disposable income of all income tax returns of state i and year j, with no change in the computation procedure described in section 3.1.¹ As the data is not grouped by nominal gross income classes, all intertemporal changes in the income level of the sample taxpayers are correctly reflected in the intertemporal variation of Y; hence we need not introduce an additional variable YL for the overall income level.
- P is defined as the price of charity which the taxpayer with the average "fictitious" taxable income of all tax returns in state i and year j faces. Once again, the computation procedure remains unchanged to the previous model².
- The public expenditure variables SOC, HEA, RES and CUL are now defined as the expenditure of all provincial and municipal authorities of state i and year j in the particular field. The functional boundaries of the items set out in section 3.2. remain unaltered³.

¹See pp. 6 f. and Paqué (14), pp. 9 ff.

²See p. 7 and Paqué (14), pp. 12 ff.

³See pp. 7 ff. of this paper. For 1961, data on gross expenditure of the four items are not available on a regionally disaggregated level; the net expenditure - based on the financing, not the provision of a service - had to be used instead. Heuristic comparisons of the inter-state variation of net and gross expenditure for later years indicated that the bias from this source should be negligably small.

- As the aggregation by GI-classes eliminates the prohibitive collinearity between the income-, price- and church tax variables, CHQ is replaced by the "ideal" variables CHL, defined as the average church tax liability per tax return of all GI-classes in state i and year j . The theoretical interpretation of the estimated parameter in terms of "crowding-out" or "religious affinity to charity" remains unchanged¹.

German states substantially differ in a number of socioeconomic characteristics which may be important for private giving behaviour. To catch at least some plausible effects of regional peculiarities, three additional variables are introduced, namely REL, URB and POL.

- REL is defined as the share of Roman catholics in the whole population of state i in year j ². A priori reasoning suggests that Roman Catholic belief with its inherent scepticism towards all secular institutions of the nation state assigns a more prominent role to non-governmental charity. Hence we expect a positive coefficient of REL to emerge.
- URB is defined as the number of inhabitants per square kilometer in state i and year j . It is a rudimentary measure of a state's degree of urbanisation. Since the anonymity of large agglomerations reduces the scope for bilateral or small-group private assistance, we expect the coefficient of URB to have a negative sign.
- Finally, POL is a "political dummy" intended to catch the effect of differences in the political attitudes of the population on private giving. For social-democratic / liberal provincial governments, POL takes the value "1", for christian-democratic/liberal provincial governments the value "0". Presuming that people voting

¹Of course, an alternative and perhaps superior variable for religious affinity to charity would be the percentage of church members in the sample of taxpayers or in the population. As the interregional (and intertemporal) variation of this measure is very low, we must resort to a church tax variable.

²As the population of Germany is almost exclusively made up of two confessions - protestants and Roman catholics - REL boils down to a kind of comparative measure of both confessions' 'propensity' to spend on charity.

for left-wing parties which tend to favour more government intervention in economic and social affairs, are less inclined to support private welfare organisations than more conservative voters, we expect a negative coefficient of POL to emerge.

For the estimates, a log-linear specification of the form

$$(2) \quad \ln C = \beta_0 + \beta_1 \ln Y + \beta_2 \ln P \\ + \beta_3 \ln REL + \beta_4 \ln URB + \beta_5 POL \\ + \beta_6 \ln CHL + \sum \gamma_i \ln G_i + \epsilon$$

was chosen, with ϵ being a random error term¹. Equation (2) was estimated by ordinary least squares (OLSQ).

4.1.2. Empirical Results

4.1.2.1. Aggregate Welfare Expenditure

The basic estimate of (2) with the aggregate welfare expenditure variable WF, defined as the sum of all per capita public expenditure items SOC, HEA, RES and CUL is given in table 2 as equation (I). The high standard error of the income and price elasticity estimates reflect a serious multicollinearity problem: Y is highly correlated with P, CHL and WF².

Two basic modifications are necessary to mitigate this statistical problem without substantially reducing the explanatory power of the regression for crowding-out-analysis. First, the price variable is simply taken out; as P is primarily collinear with Y - the relevant partial correlation coefficient (r) equals -0.72 - the consequent specification bias will almost exclusively fall on the income elasticity estimate. Second, CHL is replaced by CHY, defined as

¹Alternative specifications - linear or semi log-linear - had lower explanatory power without much changing the coefficients' sign and significance levels; they will not be discussed in the text.

²The relevant partial correlation coefficients (r) are all above 0.60.

Table 2: Estimates of the Two-Dimensional Model, Aggregate Welfare Variable

No.	Estim. Procedure	Sample	Const.	Y	P	REL	URB	POL	CHL	WF	adR ²	SSR	SE	DW	FH _{ST}	FS _{ST}	FH _T	FS _T	
I	OLSQ	n = 55	-17,654	1,936 (0,434)	-0,990 ^o (0,600)	0,151 (0,033)	0,029 ^o (0,025)	-0,095 (0,055)	0,360 (0,155)	-0,140 (0,071)	0,781	1,128	0,155	1,60 ^o	2,18	3,20**	1,93	1,98	
No.	Estim. Procedure	Sample	Const.	Y	Time	REL	URB	POL	CHY	WF	URB-D	adR ²	SSR	SE	DW	FH _{ST}	FS _{ST}	FH _T	FS _T
II	OLSQ	n = 55	-22,049	2,606 (0,307)	-	0,148 (0,033)	0,023 ^o (0,025)	-0,098 (0,056)	0,359 (0,157)	-0,136 (0,072)	-	0,774	1,190	0,157	1,68 ^o	1,89	4,18**	2,26*	1,64
III	OLSQ	n = 55	-22,146	2,607 (0,311)	0,002 ^o (0,148)	0,148 (0,034)	0,019 ^o (0,038)	-0,099 (0,057)	0,361 (0,160)	-0,116 ^o (0,162)	-	0,769	1,189	0,159	1,69 ^o	-	-	-	-
IV	OLSQ	n = 33 (T: 1968-74)	-17,291	2,121 (0,329)	-	0,152 (0,037)	0,070 (0,031)	-0,122 (0,059)	0,316 ^o (0,210)	-0,160 (0,092)	-	0,722	0,405	0,125	0,93***	-	-	-	-
V	OLSQ	n = 55	-20,527	2,493 (0,285)	-	0,200 (0,035)	-0,127 (0,053)	-0,109 (0,051)	0,442 (0,147)	-0,107 ^o (0,067)	0,492 (0,156)	0,809	0,983	0,145	1,94	1,89	2,68*	-	-
VI	OLSQ	n = 40 (rural states)	-17,189	2,088 (0,290)	-	0,208 (0,030)	-0,106 (0,051)	-0,098 (0,044)	0,392 (0,147)	-0,009 ^o (0,073)	-	0,874	0,492	0,122	1,77 ^o	1,70	1,90	-	-
VII	OLSQ	n = 55	-23,588	2,793 (0,293)	-	0,200 (0,026)	-	-	-	-0,171 (0,069)	-	0,753	1,379	0,164	1,77 ^o	2,14*	2,08	-	-
VIII	OLSQ	n = 40 (rural states)	-19,170	2,258 (0,306)	-	0,227 (0,028)	-	-	-	-0,038 ^o (0,084)	-	0,834	0,709	0,140	1,61 ^o	1,41	3,30*	-	-
IX	OLSQ	n = 55	-18,605	2,186 (0,216)	-	0,138 (0,034)	0,009 ^o (0,025)	-0,097 (0,057)	0,432 (0,157)	-	-	0,762	1,277	0,161	1,60 ^o	1,78	6,18**	-	-
X	OLSQ	n = 40 (rural states)	-16,977	2,061 (0,190)	-	0,208 (0,030)	-0,107 (0,050)	-0,098 (0,048)	0,394 (0,144)	-	-	0,878	0,492	0,120	1,76 ^o	1,25	1,67	-	-

(Abbreviations, see appendix)

the average church tax liability per average disposable income in state i and year j ; CHY is a powerful instrumental variable as it is highly correlated with CHL ($r = 0.84$), but hardly correlated with Y ($r = 0.08$).

Equation (II) presents the results of the modified regression: as can be seen from the estimation errors the collinearity problem is markedly reduced without much loss in overall estimation accuracy.

As equation (II) will serve as the starting-point for further analysis, some comments on the parameter estimates are required.

- Clearly, the income elasticity is biased upward due to the exclusion of the price variable; in view of the relatively high estimation error we should not attach too much weight to the precise magnitude of the coefficient; nevertheless it is reassuring that both the income and price elasticities of equation (I) are not totally out of the range of prior grouped data estimates of around 1.25 resp. -1.60¹.
- The socioeconomic variables yield some useful insights. The coefficient of REL is positive and highly significant, thus - as expected - assigning a higher "charity propensity" to catholics than to protestants. The significantly negative POL-coefficient also confirms our prejudice: "conservatives" tend to give more to private charitable institutions than "progressives". The insignificance of the URB-parameter may simply be due to the high collinearity between URB and POL ($r = 0.58$).
- The positive and significant parameter of CHY comes as a surprise: although the high collinearity between REL and CHY ($r = 0.55$) may point to some identification problem, there is at least not the slightest evidence of a crowding-out through church taxes.
- Finally, the coefficient of the aggregate welfare variable WF reveals the expected negative sign: the unsatisfactory F-statistics of the regression, however, indicate that further research may be required to come to definite conclusions.

¹See Paqué (14), p. 22, table 2.

Equation (II) suffers from two statistical deficiencies, namely a slight intertemporal heteroscedasticity and a marked parameter change between the city states (Berlin, Hamburg, Bremen) and the "rural" states of Germany.

To test whether the slight heteroscedasticity in time conceals an intertemporal parameter change¹, an exponential time trend is introduced in equation (III). The trend variable turns out to be entirely insignificant, but highly collinear with Y ($r = 0.63$) and WF ($r = 0.82$), thus indicating a strong trend component persisting in the income and public expenditure measure. This trend component, however, is not the primary cause for the emergence of the crowding-out effect: when restricting the sample to the observations of the three latest years (equation IV), the parameter of WF remains significant despite the loss of some trend variation².

Of course, the central problem of the basic estimate in equation (II) is the distinct parameter change between urban and rural states. To account for this unexplained parameter shift an "urban dummy" for the city states Berlin, Hamburg and Bremen is introduced in equation (V). This modification markedly improves the statistical quality of the estimate. The urban dummy turns out to be significantly positive thus indicating an unusually high charity propensity of the city states' inhabitants at their level of the exogenous variables. Most of the resulting parameter changes from (II) to (V) are easily explained by the fact that the positive shift in private giving from rural to urban states - previously attributed to the exogenous variables - is now at least partly taken over by the urban dummy: the coefficients of REL and CHY rise in magnitude and significance as all three city states are protestant, low tax burden areas; the

¹The significant F-statistic on intertemporal parameter constancy may be biased as the use of either F-statistic (FS, FH) always involves the implicit assumption that the non-tested property of the regression holds. See Maddala (12), p. 199.

²I do not interpret equation (IV) in detail as the small sample, the comparably low adjusted R^2 and the low Durbin-Watson-Statistic raise some doubts about the validity of the estimate.

parameter of URB becomes significantly negative as the cities are the most densely populated regions; the coefficient of WF is reduced as URB - positively correlated with WF ($r = 0.52$) - takes over part of the common covariance with C.

When restricting the sample to the observations of the "rural" states (equation VI), these tendencies are further accentuated: while most coefficients remain virtually the same as in equation (V), both the income elasticity and the public expenditure parameter are reduced in absolute amount; the coefficient of WF is even pulled down to an entirely insignificant level. The test statistics prove the sample to be fairly homogenous.

In light of this econometric evidence, the six variables can be divided into three groups, namely

- those explaining variations between all states (Y, REL) at high levels of significance;
- those explaining variations predominantly between "rural" states (URB, POL, CHY) at moderate levels of significance;
- the one (WF) explaining variations between rural and city states, also at moderate levels of significance.

Further testing supports the validity of this trilateral division:

- If we exclude URB, POL and CHY from the variable set (equations VII and VIII), it is primarily the small sample estimate (VIII) which suffers in statistical accuracy as the high standard error of the regression and the high F-statistic on parameter constancy in VIII indicate;
- if in turn, we exclude WF from the variable set (equations IX and X), it is only the large sample estimate (IX) which suffers a marked increase in the F-statistic on parameter constancy.

We must conclude that the estimates with the aggregate welfare expenditure variable do not yield sufficient statistical evidence of

a crowding-out effect of public expenditure on private charitable giving: all significant parameters supporting the crowding-out hypothesis stem from a sample which does not satisfy the basic statistical criteria for homogeneity. As soon as we restrict the pooling procedure to a homogenous sample, there is no crowding-out anymore.

4.1.2.2. Disaggregated Welfare Expenditure

Table 3 presents some estimates of the previous model with the four public expenditure variables SOC, HEA, RES and CUL replacing the aggregate variable WF.

As can be seen from equations (I) and (II), the high collinearity between the four spending variables - all partial correlation coefficients exceed 0.60 - do hardly allow an unrestricted estimation. Hence the variables with the least significant coefficients (RES and CUL) are excluded from further estimates. The remaining public expenditure items SOC and HEA have significant parameters in both sample estimates of equations (III) and (IV). The negative coefficient of SOC indicates a genuine crowding-out effect which does not depend on the homogeneity of the sample used.

Two major identification problems¹, however, remain:

- First SOC and HEA are themselves highly correlated ($r = 0.92$); hence the autonomous variation which accounts for sign and significance level of either coefficient may be very narrow. In fact, when excluding HEA (equations V and VI), the SOC-coefficient is markedly reduced; in the homogenous sample, it is even driven down to an insignificant level.
- Second, the introduction of both public expenditure variables reduces the significance of the URB- and POL-parameters. As there

¹We restrict our discussion to identification problems which are of crucial importance for the validity of a crowding-out effect. Minor issues (like the sensitivity of the REL and CHY-coefficients to specification changes) are not taken up.

Table 3: Estimates of the Two-Dimensional Model, Disaggregate Welfare Variables

No.	Estim. Procedure	Sample	Const.	Y	REL	URB	POL	CHY	SOC	HEA	RES	CUL	adR ²	SSR	SE	DW	FH _{ST}	FS _{ST}
I	OLSQ	n = 55	-21,291	2,502 (0,288)	0,083 (0,044)	0,034 ^o (0,025)	-0,066 ^o (0,053)	0,672 (0,187)	-0,479 (0,141)	0,314 (0,133)	0,102 ^o (0,066)	-0,097 ^o (0,108)	0,805	0,959	0,146	2,22	3,11*	2,45*
II	OLSQ	n = 40 ('rural' states)	-15,760	1,871 (0,295)	0,139 (0,039)	-0,044 ^o (0,051)	-0,058 ^o (0,042)	0,624 (0,160)	-0,326 (0,119)	0,336 (0,157)	0,006 ^o (0,109)	0,082 ^o (0,117)	0,897	0,367	0,111	2,51 ^{oo}	1,29	3,38*
III	OLSQ	n = 55	-22,227	2,587 (0,282)	0,119 (0,032)	0,018 ^o (0,024)	-0,077 ^o (0,053)	0,500 (0,150)	-0,316 (0,097)	0,218 (0,115)	-	-	0,801	1,022	0,147	2,08	2,58*	3,78**
IV	OLSQ	n = 40 ('rural' states)	-16,383	1,951 (0,261)	0,144 (0,033)	-0,049 ^o (0,048)	-0,061 ^o (0,040)	0,636 (0,150)	-0,331 (0,106)	0,365 (0,123)	-	-	0,901	0,374	0,108	2,47 ^{oo}	1,28	1,7i
V	OLSQ	n = 55	-23,219	2,724 (0,280)	0,130 (0,032)	0,027 ^o (0,024)	-0,090 (0,054)	0,412 (0,147)	-0,171 (0,061)	-	-	-	0,791	1,101	0,151	1,91	1,98	3,51**
VI	OLSQ	n = 40 ('rural' states)	-18,667	2,260 (0,266)	0,197 (0,031)	-0,096 (0,051)	-0,094 (0,043)	0,415 (0,145)	-0,069 ^o (0,064)	-	-	-	0,878	0,476	0,120	1,95	1,22	1,37
VII	OLSQ	n = 55	-24,213	2,823 (0,291)	0,185 (0,026)	-	-	-	-0,266 (0,102)	0,122 ^o (0,115)	-	-	0,763	1,298	0,161	2,17	2,58*	1,53
VIII	OLSQ	n = 40 ('rural' states)	-19,591	2,279 (0,299)	0,211 (0,028)	-	-	-	-0,203 (0,101)	0,202 ^o (0,121)	-	-	0,846	0,638	0,135	2,15	1,27	2,09

(Abbreviations, see appendix)

is substantial collinearity between both variable groups - the partial correlation coefficients are all between 0.4 and 0.6 - the autonomous variation of all single variables may be severely limited. In fact, when returning to a specification with URB, POL and CHY excluded (equations VII and VIII), the explanatory power of both public expenditure variables is reduced, with the coefficient of HEA being insignificant in the homogenous sample estimate (VIII). When excluding HEA instead (equations V and VI), the URB- and POL-coefficients return to the magnitudes and significance levels of prior specifications in table 2. Hence it is mainly the introduction of the second public expenditure variable HEA which causes the identification problem.

Despite these serious qualifications some preliminary conclusions can be drawn: clearly, SOC is the only public expenditure item which exerts a remarkable negative influence on private charitable giving. The more we narrow the autonomous variation of SOC by introducing collinear variables, the better its explanatory power turns out to be. It is difficult to decide which of the specifications comes closest to the "true" relationship between exogenous and endogenous variables as gains in overall estimation accuracy are always obtained at the cost of losses in the accuracy of the single parameter estimates. For the aggregate sample, this choice does not alter the conclusions since SOC keeps its significantly negative parameter in all specifications. For the homogenous sample of the rural states, in turn, SOC becomes insignificant when HEA is omitted from the variable set. Even then, however, SOC performs far better than the aggregate expenditure variable WF which loses its explanatory power almost entirely in the corresponding specification. Hence there are other items summed up in WF which tend to countervail the negative impact of SOC. The most important of these items seems to be HEA: as the coefficient of HEA is quite sensitive to specification changes, however, we should remain sceptical about the validity of a crowding-in effect.

4.1.3. Modifications

A great deal of the high collinearity between the public expenditure variables is due to variations in the total budget size. To mitigate this problem, we resort to an alternative set of public expenditure variables: we define the "budget quota" WFQ resp. SOCQ, HEAQ, RESQ and CULQ as the shares of the relevant expenditure categories in total public outlay of state i in year j . The budget quota increase when the relevant items rise at a higher growth rate than the whole budget size thus indicating a shift in the governments' spending priorities. As the concept assumes that "neutral" changes in the total budget do not affect private charitable giving, the per capita measure is clearly preferable on theoretical grounds. The estimates with budget quota will simply serve as a test for the parameters' sensitivity to collinearity changes.

Table 4A presents the estimates based on a log-linear specification with budget quota in place of per capita spending. While the overall statistical performance is somewhat poorer than in the corresponding specifications of table 3, the "parameter pattern" is hardly altered. Some points, however, are worth noting: the coefficient of WFQ is insignificant in both sample estimates (equation 1 and 2); SOCQ confirms the significantly negative parameter of SOC in prior specifications of table 3; HEAQ, in turn, does not retain the significantly positive coefficient in the large sample estimate.

Hence, the effect of public social services on private charitable giving proves to be the least sensitive to specification changes: even when eliminating the effect of changes in the absolute budget size we are still left with a crowding-out effect.

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Table 4: Estimates of the Two-Dimensional Model, Modifications

A) Budget-Quota

No.	Estim. Procedure	Sample	Const.	Y	REL	URB	POL	CHY	WFQ	SOCQ	HEAQ	RESQ	CULQ	adR ²	SSR	SE	DW
I	OLSQ	n = 55	-20,579	2,458 (0,282)	0,153 (0,035)	0,021° (0,026)	-0,093° (0,057)	0,349 (0,164)	-0,262° (0,176)	-	-	-	-	0,768	1,221	0,160	1,68°
II	OLSQ	n = 40 ('rural' states)	-14,985	1,797 (0,257)	0,206 (0,029)	-0,139 (0,054)	-0,103 (0,042)	0,460 (0,148)	0,255° (0,171)	-	-	-	-	0,882	0,461	0,344	1,83
III	OLSQ	n = 55	-20,348	2,409 (0,260)	0,075 (0,044)	0,038° (0,026)	-0,058° (0,053)	0,695 (0,191)	-	-0,621 (0,172)	0,214° (0,150)	0,097° (0,067)	-0,102° (0,108)	0,805	0,960	0,146	2,43°
IV	OLSQ	n = 40 ('rural' states)	-15,317	1,844 (0,249)	0,150 (0,041)	-0,095° (0,058)	-0,079 (0,042)	0,620 (0,156)	-	-0,161° (0,183)	0,292 (0,162)	0,074° (0,095)	0,129° (0,106)	0,896	0,369	0,111	2,41°
V	OLSQ	n = 55	-21,816	2,554 (0,247)	0,112 (0,032)	0,023° (0,024)	-0,072° (0,053)	0,510 (0,150)	-	-0,412 (0,121)	0,126° (0,141)	-	-	0,802	1,021	0,147	2,22
VI	OLSQ	n = 40 ('rural' states)	-16,196	1,933 (0,239)	0,159 (0,036)	-0,067° (0,054)	-0,071° (0,041)	0,641 (0,158)	-	-0,263 (0,142)	0,380 (0,142)	-	-	0,897	0,392	0,111	2,29°

B) Municipal Expenditure

No.	Estim. Procedure	Sample	Const.	Y	REL	URB	POL	CHY	WF	SOC	HEA	CUL	adR ²	SSR	SE	DW
VII	OLSQ	n = 40 ('rural' states)	-14,415	1,751 (0,347)	0,213 (0,030)	-0,103 (0,050)	-0,104 (0,043)	0,375 (0,145)	0,094° (0,088)	-	-	-	0,878	0,478	0,120	1,70°
VIII	OLSQ	n = 40 ('rural' states)	-17,117	2,015 (0,347)	0,163 (0,033)	0,029° (0,064)	-0,083 (0,041)	0,534 (0,145)	-	-0,174° (0,117)	0,267 (0,102)	-0,199° (0,131)	0,899	0,372	0,110	1,97
IX	OLSQ	n = 40 ('rural' states)	-14,863	1,768 (0,313)	0,171 (0,033)	-0,013° (0,059)	-0,076 (0,042)	0,520 (0,148)	-	-0,222 (0,115)	0,281 (0,104)	-	0,895	0,400	0,112	1,91
X	OLSQ	n = 40 ('rural' states)	-16,535	2,011 (0,327)	0,210 (0,032)	-0,109 (0,052)	-0,099 (0,045)	0,386 (0,152)	-	0,015° (0,081)	-	-	0,874	0,492	0,122	1,74°

(Abbreviations, see appendix)

of provincial and municipal spending on private charitable giving, some of the regressions of table 3 were reestimated using a per-capita measure of municipal spending alone. As provincial and municipal expenditures cannot be distinguished for the city states of Berlin, Hamburg and Bremen, the sample is restricted to the remaining "rural" states; as research and universities are exclusively financed by provincial and federal spending authorities, the relevant expenditure category (RES) is omitted from the variable set.

The estimates presented in Table 4B do not exhibit any major differences to the corresponding regressions of table 3; although the coefficients of SOC and HEA have a somewhat lower significance level than prior estimates, they are clearly not outside the range of previous results. Hence there is no conclusive evidence that municipal and provincial welfare spending have different effects on private charitable contributions.

4.2. Three-Dimensional Model

4.2.1. Specification

The crowding-out analysis of the previous subsection can be applied to tax data disaggregated by gross income classes: we redefine C, Y and P as the average charitable giving, disposable income and price of charity per gross income class k in state i and year j. All public expenditure items and all socioeconomic variables are now used to explain the shifts in the overall propensity to spend on charity between states and years. To avoid extreme collinearities the church tax variable CHY is replaced by CHY, the average share of church tax liability in average total direct tax liability of gross-income class k in state i and year j¹. To account for changes in the overall income level which are not adequately reflected in the grouped data², we introduce the variable YL, defined as the average "national income per employee" in state i and year j.

¹For details, see pp. 9 f. of this paper.

²See Paqué (14), pp. 17 f.

Heteroscedasticity and parameter changes between different income groups force us to restrict the sample to all gross income classes above 16 000 DM yearly nominal gross income¹.

For the estimates a log-linear specification of the well-known form

$$(3) \quad \ln C = \beta_0 + \beta_1 \ln Y + \beta_2 \ln P + \beta_3 \ln YL \\ + \beta_4 \ln REL + \beta_5 \ln URB + \beta_6 \ln POL \\ + \beta_7 \ln CHQ + \sum \gamma_i \ln G_i + \epsilon$$

was chosen, with ϵ being a random error term. Equation (3) was estimated by ordinary least squares (OLSQ); a weighted least squares procedure (WLSQ) was later adopted to mitigate some interstate heteroscedasticity problems.

4.2.2. Estimates

Equation I in table 5 presents the basis estimate of specification (3). The F-statistic indicates a parameter change between the city states and rural states which is far more dramatic than in the estimates based on the aggregate data in subsection 4.1. Unfortunately, there is no easy remedy to this basic pooling problem: all common procedures like the dummy variable method or the variance component models² aim at reducing the parameter shifts to changes in the intercept. In our model, however, we just like to answer the question which variables are responsible for interstate shifts of the regression intercept, i.e. the overall propensity to spend on charity. When comparing the F-statistics on parameter change of (I) and (II) - an estimate without any crowding-out- or socioeconomic variables -, we see that part of the changes are well explained by the shift

¹See Paqué (14), pp. 16 f. As for some years and some states, the income range above 500 000 DM yearly gross income is not divided into two separate classes, the number of observations for the states varies between 35 and 40. For the total sample, 417 observations are available.

²See Maddala (12), p. 326 ff.; Maddala (13).

Table 5: Estimates of the Three-Dimensional Model

No.	Estim. Procedure	Sample	Const.	Y	P	YL	REL	URB	POL	CHQ	WF	SOC	HEA	RES	CUL	adR ²	SSR	SE	DW _Y	FH _{ST}	FS _{ST}
I	OLSQ	n = 417	-15,407	1,267 (0,020)	-1,545 (0,114)	0,619 (0,103)	0,175 (0,015)	-0,022 (0,013)	...	0,104 (0,059)	-0,144 (0,055)	-	-	-	-	0,987	19,475	0,218	1,91	1,68**	10,28**
II	OLSQ	n = 417	-10,509	1,225 (0,024)	-1,740 (0,149)	0,128 (0,058)	-	-	-	-	-	-	-	-	-	0,977	34,010	0,287	1,80	1,17	29,78**
III	OLSQ	n = 417	-10,467	1,240 (0,019)	-1,637 (0,118)	-	0,176 (0,014)	-0,051 (0,012)	0,138 (0,027)	-	-	-	-	0,986	21,213	0,227	1,87	1,86**	13,84**
IV	OLSQ	n = 417	-15,253	1,248 (0,018)	-1,577 (0,114)	0,653 (0,094)	0,196 (0,012)	-	-	-	-0,198 (0,047)	-	-	-	-	0,987	19,772	0,220	1,90	1,65**	9,12**
V	WLSQ	n = 417	-11,969	1,221 (0,013)	-1,720 (0,081)	0,206 (0,089)	0,201 (0,013)	-0,020 (0,012)	-0,109 (0,020)	...	0,049 ^o (0,047)	-	-	-	-	-	10,743	0,162	1,71 ^o	1,10	10,29**
VI	OLSQ	n = 306*	-12,009	1,246 (0,019)	-1,652 (0,112)	0,117 ^o (0,168)	0,194 (0,016)	-0,121 (0,029)	-0,041 (0,024)	0,232 (0,063)	0,160 (0,093)	-	-	-	-	0,990	9,974	0,183	1,98	1,33	10,92**
VII	WLSQ	n = 306*	-8,753	1,218 (0,014)	-1,815 (0,077)	-0,364 (0,126)	0,199 (0,015)	...	-0,108 (0,018)	0,167 (0,055)	0,371 (0,069)	-	-	-	-	-	6,419	0,147	1,65 ^{oo}	1,10	2,92**
VIII	OLSQ	n = 417	-18,428	1,291 (0,020)	-1,511 (0,111)	0,889 (0,117)	0,125 (0,017)	-0,018 ^o (0,013)	...	0,259 (0,063)	-	-0,390 (0,065)	0,118 ^o (0,070)	...	0,111 (0,059)	0,988	18,148	0,211	1,88	1,72**	9,87**
IX	OLSQ	n = 417	-18,541	1,286 (0,020)	-1,525 (0,111)	0,930 (0,114)	0,123 (0,017)	-0,015 ^o (0,013)	...	0,237 (0,061)	-	-0,346 (0,060)	-	-	0,162 (0,051)	0,988	18,274	0,212	1,87	1,81**	8,96**
X	OLSQ	n = 417	-18,091	1,279 (0,020)	-1,534 (0,112)	0,904 (0,104)	0,149 (0,015)	0,156 (0,059)	-	-0,278 (0,045)	-	-	-	0,987	18,746	0,214	1,91	1,86**	7,19**
XI	WLSQ	n = 417	-14,260	1,233 (0,015)	-1,735 (0,080)	0,467 (0,112)	0,157 (0,019)	-0,021 ^o (0,013)	-0,085 (0,022)	0,123 (0,036)	-	-0,154 (0,059)	-	-	0,157 (0,050)	-	10,462	0,160	1,70 ^o	1,13	6,90**
XII	WLSQ	n = 417	-13,947	1,224 (0,014)	-1,736 (0,080)	0,464 (0,104)	0,183 (0,017)	...	-0,115 (0,020)	0,052 ^o (0,054)	-	-0,092 (0,047)	-	-	-	-	10,719	0,162	1,72 ^o	1,00	7,43**
XIII	OLSQ	n = 306*	-15,119	1,247 (0,019)	-1,679 (0,109)	0,511 (0,194)	0,151 (0,019)	-0,107 (0,028)	...	0,352 (0,072)	-	-0,162 (0,091)	-	-	0,263 (0,059)	0,991	9,396	0,178	1,87	1,61**	8,17**
XIV	OLSQ	n = 306*	-16,521	1,252 (0,020)	-1,656 (0,112)	0,760 (0,192)	0,189 (0,018)	-0,137 (0,028)	...	0,346 (0,074)	-	-0,192 (0,093)	-	-	-	0,990	10,021	0,183	2,03	1,71**	7,37**
XV	WLSQ	n = 306*	-11,474	1,224 (0,014)	-1,838 (0,076)	0,049 ^o (0,069)	0,160 (0,018)	-0,055 (0,023)	-0,080 (0,019)	0,261 (0,062)	-	...	-	-	0,314 (0,058)	-	6,228	0,145	1,64 ^{oo}	1,15	3,35**
XVI	WLSQ	n = 306*	-14,080	1,224 (0,015)	-1,830 (0,080)	0,452 (0,174)	0,203 (0,018)	-0,071 (0,024)	-0,108 (0,020)	0,242 (0,077)	-	-0,060 ^o (0,081)	-	-	-	-	6,836	0,152	1,69 ^o	1,19	4,79**

(Abbreviations, see appendix)

* 'rural states'

variables. Nevertheless, there are still parameter changes involved which do not allow a simple pooling of the data¹.

Despite this difficulty we will stick to our specification to check the robustness of the estimates obtained in the aggregate models of subsection 4.1. of this paper. In purely statistical terms, the results must be viewed with considerable caution.

Equation I largely confirms prior parameter estimates based on different samples. Only the coefficient of URB and POL have "exchanged" significance; in light of their high collinearity ($r = 0.58$) this result does not come as a surprise. The church tax variable (CHQ) turns out to be significantly positive thus supporting the prior conclusions based on regressions with CHY. With respect to the negative parameter of WF, we face a similar identification problem as in the Abrams & Schmitz-Model: if the highly collinear variable YL ($r = 0.88$) is excluded, WF takes over the positive income and trend effect (equation III); hence there is only a very narrow autonomous variation of WF which is responsible for the appearance of a crowding-out effect. Other collinearity problems turn out to be less serious: when URB, POL and CHQ are excluded (equation IV), the WF-coefficient gains in significance, but the shift is not very dramatic.

All F-statistics on homoscedasticity indicate a pronounced interstate heteroscedasticity in all regressions considered so far. Heuristic examination of the residual structure pointed to an inverse variation of the estimation error with the number of income taxpayers in a particular state. Hence, to establish homoscedasticity,

¹As a matter of fact, even a regression with Y, P, YL and ten state dummies did not nearly eliminate the interstate parameter change. The only promising statistical procedure seems to be a "switching regime" model defining distinct income and/or price elasticity for all states or groups of states. As there is an important identification problem which seriously restricts the validity of the estimates anyway (see below), I did not resort to this complex procedure.

a weighted least squares procedure was adopted, with the number of taxpayers in state i and year j as (normalized) weights¹.

The parameters of the WLSQ equation V reveals a pattern very similar to the restricted sample estimate of table 2: both the coefficients of URB and POL are now significantly negative, while the WF-parameter is reduced to insignificance. As the weighting procedure attaches less weight to the city states (equation VI), the similarity is not surprising.

When restricting the sample to the "rural" states (equation VI), the parallel to equation VI of table 2 becomes still more striking. The only remarkable difference seems to be the significantly positive sign of the WF-parameter in table 5 which is due to the extremely high collinearity between YL and WF ($r = 0.96$). When applying a weighted least squares procedure on the restricted sample (equation VII), this identification problem leads to utterly implausible parameters of YL and WF.

Due to the high collinearity between the main shift variables, the simultaneous introduction of all four disaggregated expenditure items yields mostly insignificant parameters (equation VIII). Hence we restrict the analysis to the two variables with the lowest collinearity, namely SOC and CUL ($r = 0.51$). The resulting estimates (equations IX-XVI) support the main conclusion of subsection 4.1.: the expenditure on social services exerts a negative influence on private charitable giving; when restricting the sample to the rural states, this influence markedly diminishes; only in the WLSQ-equations XV and XVI of the restricted sample, however, does it become insignificant².

¹Owing to the strong interstate parameter changes, more sophisticated (iterative) weighting procedures did not yield satisfactory results.

²As the statistical properties of the relevant estimates are not satisfactory, we will not discuss the parameter estimate of CUL.

4.2.3. New Evidence on Income and Price Elasticities

Table 6 summarizes the OLSQ-income- and price elasticities estimated from different sample sources, namely

- the aggregate sample for the F.R.G. with 40 observations (A),
- the total disaggregated sample for the German states with 417 observations (B), and
- the restricted disaggregated sample (for the 'rural' states) with 306 observations (C)¹.

The results are striking: in all four specifications, the estimated parameters do not significantly differ from each other.

- The income elasticity is around 1,25, independent of specification, income variable used (gross disposable income or taxable income) and sample size;
- the constant price elasticity is around -1,60 in the estimates with Y (gross disposable income) and around -1,30 in the estimates with YT (taxable income);
- the variable price elasticities turn out to be
 - = around -1,75 for the lower gross income classes (16 000 - 100 000 yearly gross income) and around -1,60 for the higher classes (100 000 and above yearly gross income) in the estimates with Y;
 - = around -1,40 for the lower and around -1,30 for the higher classes in the estimates with YT.

Hence, despite all dramatic interstate parameter changes in the large sample estimates, the income and price elasticities of the aggregate analysis for the F.R.G. are very well confirmed.

¹For B and C, the model was, of course, fully specified, with other relevant variables (YL, REL, URB, POL, CHQ and/or WF) included. For the sake of simplicity, only income and price elasticities are printed in table 6.

Table 6: Estimates of Income and Price Elasticities

No.	Estim. Procedure	Sample	Y	YT	P	PL	PH	SE
I	A) OLSQ	n = 40	1,249 (0,020)	-	-1,589 (0,133)	-	-	0,080
	B) OLSQ	n = 417	1,267 (0,020)	-	-1,545 (0,114)	-	-	0,218
	C) OLSQ	n = 306	1,245 (0,019)	-	-1,656 (0,112)	-	-	0,184
II	A) OLSQ	n = 40	1,263 (0,021)	-	-	-1,734 (0,149)	-1,597 (0,129)	0,077
	B) OLSQ	n = 417	1,287 (0,021)	-	-	-1,729 (0,128)	-1,544 (0,113)	0,216
	C) OLSQ	n = 306	1,259 (0,020)	-	-	-1,778 (0,126)	-1,655 (0,112)	0,183
III	A) OLSQ	n = 40	-	1,243 (0,023)	-1,275 (0,155)	-	-	0,090
	B) OLSQ	n = 417	-	1,260 (0,021)	-1,254 (0,123)	-	-	0,226
	C) OLSQ	n = 306	-	1,243 (0,020)	-1,341 (0,120)	-	-	0,190
IV	A) OLSQ	n = 40	-	1,252 (0,024)	-	-1,374 (0,177)	-1,280 (0,155)	0,090
	B) OLSQ	n = 417	-	1,277 (0,022)	-	-1,399 (0,136)	-1,250 (0,122)	0,225
	C) OLSQ	n = 306	-	1,252 (0,021)	-	-1,420 (0,134)	-1,339 (0,120)	0,190

(Abbreviations, see appendix)

5. Conclusions

From the estimates of the econometric model used in this paper, we can draw the following conclusions about crowding-out of private charitable giving:

- Public expenditure on social services (SOC) tends to reduce private charitable contributions. Depending on sample size and specification, the coefficients mostly vary between -0.35 and -0.06 thus indicating a partial crowding-out effect. When all different welfare expenditure items (SOC, HEA, RES and CUL) are summed up in one variable (WF), it is the social service component in WF which causes a mostly insignificant negative parameter of WF.
- Other public expenditure items (HEA, RES, CUL) do not exert a comparably significant influence on private charitable giving: while the coefficient of RES remains totally insignificant throughout, HEA and CUL mostly have positive parameters which are not very robust to changes in specification and sample size.
- With respect to church taxes, the overwhelming evidence indicates a positive impact of the church tax burden on private charitable contributions. As I argued in section 3.1.¹, this positive effect should be interpreted as a particular religious affinity to charity which clearly is much stronger than any crowding-out effect.

The socioeconomic variables reveal a clear pattern:

- No doubt, catholics tend to spend more on charity than the average population.
- Urbanization and "social democratic" political attitudes tend to reduce the populations' propensity to give money for charitable purposes. Even if we regard "left-wing" political preferences as a positive function of urbanization itself - the high positive

¹See p. 10 of this paper.

correlation between URB and POL points in this direction - we are still left with a distinct negative effect of "urbanisation" in general.

The main conclusions of the analysis for economic policy are straightforward: the private voluntary provision of social services does not only depend on individual income and the state of the "social environment", but also on the structure and volume of public expenditures. Hence government should correct its cost-benefit analysis for crowding-out effects: the cost of a 1 %-increase in public social services is higher than the pure tax cost indicates. Even if the absolute amount of private charity reduction is of minor magnitude, the relative decrease of private initiative due to partial crowding-out effects may be quite substantial.

Appendix

Abbreviations in tables 1 - 6:

OLSQ	= ordinary least squares;
WLSQ	= weighted least squares (weighting procedure described in section 4);
n	= total number of observations in the sample;
T	= years in the sample;
const.	= parameter estimate of constant resp. weighted constant in log-linear specifications;
Y, P, CHQ, WF' ...	= parameter estimates - standard estimation error in paranthesis - of Y, P etc. (as defined in the text) in log-linear specification;
POL, URB-D	= parameter estimates of dummy variables as defined in the text;
Time	= parameter estimate of exponential time trend;
adjR ²	= adjusted square of multiple regression coefficient (only given for OLSQ-estimates);
SSR	= sum of squared residuals;
SE	= standard error of the regression;
DW _Y	= Durbin-Watson-statistic for the estimate with observations ordered according to the magnitude of the income variable (Y) in the equation.
DW	= Durbin-Watson-statistic for the estimate with observations ordered by states (order: Berlin, Hamburg, Bremen, Schleswig-Holstein, Niedersachsen, Nordrhein-Westfalen, Hessen, Rheinland-Pfalz, Saarland, Baden-Württemberg, Bayern) and within states by years (1961, 65, 68, 71, 74);
FH _{ST}	= F-statistic of homoscedasticity: the sample is divided into two distinct ranges of the grouping characteristics (states: 'city' states and 'rural' states for n = 55 and n = 417; 'northern rural states' (Schleswig-Holstein, Niedersachsen, Nordrhein-Westfalen, Hessen) and 'southern rural states' (Rheinland-Pfalz, Saarland, Baden-Württemberg, Bayern) for n = 40 and n = 306; time: 1961-1965 and 1968-1974); the F-statistic is given as the ratio of the SSR
FH _T	-corrected for the corresponding ratio of degrees of freedom - of the separate estimates for the two ranges;

FS_{ST}

FS_T

= F-statistic of parameter constancy as described by Maddala (17, pp. 198 ff.): the sample is splitted into two or more distinct ranges of the grouping characteristics (states: 'city' states and 'rural' states for n = 55 and n = 417; 'northern' rural states' (Schleswig-Holstein, Niedersachsen, Nordrhein-Westfalen, Hessen) and 'southern rural states' (Rheinland-Pfalz, Saarland, Baden-Württemberg, Bayern) for n = 40 and n = 306; time: 1961-1965 and 1968-1974); for these ranges separate regressions are run and the SSR of these unrestricted estimates are summed up; the F-statistic is obtained by computing the difference of the restricted estimates' SSRs and the summed unrestricted estimates' SSRs as a fraction of the unrestricted estimates' SSRs, both numerator and denominator corrected for the relevant degrees of freedom;

significance levels

- of the F- and DW-statistics:

- * = significant at the 5 % level;
- ** = significant at the 1 % level;
- oo = DW-statistic in the indifference range at the 1 % and the 5 % level;
- o = DW-statistic in the indifference range at the 5 % level, but insignificant at the 1 % level;

- of the parameter estimates:

all significant at least at the 5 % level (one-sided test) if not denoted by "o" (= not significant);

in table 5:

- ... = variable excluded as entirely insignificant (t-values below 0.7)

References

- (1) Abrams, Burton A., Mark D. Schmitz, "The 'Crowding-Out' effect of Governmental Transfers on Private Charitable Contributions", in: Public Choice, Vol. 33(1978), pp. 29-39.
- (2) Barro, Robert J., "The Impact of Social Security on Private Saving: Evidence from the U.S. Time Series", in: American Enterprise Institute, Study No. 199, Washington D.C. 1978, pp. 1-36.
- (3) Brennan, Geoffrey, "Tax Concessions for Charitable Contributions. A Comment", in: Public Finance/Finances Publiques, Vol. 32 (1977), pp. 402-411.
- (4) Clotfelter, Charles T., "Tax Incentives and Charitable Giving: Evidence from a Panel of Taxpayers", in: Journal of Public Economics, Vol. 13(1980), pp. 319-340.
- (5) Dean, James M., "Redistribution and Tax Concessions for Charitable Contributions", in: Public Finance/Finances Publiques, Vol. 28(1973), pp. 371-376.
- (6) Feldstein, Martin, "The Income Tax and Charitable Contributions: Part I - Aggregate and Distributional Effects", in: National Tax Journal, Vol. 28(1975), pp. 81-100.
- (7) Feldstein, Martin, "The Income Tax and Charitable Contributions: Part II - The Impact on Religious, Educational and other Organizations", in: National Tax Journal, Vol. 28(1975), pp. 209-226.
- (8) Feldstein, Martin, "Social Security, Induced Retirement and Aggregate Capital Accumulation", in: Journal of Political Economy, Vol. 82(1974), pp. 905-926.
- (9) Feldstein, Martin, "Reply to Robert J. Barro's 'The Impact of Social Security on Private Giving'", in: American Enterprise Institute, Study No. 199, Washington D.C. 1978, pp. 37-47.
- (10) Hochman, Harold M., James D. Rodgers, "The Optimal Tax Treatment of Charitable Contributions", in: National Tax Journal, Vol. 30(1977), pp. 1-18.
- (11) Johnson, David B., "Some Fundamental Economics of the Charity Market", in: The Economics of Charity. Blacksburg, Center for the Study of Public Choice, 1970, pp. 71 ff.
- (12) Maddala, G.S., Econometrics. Mc Graw Hill, Tokyo 1977.

- (13) Maddala, G.S., "The Use of Variance Components Models in Pooling Cross-Section and Time-Series Data", Econometrica, Vol. 39 (1971), pp. 341-358.
- (14) Paqué, K.-H., "The Efficiency of Public Support to Private Charity. An Econometric Analysis of the Income Tax Treatment of Charitable Contributions in the Federal Republic of Germany", Kiel Working Paper No. 151, Institute of World Economics, Kiel.