REGIONAL PUBLIC HEALTH CARE SPENDING IN SWITZERLAND: AN EMPIRICAL ANALYSIS *

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Abstract

In this study we attempt to explain variations across the Swiss regional states (cantons) in public health care expenditures. The large autonomy of the cantons in the organization and financing of health care services creates strong heterogeneity. Per capita public expenditures in health care are assumed to depend on the median voter income, the median tax share, intergovernmental grants, and some demographic and structural factors. The empirical analysis shows that cantonal behavior is sensitive to federal subsidies. A 10 percent increase in the cost of benefits causes a 1.4 percent decrease in benefit amounts. Moreover, changes in median income seem to have significantly larger effects on budgetary behavior than do equal changes in grants from the federal state.

JEL classification: D72, H77, I18.

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1. Introduction

The Swiss health care system is based on a peculiar health insurance system, whose characteristics are between private and social insurance. On the one hand, the State plays a significant role in terms of regulation[1]: health insurance is universal (mandatory for all residents), it covers a package of health-care benefits defined by law, premiums are community rating and subject to State regulation, and a subsidy is designed to help people with low income pay their health insurance premiums; on the other hand, health insurance is consumer-driven, since individuals are required to purchase their own health insurance by choosing one of the about 90 competing private insurance companies (sickness funds) that offer the basic insurance plan.[2]

In 2002 health care costs total CHF 48 billion in Switzerland and correspond to 11.1% of GDP. With respect to per-capita health expenditures Switzerland ranks first among European countries and second (after the U.S.) in the world. However, if compared to the majority of Western countries, the share of public health expenditure is particularly low. Only a quarter of health care financing (26.4% in 2002) is collected in Switzerland by means of taxes. Moreover, this contribution is provided by three distinct layers of government, the federal government, the 26 cantons and the 2700 municipalities approx. The Swiss health sector is strongly marked by federalism. Decentralization of competences and expenditure has led to significant inter-cantonal differences with regard to public expenditure, the regulatory settings and to production capacity. The aim of this study is to focus on public health care expenditure and to analyze the

[1] See Reinhardt (2004).
[2] See Herzlinger and Parsa-Parsi (2004).

determinants of per-capita public health expenditure variability across the Swiss cantons.[3]

The paper is structured as follows: in section 2 we present the main features of public health care financing in Switzerland and show the impact of federalism on cantonal expenditure; in sections 3 and 4 we discuss the specification of the model and submit the empirical estimation results of the panel data set. Conclusions are drawn in section 5.

2. Federalism and public health expenditure in Switzerland

Public expenditure accounts in Switzerland for only one quarter of total health care costs. The remaining three quarters are financed through mandatory health insurance premiums (26.3%), social insurance contributions (7.7%), premiums for private complementary insurance (9.7%), co-payment of insured services (5.2%) and out-of-pocket payments (23.7%).[4]

The presence of such a large number of third-party payers makes it extremely complex to follow the financial flows in Switzerland. Since many services are simultaneously financed by multiple payers (the state and the mandatory health insurance or the mandatory health insurance and complementary private insurers) it is difficult to manage the health care expenditures in general, due to a *cost shifting* problem.[5]

80% of public spending is provided by regional and local governments. Out of respect for the typical organization of a federal state, in the health and social sectors the Federal Constitution grants large decision-making autonomy and

[3] In a previous paper [see Crivelli et al, 2004] we analyzed the determinants of socialized health expenditure, by considering the mandatory health insurance expenditure in addition to public spending.
[4] Overall, two-thirds of the financing do not depend on the citizens' ability to pay.
[5] Since nobody is entirely responsible for the global health care budget, it is sometimes easier for a single financing body (e.g. the Canton) to obtain a reduction in its own financial share, rather than to engage in a more rational use of total health care spending. This encourages shifting costs at the expense of another payer, rather than looking for solutions which would allow an effective rationalization of expenditure.

financial responsibility to the single cantons.[6] In other words, in Switzerland the bodies that formally have the task of guaranteeing access to health services (also through financial support) and of monitoring the effectiveness and efficiency of the system are the cantonal governments, while the Confederation is responsible only for the regulation of health insurance.[7]

Public health expenditure of local and cantonal governments can be subdivided in two main elements: (1) direct health expenditure (in 2002 this item totals CHF 7.8 billion), and (2) health insurance subsidies for persons with a low income (in 2002 CHF 2.83 billion were distributed to households).[8]

2.1.Direct public health expenditure

As far as direct health expenditure is concerned, 92% of cantonal and local spending (CHF 6.31 billion in 2002) is devoted to assuring financial support for public-interest hospitals, nursing homes and institutions offering home care services. Figure 1 displays the per capita amount directly spent by each canton in 2002.

The largest share in direct public health expenditure (on average 80%) concerns the hospital sector, where the cantons' autonomy is particularly important.[9] Each of the 26 cantons is bound to elaborate its own hospital planning, which defines the list of hospitals authorized to practice and be reimbursed by the

[6] According to article 3 of the Federal Constitution "*the Cantons are sovereign insofar as their sovereignty is not limited by the Federal Constitution; they shall exercise all rights which are not transferred to the Confederation*".

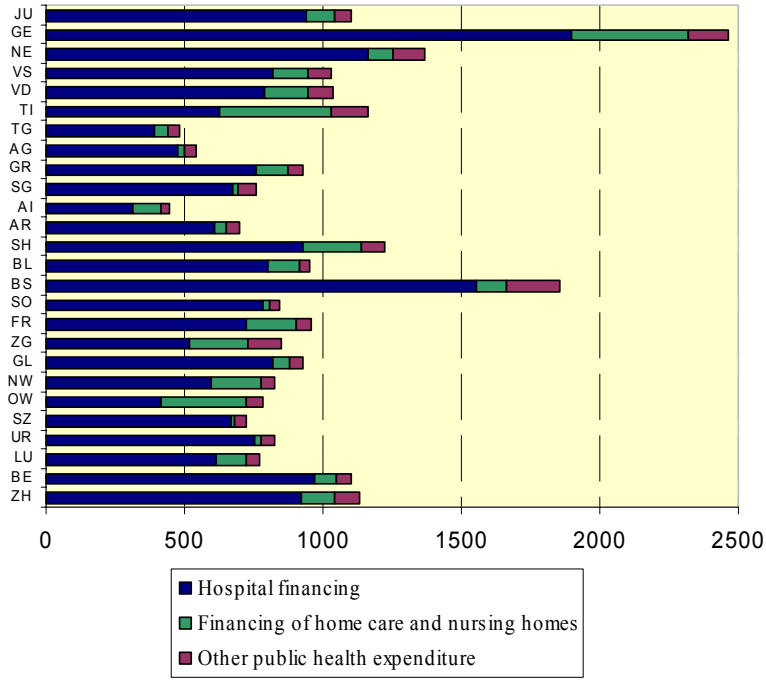
[7] A change in route happened in 1996. The introduction of compulsory insurance and the definition of the benefit basket guaranteed to all the Swiss population has brought about the institutionalization of a public service on a national scale, in the sense that minimum health services, for which universal access is granted to all citizens, cannot be modified by decision of the single cantonal governments. However, the additional decision-making powers of the central body were not supported by a formal devolution of competences from the cantons to the Confederation (which would have required a change in the Constitution) nor by a redistribution of public health expenditures for a greater engagement of the Confederation [see Crivelli and Filippini, 2003].

[8] However, only CHF 933 million were financed directly by the cantons, while CHF 1.9 billion were provided to them by the federal government by means of a specific matching grant.

[9] For more detailed information about the nursing home sector see Crivelli et al (2002).

compulsory health insurance for the citizens of the canton. The inter-cantonal differences with regard to acute beds density are very marked. The national average is 352 acute beds per 100,000 inhabitants, but two cantons exceed this average by 50% or more [Ticino (TI): 522 beds and Basel-City (BS): 702 beds], whereas 3 cantons show a density over 30% lower than the national average [Zug (ZG): 201 beds, Schwyz (SZ): 231 beds and Thurgovia (TG): 234 beds].

Figure 1: Per capita direct health expenditure (2002) in the 26 Cantons



Source: Swiss Federal Statistical Office (2004)

N.B.In order to arrive at the real situation, these density figures have to be corrected by considering cross-border hospital care (i.e. patients of a particular canton who are treated in another canton).[10]

[10] In Switzerland cross-border care is very important from both the demand and the supply side. Cross-border patients represent a significant share of hospital demand in some cantons, whereas in other cantons an important share of bed capacity serves to provide hospital care to patients living outside the cantonal boundaries. For details see Crivelli (1998).

How hospital services have to be financed is defined in the federal legislation. The tariffs paid for the canton's inhabitants by the mandatory health insurance in public-interest hospitals must cover "*maximum 50 per cent of the costs that can be invoiced in the general ward*". The other half of the operating costs (those not covered by the health insurers), as well as investment, training and research costs have to be financed by the Canton by means of tax revenues.[11]

If for medical reasons an insured person resorts to the services of a public-interest hospital situated outside his/her canton of residence, the canton of residence has to assume the difference between the costs invoiced and those corresponding to the tariffs applicable to the inhabitants of the canton where the aforesaid hospital is situated.

Conversely, private hospital services are financed exclusively by the health insurers (basic insurance and complementary private insurances). Therefore, according to present legislation the public-private mix in the hospital supply has a strong impact on public health expenditure. The higher the percentage of people getting hospital care in a private clinic in a canton, the higher the share entirely covered by means of health insurance premiums, relaxing the public health budget.

2.2.Health insurance premiums subsidies

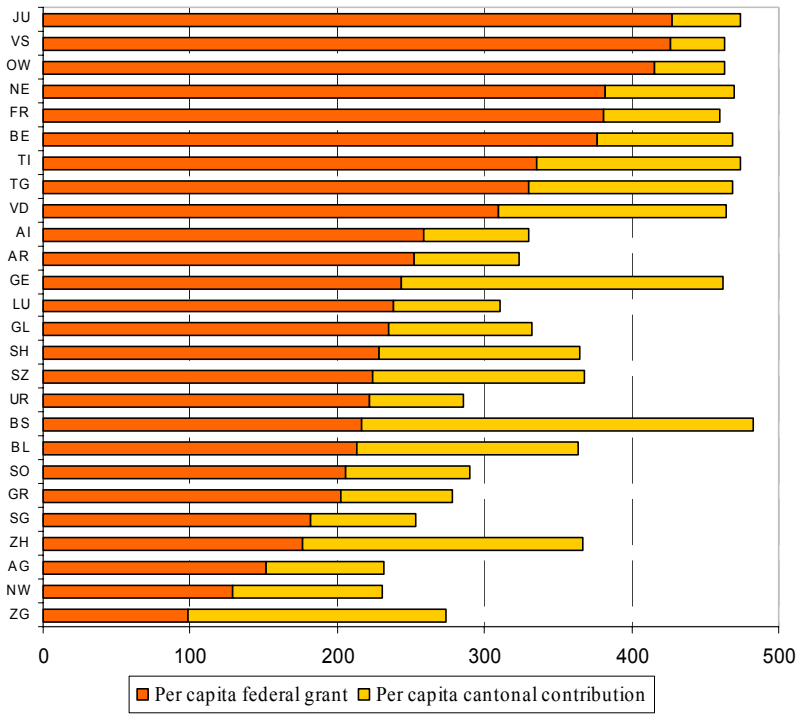
To reduce the social impact of per capita payments, the Health Insurance Act of 1996 introduced State subsidies for persons with a low income. The financing of these subsidies is ensured to the extent of two-thirds by the Confederation and one third by the cantons, through general taxation. The Confederation's funds are distributed as a specific matching

[11] Public hospital services reimbursed by the compulsory insurance are therefore financed in a dual mode: partly by the health insurers and partly by the State.

grant.[12] The financial participation of each canton is established on the base of an equalizing allocation system, in consideration of its financial strength (the marginal cantonal price for one CHF of distributed subsidy varies between 10 and 64 cents).[13] Moreover, the cantons have the authority not to use all the federal grant.[14] Finally, the task of implementing the subsidy distribution system lies solely with the single cantons.

The per capita spending on health insurance subsidies in the different cantons is illustrated in Figure 2.

Figure 2: Per capita subsidy to health insurance premiums (2002)



Source: Swiss Federal Office of Public Health (2004)

The 26 cantonal systems of subsidies differ greatly one from the other, in terms of technical profile as well as effectiveness. The threshold for obtaining subsidies for the mandatory health

[12] A complete discussion of the different grant types is provided by Bailey (1999). Note that from 2008 the specific matching grant should be replaced by a lump-sum general grant. In the future the budget of the Confederation for the program of premium reductions will total "25 percent of the compulsory health insurance expenditure for 30 percent of the population" and will be allocated to the cantons without regard to their own contribution.

[13] See Dafflon (2004) for more details.

[14] The maximum reduction totals 50% of the allocated funds.

insurance, e.g. in the case of a married couple with two children, varies from 20,000 PPP-$ of taxable income in Canton Ticino (TI) to 54,000 PPP-$ in Basel-Country (BL). As a result, the burden of the compulsory health insurance premium for a given kind of household varies greatly depending on the canton of residence.[15]

This short descriptive analysis of public health expenditure in Switzerland sheds light on the fact that the federal structure has created marked differences between local government expenditures, whose level can also be influenced by the intergovernmental matching grant that the Central State introduced in 1996 with the aim of increasing the vertical equity of the community rating premiums.

3. Model specification and estimates

In this study we use a simplest median voter model as a starting point. Under this model the demand for local government spending is a function of the median voter income and median tax price of spending in the jurisdiction.[16] Moreover, the model will take into account the fact that the central government annually pays a specific matching grant to the cantonal government to subsidize health insurance premiums. As we know from the literature, intergovernmental specific matching grants stimulate provision of local government services by increasing the real incomes of local voters and by reducing the relative price of the service in question.[17] Therefore, matching grants encourage consumption by the median voter. In

[15] To illustrate the size of variation we can quote the case of a family of four persons – two parents and two minor children – with a gross income of 45,000 Euro. In 2004 for health insurance this kind of family paid 4.7 percent of their after-tax income if resident in Canton Obwalden, whereas the burden rose to about 16 percent of the after-tax income for a similar family residing in Canton Neuchâtel.

[16] For a review of the median voter model see Bergstrom and Goodman (1973) and Mueller (2003). For an application of the median voter model across levels of government see Turnbull and Mitias (1999).

[17] There is a significant body of research estimating the effects of matching grants on local public expenditure. For a review of this literature see Ribar and Wilhelm (1999).

this framework, it is assumed that the local authority behaves in accordance with the median voter's preferences.

Several studies have attempted to explain the variation across states and over time in public health care expenditures. In these studies, total expenditures are assumed to depend on the median voter income, the median tax share, intergovernmental grants, and some demographic and structural factors.[18]

In the public choice literature, it is argued that the more citizens can express their preferences, the more public goods will be fashioned according to their tastes.[19] Of course, in a state like Switzerland, based on a direct democracy system, this thesis is relevant. Instruments for the direct political participation of citizens are present both at the federal and cantonal level. However, the direct democratic rights at the level of cantons are very heterogeneous. Therefore, the variation across cantons in public expenditures could be also explained by different barriers which prevent citizens from participating in the political process. The empirical model that we utilize (use?) in this study will also consider this factor.

Following these studies and taking into account the availability and quality of data for the Swiss cantons, we decided to specify the following parsimonious cantonal public health expenditures model using a log-log functional form:

$$PHE_{it} = f(Y_{it}, P_{it}, MCS_{it}, MG_{it}, A75_{it}, A05_{it}, DDI_{it}, BEDS_{it}, T) \quad [1]$$

where subscript *i* stands for the canton, *t* for the year, and:

PHE_{it} = public health expenditures per capita;

Y_{it} = median income;

P_{it} = median tax share;

MCS_{it} = marginal state share, calculated as 1 minus the federal matching rate for health insurance subsidies;

[18] See Gouveia (1996), Oulasvirta (1999) and Levaggi and Zanola (2003).
[19] For a discussion of this issue see Oates (1972 and 1999), Leu (1986), Frey (1994).

MG_{it} = matching grant received by the cantonal government;

$A75_{it}$ = percentage of population older than 75;

$A05_{it}$ = percentage of population aged under 5;

DDI_{it} = cantonal index for direct democracy. Direct democracy is defined in terms of individual political participation possibilities. The index was calculated by Trechsel and Serdült (1999) and Frey and Stutzer (2000);[20]

$BEDS_{it}$ = density of acute beds in hospitals per 100,000 inhabitants;

T = time variable which should capture the cost differences over time owing to changes in medical technology or to other factors that may influence the development of health costs at the national level.

4. Data and estimation results

The econometric estimation of model [1] is based on a combination of time-series and cross-section data for 26 cantons over the period 1996-2002.[21] These data were obtained from some annual publications by the Swiss Federal Statistical Office, the Swiss Federal Department of Finance and the Swiss Federal Office of Public Health. Note that for the index of direct democracy only one value is available for the whole period analyzed. Therefore, model [1] includes one time-invariant variable. [22]

[20] The direct democracy index is indicated by the public choice theory as a means for individuals to express their preferences over public issues, especially in a decentralized context. The index varies from 1 to 6. A value close to six signifies that citizens in that particular canton manage to express their preferences over public issues to a greater extent.

[21] It is worth pointing out that some variables of the model show a high within variation while others show a low within variation.

[22] In a preliminary version of the model we included as explanatory variables a dummy for cantons with a university hospital, the ratio between import and export of hospital patients and the share of public interest hospitals. However, these variables turned out to be statistically not significant and were left out of the final model specification.

Equation [1] is estimated by applying a log-log functional form. With regard to the choice of econometric technique, it should be noted that in the econometric literature we can find various types of models focusing on cross-sectional variation, i.e. heterogeneity across units. The three most widely used approaches are: the fixed-effects model, the random effects model and the Kmenta approach.[23]

In order to choose between the fixed-effects model and the random-effects model we applied the Hausman test. This test checks the null hypothesis that the explanatory variables and the individual-specific error terms are uncorrelated. The result of the test shows that the differences in coefficients between the two models are not systematic, thus implying that the random effects model is to be preferred. Moreover, the within variation of the majority of the variables included in the model is relatively low and this could imply a low statistical efficiency of the fixed effects model. Therefore, the following comments are based on the results obtained with the GLS model.

Further, the matching grant may be endogenous because cantons simultaneously select the amount of the health expenditures and the amount of the potential grant that they want to use. In order to cope with this endogeneity problem we follow two strategies. First, we used a lag of the grant as proxy for the actual value in equation [1]. Second we used instrumental-variable methods.[24]

Table 1 presents the final regression results. Most of the coefficients are statistically significantly different from zero and

[23] For a detailed presentation of the econometric methods that have been used to analyze panel data, see Greene (2003) and Baltagi (1995). The Kmenta approach is also technically known as the cross-sectionally heteroskedastic and timewise autoregressive model (Kmenta, 1986). This approach is attractive when N, the number of units, is lower than T, the number of periods, or when the within variation of many explanatory variables is very low.

[24] The instrumental variables include some cantonal socio-economic variables, and a binary indicator that equals 1 if the canton is located in the Italian or French speaking part of Switzerland.

carry the expected sign. The log-log transformation permits us to consider the estimated coefficients as elasticities.

The estimation points out that the median income and grant elasticities are, as expected, positives and significantly different from zero. Moreover, the value of the median income elasticity is higher than the grant elasticity. The level of the median income seems to stimulate more spending than the specific matching grant. This result is contrary to part of the empirical literature on the flypaper-effect.[25]

Table 1 Econometric results

Coefficients	IV model	Random effects-model
β_0	-0.630 (1.733)	-0.847 (1.964)
β_Y	0.549*** (0.127)	0.592*** (0.142)
β_P	0.006 (0.037)	0.013 (0.041)
β_{MG}	0.330*** (0.055)	0.147** (0.059)
β_{MCS}	-0.002 (0.062)	-0.126** (0.062)
β_{over75}	0.364** (0.174)	0.415** (0.185)
β_{chi}	-0.355 (0.246)	-0.607** (0.262)
β_{di}	-0.323*** (0.118)	-0.414*** (0.120)
β_{beds}	0.041 (0.036)	0.061 (0.040)
β_T	0.007 (0.007)	0.011 (0.008)

*, **, ***: significantly different from zero at the 90, 95 and 99% confidence level.

As expected, the price elasticity of the marginal state share is negative and significantly different from zero; a 10% increase in

[25] For a discussion on this issue see Bailey and Connolly (1998) and Levaggi and Zanola (2003).

the state share would decrease the local public health expenditures by 0.12%. On the other hand, the median tax share is not statistically significant.

The negative sign of the coefficient of DDI could imply that, in those cantons where direct democracy is stronger, health care expenditures are generally lower because citizens' preferences are taken more seriously, and waste contained.[26]

The coefficient for the percentage of population over 75 is positive and significantly different from zero at the 95% confidence level. This result confirms the hypothesis that an older population tends to cause higher health expenditures, because of the increased incidence of illnesses such as insanity (dementia?) or other chronic diseases, as well as proximity to the time of death of the elderly.[27] The coefficient for the percentage of population aged under 5 is, as expected, negative and significantly different from zero at the 99% confidence level.

The elasticity of bed density shows a positive value but is slightly not significantly different from zero at the 90% confidence level. In other words, an increase in the number of beds causes an increase in the cantonal public health expenditures.[28]

Time variable T is positive but not significantly different from zero.

5. Conclusions

Our study has presented the structure of regional public health care expenditure in Switzerland and an empirical analysis of its determinants. The descriptive analysis shows that in Switzerland, where the principle of federalism is very deep-

[26] It is interesting to bring to the fore the fact that in Switzerland popular initiatives and referenda are a central part of the democratic life of the country, and they are very frequently used. Citizens can also call a referendum on issues like cantonal hospital planning.
[27] See Zweifel at al. (1999).
[28] For further details on the supplier-induced demand theory see McGuire (2000).

rooted and deeply felt by the whole population, the decentralization of the health care sector has given rise to significant differences between cantons in terms of per-capita public health expenditures.

In the second part of the paper we have presented the results of the estimation of a double logarithmic linear econometric model of per-capita regional public health expenditures over the years 1996-2002 using panel data. The model serves to determine the responsiveness of per-capita public expenditures to the median voter income, median tax share, the price and size of the intergovernmental matching grant, the strength of direct democracy and variables relating to demographic characteristics of cantons. The empirical analysis shows that cantonal behavior is sensitive to the federal subsidies. A 10 percent increase in the cost of benefits causes a 1.4 percent decrease in benefit amounts. Moreover, changes in median income seem to have significantly larger effects on budgetary behavior than do equal changes in grants from the federal state.

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