Fiscal Federalism and Economic Performance:
Evidence from Swiss Cantons

by

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The advantages and disadvantages of fiscal federalism are widely discussed in economics and political science. While some authors argue that federalism favors individual initiatives and serves as a market preserving device, others emphasize the dangers arising from an increasing corruption and local capture due to decentralization. In this paper, we empirically study the impact of different instruments of fiscal federalism on economic performance measured by GDP per capita using panel data for the 26 Swiss cantons from 1980 to 1998. In our econometric production function approach, the impact of fiscal federalism, tax competition and grants on economic performance is analyzed by additionally using controls for physical and human capital investment as well as further controls and indicators of fiscal federalism. According to our results, the intensity of tax competition, which is measured by the difference between a cantons tax rate and the average of its neighbors' tax rates, is at least not harmful for economic performance. Moreover, the fragmentation of cantons in communities does not affect real GDP per capita indicating that economies of scale do not necessarily provide a good argument for a merger of communities.

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> *The planned economy in a federal country
> cannot assume the forms which today are
> – only too well – known under this name;
> ... in a federal country economic policy
> has to be directed towards creating a na-
> tional durable system of rules, within
> which the personal initiative has the wid-
> est possible scope and can be brought into
> effect as favorably as possible.*
>
> *Friedrich A. von Hayek (1939, p. 340)*

1. Introduction

The advantages and disadvantages of fiscal federalism or decentralization are widely dis-
cussed in economics and political science. While some authors argue that federalism or de-
centralization of state activity favor individual initiatives and serve as a market preserving
device (Weingast 1995), others emphasize the dangers arising from increased corruption and
local capture (Rodden and Rose-Ackerman 1997, Brueckner 2000, Bardhan 2002). The politi-
cal controversy is mainly focused on the proper organization of government in developing
countries. However, a similar discussion on fiscal federalism or decentralization has focused
on OECD countries. For example, in the current discussion of reforming German federalism,
it is widely recognized that the inability to re-design the German welfare state is partly the
result of the "joint decision trap" (Scharpf 1978, 1988) emerging from a cooperative federal-
ism German style. In that discussion, the proponents of fiscal decentralization emphasize the
beneficial impact that fiscal competition between sub-federal jurisdictions may have on the
efficiency of public goods' provision while opponents point to the undesired impact of fiscal
competition on personal and regional income redistribution. The German commission on the
reform of federalism has decided to leave a competitive federalism out of discussion. The
argument is that several poorer states in particular in Eastern Germany have insufficient re-
sources to enter a 'fair' fiscal competition. The commission is supposed to propose a more
clear-cut constitutional assignment of federal and state responsibilities, only. Excluding the
power to tax from the reform of German federalism is subsequently criticized by proponents
of fiscal competition as deliberately leaving potential efficiency gains unconsidered.

The assessment of competitive and cooperative forms of fiscal federalism is also ambiguous
from a theoretical point of view as recent surveys on the tax competition literature show (Wil-
son 1999, Wilson and Wildasin 2004). Equally valid theoretical arguments do not offer clear-
cut economic policy advice. On the one hand, some economists emphasize advantages of fis-
cal federalism like high variability and quality of goods and services and the enforcement of

individual preferences in the provision of public goods. Tiebout's metaphor (1956) of „voting by feet" hence implies that fiscal competition leads to an efficient supply of public services. On the other hand, this interpretation has extensively been criticized in the literature on tax competition by other economists like e.g. by Gordon (1983) and Sinn (1997, 2003) supporting the critiques of fiscal competition for allocative and redistributive reasons. Finally, from a political economy perspective (Brennan and Buchanan 1980), fiscal competition is interpreted as a possibility to reduce the size of government and thus to maintain the efficiency of a market system. Because of enhanced migration possibilities of mobile investors, governments of sub-federal jurisdictions are forced to tailor their fiscal policies to the needs of investors and to find policy solutions favoring market economies.

Another aspect of fiscal competition has recently gained attention. In a system of competitive federalism, sub-federal jurisdictions can experiment with new economic policies. Efficient solutions will be imitated while unsuccessful policies are refused by the competing jurisdictions. Thus, competition between jurisdictions results in a discovery process, eventually contributing to progress in the public sector. Federalism and decentralization lead to a higher innovative capacity of the political system. This argument often appears in the political discussion in Germany where the lack of competition between states is supposed to prevent a reform of the German welfare state. Oates (1999) speaks of 'laboratory federalism' and points out that the reform of welfare in the US in 1996 followed these considerations (see Inman and Rubinfeld 1997). However, the innovation inducing capacity of competitive as compared to cooperative federalism is disputed, too. In a decentralized system, citizens use the quality and the prices of public services in other jurisdictions as a yardstick in elections of representatives in their own jurisdiction ('yardstick competition' according to Salmon 1987, Besley and Case 1995). If the government of a state faces uncertainty of re-election, it has an incentive to act as a free-rider with respect to the policy innovations of other jurisdictions reducing the absolute amount of policy innovations in a federal country (Rose-Ackerman 1980, Strumpf 2002).

The implicit hypotheses from this discussion need to be tested empirically in order to provide some confidence in specific policy proposals. However, the empirical results are inconclusive. In cross-country studies as well as in studies for the US, Germany and China, econometric results of a positive or negative impact of fiscal decentralization on economic growth can be found. Aside methodological problems, one reason for the ambiguity of these results may be seen in the fact that fiscal decentralization is mainly measured in terms of the share of sub-federal spending from total spending. This measure does not reflect actual fiscal autonomy of sub-federal jurisdictions because it may largely depend on federal grants, or participate in a

system of joint taxation, or are restricted by federal mandates on either the revenue or expenditure sides of their budgets. In addition, it would be useful to consider different instruments of fiscal federalism in order to find out which combination of elements of cooperative and competitive federalism serve the purpose of a relatively reasonable organization of fiscal federalism. For example, tax competition can be combined with certain forms of federal grants mitigating negative allocative or distributional effects.

In this paper, we empirically study the impact of different instruments of fiscal federalism on economic performance measured by GDP per capita using panel data for the 26 Swiss cantons from 1980 to 1998. In many policy debates in Germany, Austria and France, proponents and opponents are interested in the US and Swiss experiences of a system of competitive federalism. While there exists fiscal competition in both countries, in Switzerland the cantons rely to a larger extent on direct (income and profit) taxes to finance public services than the US states. This creates an even more intense fiscal competition in Switzerland. In addition, the Swiss federal level provides grants to the cantons. In our econometric production function approach, the impact of these different instruments of fiscal federalism, tax competition and grants, on economic performance are analyzed by additionally using physical and human capital investment as well as further controls and indicators of fiscal federalism. While matching grants are negatively correlated with economic performance, the intensity of tax competition, which is measured by the difference between a canton's tax rate and the average of its neighbors' tax rates is at least not harmful for economic performance. Moreover, the fragmentation of cantons in communities does not affect real GDP per capita indicating that economies of scale do not necessarily provide a good argument for a merger of communities.

The remainder of the paper is organized as follows: The different transmission channels by which fiscal federalism affects economic growth are discussed in *Section 2*. *Section 3* surveys the empirical literature on the impact of fiscal federalism on growth. In *Section 4*, the Swiss tax system is explained in order to demonstrate the importance of sub-federal Swiss taxing powers. Data and the specification of our empirical model appear in *Section 5* while *Section 6* discusses the obtained results. Finally, *Section 7* provides some concluding remarks.

2. Transmission Channels of Fiscal Federalism on Economic Growth[1]

Given the political controversy around the world, the question emerges how the different institutional arrangements of federalism influence economic development of a country and its

regions. What are the transmission channels of fiscal federalism on economic growth? Additionally, the question arises: what is the influence of federalism on the regional growth processes. Which contribution to regional development should be ascribed to cooperative fiscal federalism or fiscal competition?

Most economists judge competition positively: it is a means to achieve variability and quality of product supply, and it provides goods and services according to individuals' preferences. Some economists believe that the same is true for systems competition. Governments can experiment with new solutions for economic problems in a decentralized fashion. Better solutions succeed in a process of imitation and copycatting by other jurisdictions. Competition between jurisdictions thus becomes a discovery process, which contributes to the progress in the public sector. Supreme Court justice Louis Brandeis already contended in 1932: „*It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country*" (quote by Oates 1999, p. 1132). Such a 'laboratory federalism' served as a role model for the reform of welfare in the US in 1996 (Inman and Rubinfeld 1997).

In a similar way Weingast (1995) emphasizes the advantages of a „*market-preserving federalism*". Starting from a „*fundamental political dilemma* ", according to which '*a government strong enough to protect property rights and enforce contracts is also strong enough to confiscate the wealth of its citizens*" (p. 1), competitive federalism reduces the size of government interventions and thus helps to maintain market efficiency. Because of the increased opportunities of mobile production factors to migrate, sub-federal jurisdictions conduct policies that are in the interest of these mobile factors and thus create solutions favoring market efficiency. Similar conclusions can be drawn from the political economy analysis by Brennan and Buchanan (1980). Weingast (1995) does however not provide precise considerations as to the growth effects of federalism. He only mentions the advantageous development in England in the 18th century and in the US in the 19th century as evidence of market-preserving federalism. Rodden and Rose-Ackerman (1997) doubt the simplicity of the argument. Instead of serving the interests of mobile investors, sub-federal jurisdictions may be captured by local interest groups and introduce protectionist measures in order to shelter them from external competition. Whether federalism produces market-preserving or protectionist policies, thus depends on additional institutional safeguards.

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[1]. For a more extensive survey of the theoretical and empirical studies investigating the impact of fiscal federalism on economic growth, see Feld, Zimmermann and Döring (2003, 2003a).

The higher innovative capacity of a federal as compared to a unitary system as possible explanations of differences in the economic development of countries is hence contested. In a decentralized system citizens use services provided by the governments of other jurisdictions as a yardstick to evaluate the policy of their government in elections (yardstick competition according to Salmon 1987, Besley and Case 1995, Feld, Josselin and Rocaboy 2002, 2003). A government is re-elected, if it provides services that are at least not worse than those in other jurisdictions or the tax prices of which are not higher. Each government hence has incentives to wait initially in order to imitate only those policies of other jurisdictions that have turned out to be relatively successful. If the government of a state is uncertain about re-election, it has an incentive to act as a free-rider with respect to the policy innovations of other jurisdictions finally reducing the absolute amount of policy innovations in a federation (Rose-Ackerman 1980).[2] Schnellenbach (2004) studies the incentives for policy innovations in a decentralized setting by particularly focusing on the incentives of voters. As voters normally have little incentives to be politically informed before elections, policy innovations are mainly possible in times of crises. Citizens' incentives to become informed on policy innovations are however improved by high mobility and elements of direct democracy in political decision-making processes. Political rents of governments can hence be reduced by competition, and politicians can be offered incentives to innovate.

Similarly, political scientists and sociologists, who study political and societal innovations in federal systems for a longer time than economists (Walker 1969, Gray 1973, Berry and Berry 1990, Nice 1994), do not agree whether federalism is favorable to policy innovations. Mayntz (1995), for instance, emphasizes the creation of knowledge that is induced by parallel experimentation. Scharpf, Reissert and Schnabel (1976) and Scharpf (1978, 1988, 1989) however question this argument generally: In the special variant of German cooperative federalism, vertical and horizontal coordination is added to the problem of vertical assignment of functions. In his work on the joint-decision trap in the Federal Republic of Germany, Scharpf argues that the capacity of cooperative federalism to solve problems is chronically suboptimal such that the capacity to innovate in federalism is considerably reduced (see also Schmidt 2001, p. 477). These results constitute an important argument in the political discussion in Germany against this variant of German federalism. In fact, some authors, like Blankart and

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[2]. According to Strumpf (2002) this free-rider behavior strongly depends on homogeneity and on the number of jurisdictions. Heterogeneous jurisdictions act to a lesser extent as free-riders, because it pays off to them to realize first-mover advantages with tailor-made policy innovations. Kotsogiannis and Schwager (2001) point out that in a federal country policy innovations offer selfish politicians the possibility to obtain personal advantages and to let them appear as the result of the uncertainty of policy innovations.

Mueller (2002), hold the second chamber (Bundesrat) partially responsible for the missing reforms in Germany. If one considers the current German growth weakness, which to a major degree could be ascribed to the lack of the political system to innovate, then the importance of political innovations for the national development of a country is obvious. The discussion in this section however underlines that the relation between federalism and growth is rather complicated such that it does not suffice to compare federal and unitary states. It seems reasonable to look more closely at the different instruments of federalism and on how public services are provided and financed.

Another line of research corroborates this view. It is often hypothesized that fiscal federalism with far-reaching competencies of the subnational levels to decide on revenue and spending leads to an unfavorable regional distribution of income such that poor regions become poorer and rich regions become richer (see the discussion in Feld 2002, Feld and Kirchgässner 2003 as well as Thierstein et al. 2003). The more affluent taxpayers sort themselves in regions where the tax burden is lower. Poor regions, however, supposedly need to levy high taxes to finance the 'necessary' infrastructure for catching up with richer regions. If these jurisdictions enter fiscal competition, the economic differences between regions are exacerbated. Instead of having a regional convergence, divergence of regional incomes results. The policy conclusion from this reasoning is clear: Fiscal competition should be eliminated by harmonization or centralization and it should be supplemented by grants that equalize regional fiscal capacity. Cooperative federalism is the policy conclusion.

Ludema and Wooton (2000), Kind, Knarvik and Schjelderup (2000), Baldwin and Krugman (2004), and Brakman, Garretsen and Van Marrewijk (2003) challenge this view from the perspective of the New Economic Geography by analyzing the impact of fiscal competition on the economic development of central and peripheral regions. The advantages of agglomerations in the economic centers permit them to raise higher taxes than the peripheral regions. An example from the EU may illustrate this. Northern Italy offers firms an excellent infrastructure, well-established relations with customers and suppliers, and a highly qualified workforce such that it can afford the relatively high Italian tax burden. Peripheral regions, like Ireland, have hardly any alternative to balance their locational disadvantages than tax policy and public investment in infrastructure. They need to attract economic activity by an appropriate mix of taxes and public services. Harmonization or centralization of fiscal competencies would take from peripheral regions the few instruments to compensate for their locational disadvantages vis-à-vis the central regions, and it would therefore be harmful for regional development. It is nevertheless questionable whether government policies are sufficiently powerful to

compensate for these strong locational advantages of central regions. These theoretical studies cast doubts as to the success of grants to foster regional development.

Given these arguments, fiscal federalism might influence economic development in several ways that also depend on the perspective adopted. First, it could be asked whether fiscal competition or fiscal cooperation between sub-federal jurisdictions has an effect on economic growth of the sub-federal jurisdictions. In that case, fiscal competition theoretically has ambiguous effects because on the one hand it might induce higher efficiency of public goods' provision and higher political innovation in that region and hence a better economic performance of the regions or states. On the other hand, fiscal competition might lead to migration of mobile production factors to centers of economic activity where agglomeration economies can be realized such that they are sufficiently affluent to afford excellent infrastructure. Single poorer regions might suffer from that competition. However, they may equally gain from fiscal competition when they can credibly commit to a low tax burden which might compensate for existing locational disadvantages.

Similarly, grants as the main fiscal instrument of cooperative federalism have ambiguous effects on economic performance. On the one hand, grants may help poorer regions to provide more attractive conditions to potential investors than they could otherwise afford. Hence, it is possible to attract investors or to motivate existing investors not to leave with the help of intergovernmental grants. Fiscal transfers result in an income increase of the recipient regions possibly leading to a higher GDP per capita. On the other hand, grants provide adverse incentives to the poorer regions hampering structural change for new and promising technologies. Consequently, the status quo will be preserved and declining industries are artificially kept alive while reforms are postponed to the future under possibly worse conditions. Specific problems emerge for regions with excessive debt levels. Grants designed as bailout payment provide incentives to stay indebted (soft budget constraint). Second, it is an open question whether fiscal competition or coordination accelerates or decelerates convergence of regions of a country. The same reasoning mentioned before with respect to regional economic development applies here with the a focus on the catching-up hypothesis.

The third perspective is different since a national perspective is adopted. Fiscal competition or cooperation could foster economic performance of the whole country by exploiting efficiency potential in the provision of the public good. Again, there is an ambiguous assessment of the relation between economic development and fiscal federalism. On the one hand, and quite simply, fiscal competition might lead to a more efficient allocation of labor and capital in cen-

tral regions that are the main growth poles of the economy. In addition, the incentives from fiscal competition to innovate and provide public services more efficiently reduces the waste of resources in the economy as a whole. From that perspective, grants mainly provide negative incentives to successful regions in exploiting their economic potential because transfers in a horizontal fiscal equalization system has the effect of a tax on the additional revenue that could accrue by the location of new taxpayers. On the other hand, fiscal competition may deprive the poorer regions' structural change stimulating higher overall growth rates when completed. In this case, the positive impact of grants to induce structural change in recipient regions needs to compensate for the negative incentives for donor regions in order to have an overall positive impact on economic development of a country.

3.   A Survey on the Empirical Evidence

Since the theoretical results on the impact of fiscal federalism on economic development are ambiguous, empirical studies might shed some light on the issue. The empirical studies testing this hypothesis do however not provide consistent results. This holds for cross-country studies as well as for studies on single countries. In the area of cross country studies, Davoodi and Zou (1998) find a weakly significant negative relation between the degree of fiscal federalism and the average growth rate of GDP per capita for a sample of 46 countries over the period from 1970 to 1989. For the sub-sample of industrial countries this effect is not significant. The negative influence for developing countries, anyhow, is robust though only weakly significant as well. According to these estimates, an additional decentralization of spending by 10 percent reduces the growth of real GDP per capita in developing countries by 0.7 – 0.8 percentage points. Woller and Philipps (1998) also cannot find a robust relation between economic growth and decentralization, using a sample with a lower number of developing countries and a shorter time period.

In a recent analysis for average economic growth of the past 25 years in a cross-section of 91 countries, Enikolopov and Zhuravskaya (2003) show that the effects of fiscal decentralization depend to a large extent on the structure of the party system as well as on the degree of 'subordination' of subnational levels. According to them, especially in developing and transition countries, the age of the most important political parties is favorable to the positive effects of decentralization on economic growth. In countries with a – in this respect weaker – party system, a 10 percent increase of decentralization of revenue decreases real per capita GDP growth by 0.14 percentage-points. These results are in contrast to those of Martinez-Vazquez and McNab (2002) according to whom the decentralization of revenue significantly reduces

the growth of real GDP per capita of developed countries, but not of the developing and transition countries. Yilmaz (2000) analyzes the different effects of fiscal decentralization in 17 unitary and 13 federal countries for the period 1971-1990 with annual data. Decentralization of expenditures to the local level increases the growth of real GDP per capita in unitary states more strongly than in federal states. However, the decentralization to the intermediate level in federations is not significant. Thießen (2003) analyzes the average growth rates of real GDP per capita for a cross-section of 21 developed countries in the period 1973-1998 and in a parallel study (Thießen 2003a) for a panel of 26 countries between1981 and 1995. According to his estimates a 10 percent increase of decentralization of expenditures increases the growth of real GDP per capita by 0.12-0.15 percentage points in high-income countries. However, the relation between federalism and economic growth might be non-linear, because the quadratic term of expenditure decentralization is significantly negative.

The empirical results concerning the impact of decentralization on economic growth for individual countries also appear to be ambiguous. To date the discussion is limited to China, the US, and Germany. Zhang and Zou (1998) note a significantly negative effect of expenditure decentralization on economic growth in 28 Chinese provinces, using annual data between 1987 and 1993. Jin, Qian and Weingast (1999), however, report a weekly significant positive effect of expenditure decentralization on economic growth of almost the same sample of Chinese provinces over time. The most important difference between the studies is the use of time dummies that are not included by Zhang and Zou (1998). Consequently, symmetric shocks are not adequately controlled for. Lin and Liu (2000) strengthen the result of a positive relation between decentralization and economic growth in Chinese provinces for the period 1970 to 1993 also for the revenue side. In addition, higher responsibility of public budgets at the provincial level is connected with increased economic growth. These authors also use time dummies in addition to fixed cross-section effects. The relevance for the estimates of using time dummies points to the strong economic dynamics in China. The sometimes enormously high Chinese growth rates apparently cannot be captured by structural variables alone so that auxiliary variables for the individual years are necessary for correctly specifying the econometric model. Thus, for China, there might well exist a positive relation between decentralization of governmental activity and economic growth.

In a time-series analysis for the US from 1951 to 1992, Xie, Zou and Davoodi (1999) claim that the US is in a decentralization equilibrium. They ascribe this to the fact that differences in decentralization at the state or local level do not exert statistically significant effects on real GDP growth. Akai and Sakata (2002), however, offer evidence to the contrary for US states.

Considering additional explanatory factors and various indicators for the degree of fiscal federalism, they find a positive influence on economic growth. If expenditure decentralization increases by 10 percent, the growth of GDP per capita increases by 1.6 to 3.2 percentage points. However, decentralization on the revenue side and indicators for fiscal autonomy of subnational levels, measured by the share of own revenue in total revenue, do not show significant effects. Both studies might not necessarily contradict each other because of the different perspectives adopted. While the first study starts from a national perspective, the second one adopts the perspective of the single states. As mentioned in *Section 2*, both perspectives might well coincide with each other.

The same argument might hold for Germany. Berthold, Drews and Thode (2001) analyze the effects of horizontal fiscal equalization between states and supplementary federal grants on economic development of the 16 Lander in a panel analysis with annual data from 1991 to 1998. According to their estimates, higher grants in horizontal and vertical fiscal relations significantly reduce the growth of nominal GDP per capita of the Lander. Behnisch, Büttner and Stegarescu (2002), however, find a positive effect of increasing federal activities – measured by the share of expenditure at the federal level – on total German productivity growth in a time series analysis from 1950 to 1990. Further empirical evidence does not exist. Hence, a study of the impact of Swiss federalism on economic growth seems to be promising.

4.   The Swiss Tax System

Switzerland consists of three governmental layers. The central government, 26 cantons on the state level and some 3000 municipalities on the local level. The Swiss constitution allows for comparably high fiscal competencies on the sub-federal level. In contrast to many other (federalist) countries this holds especially for the taxing powers. All three tiers of government have their own tax sovereignty. Cantons are free to choose their taxes autonomously, except they are constitutionally reserved for the central government. The federal constitution explicitly lists all revenue sources of the central government in Article 42. The central government cannot levy new taxes or attract tax power from the cantons without changing the constitution which, in Switzerland, has to pass a mandatory popular referendum with a simple majority of the people as well as of the cantons. Additionally, the federal power to tax for income underlies a sunset legislation and has to be approved by voters every few years.

Table 1: Tax burden and financial prosperity of Swiss cantons, 2001; Ratio of grants on cantonal revenue, 1999.

Cantons	Index of income and property tax burden *(Swiss average = 100)*	Federal index of financial prosperity *(Swiss average = 100)*	Share of grants from total cantonal revenues *(%)*
Financially potential cantons			
Zug	49.6	216	26.1
Basel-City	118.9	173	10.8
Zurich	82.5	160	15.1
Geneva	90.2	141	9.7
Nidwalden	75.5	129	39.6
Basel-Land	89.6	120	15.0
Cantons with average financial potential			
Schwyz	65.5	112	40.4
Schaffhausen	114.5	107	17.7
Aargau	86.5	97	19.3
Vaud	111.7	94	19.1
Thurgau	110.7	83	25.7
Solothurn	114	82	26.8
Glarus	105.9	82	26.8
Ticino	80.9	82	23.3
St. Gallen	101.8	80	24.9
Graubünden	95.1	77	47.1
Luzern	123.7	67	27.9
Uri	116.2	64	48.8
Appenzell a.Rh.	108.6	63	29.6
Appenzell i.Rh.	87.9	62	38.7
Financially weak cantons			
Bern	115.7	57	28.2
Neuchâtel	125.5	55	38.8
Fribourg	130	51	35.3
Obwalden	126.7	35	44.5
Jura	134.9	34	48.6
Valais	125.1	30	41.7
Switzerland	**100**	**100**	**23.1**

Source: Swiss Federal Tax Administration, 2001, Swiss Federal Finance Administration, 1999

Historically the main taxing powers are assigned to the cantons. Even the tax harmonization law introduced in 1993 (Article 129 of the Federal Constitution) does not affect the cantonal competence with respect to tax surcharges, tax rates and tax exemptions. Cantons have the main taxing powers for individual and corporate income and property whereas the local gov-

ernments levy a surcharge on the cantonal income and property taxes. The fiscal autonomy of municipalities varies considerably from canton to canton, but even in rather centralized cantons communes are not forced to keep tax rates on a certain level. Therefore, tax burdens across Swiss municipalities vary even more than across cantons.

Table 2: **Structure of revenue and expenditure in the Swiss federalism, 1950 - 1999**

	1950	1960	1970	1980	1990	1999
	%	%	%	%	%	%
Central government						
Revenue	42	40	34	30	31	31
Expenditure	38	35	32	31	31	32
Cantons						
Revenue	32	33	39	39	39	40
Expenditure	34	38	40	39	40	40
Municipalities						
Revenue	26	27	27	31	30	29
Expenditure	28	27	28	30	29	28
Total*						
Revenue	100	100	100	100	100	100
Expenditure	100	100	100	100	100	100

* Without double counting, *Source*: Statistical Yearbook of Switzerland, 2000, Table 18.1

Table 1 exhibits the variation of income and property taxes between the cantons for the year 2001. The index of the weighted average for Switzerland is 100, whereas the canton Jura reaches the maximum value of 134.3 and the canton Zug the minimum value of 49.5. For instance, a single person who earns a gross income of 100,000 CHF is charged for 19,640 CHF income taxes on the cantonal and local level in the town of La Chaux-de-Fonds of the canton Neuchâtel. The same person living in the village of Freienbach of the canton Schwyz has to pay 4,790 CHF income taxes at the cantonal and local level only (church taxes included). The federal government relies on indirect taxes like the VAT and the mineral oil tax, but also raises a tax on income of individuals and corporations in addition to the cantons. Presently, the federal income tax covers about 60% of total federal revenue. The tax rates for the income tax on the central level are explicitly enumerated in the constitution. Currently, the statutory maximum average rate amounts to 11.5% with a maximum marginal rate of 13.2%.

As can be seen from *Table 2,* the distribution of revenue and expenditure among the three layers of government changed considerably over time. Contrary to the increase in many other countries, the share of the central government in total government expenditure and revenue even decreased by about 10 percentage points within the last fifty years. Today, the financial

importance of the sub-federal governments accounts for nearly 70% of all financial flows of the total government. All in all, with considerable tax autonomy, including progressive income and property (wealth) taxes, the Swiss sub-federal governments constitute a unique data base to investigate the effect of federalism on the size of government on the European continent. Though many other federalist countries in Europe have the power to spend they have rather limited power to tax which in principle implies that analyzing the effect of fiscal federalism on the size of government is biased in these countries, at best.

5.   Data and Empirical Specification

In this paper, we adopt the regional perspective by analyzing economic performance of the Swiss cantons. Convergence of per capita income of the cantons as well as the impact of Swiss fiscal federalism on overall economic development of Switzerland are left to future research. In order to test the impact of federalism on cantonal economic development, we propose an econometric model that is based on the production function approach employed in Feld and Savioz (1997). This paper is an application of the empirical analysis of neoclassical growth models by Maniw, Romer and Weil (1992). As a first shot this is justified instead of estimating an endogenous growth model because too little is still known on the interaction of fiscal federalism and agglomeration economies that shape regional development. In this model, the gross domestic product Q_{it} of each of the 26 cantons at time t is assumed to be a function of their endowment with labor L_{it}, human capital H_{it} and plant and equipment (P&E) K_{it}. The differentiation in two types of capital goods is appropriate because cantonal authorities and not the federal government are responsible for education in Switzerland. The following specification of the Cobb Douglas production function is used:

$$Q_{it} = A L_{it}^{b_1} H_{it}^{b_2} K_{it}^{b_3} e^{b_0 D_{it} + e_{it}}, \tag{1}$$
$$e_{it} \sim IN(0, s_{it}^2),$$
$$i = 1, 2, ..., 26.$$
$$t = 1980, ..., 1998.$$

The technological disturbance term ε_{it} is assumed to be independently and normally distributed.. βj, j=1, 2, 3, are the elasticities of output with respect to the factors of production. Institutions of fiscal federalism, D, hence enter the production function as a technological factor and reflect the efficiency of public activities. Taking natural logs of both sides of the equation yields the following econometric model:

$$lnQ_{it} = b_0 D_{it} + b_1 lnL_{it} + b_2 lnH_{it} + b_3 lnK_{it} + b_4 lnV_{it} + e_{it} \tag{2}$$

where Q_{it} stands for real GDP. The model implies that real GDP is a function of labor (L_{it}), human capital (H_{it}), physical capital (K_{it}), and a vector of control variables V_{it}. b_0 to b_4 are the parameters of interest while e_{it} denotes the error term. Labor is measured by number of the cantonal employees, human capital is proxied by cantonal education spending per capita. Since there are no data on cantonal capital stocks we use cantonal capital investment instead. Population size of the cantons is included as the most important control variable.

The focus of the analysis is on the impact of federalism on economic performance, which is tested by five different variables: revenue or spending decentralization, grants, tax competition, fragmentation, and urbanization. Decentralization as the local fiscal autonomy is proxied by the ratio of local revenue (spending) on the aggregated state and local revenue (spending). The decentralization measures are used to conduct a similar test as is done in the empirical studies mentioned above. Following the traditional Tiebout approach, decentralization is hypothesized to have a positive effect on economic performance. Decentralization as such does however not suffice because it does not really indicate whether and to what extent subordinate jurisdictions, in this case communities, are autonomously deciding on finances. Instead of simply taking this one variable as indicating more or less federalism in the Swiss cantons we additionally focus on the different instruments of fiscal federalism in Switzerland.

Hence, matching grants per capita as the most important instrument of cooperative federalism in Switzerland are included. The predicted sign of this variable is ambiguous since it might either lead to a waste of resources or help poor cantons to catch up with the richer ones. In a second step, we additionally include federal lump-sum grants in order to find out whether there are notable differences between both instruments. Tax competition is measured by the difference between a canton's tax rate in the highest income tax bracket of a million Swiss francs annual taxable income and the average of its neighboring cantons' tax burden in that bracket (see Feld and Reulier, 2002). This variable indicates that the higher the difference to average tax burden of the neighboring cantons, the higher the pressure of tax competition on the cantonal and local tax authorities. The tax competition variable is a proxy for the extent of competitive federalism in Switzerland. The fragmentation variable is constructed by the number of communes in a canton divided by population. It is supposed to capture the lack of exploiting economies of scale. In political, but also scientific discussions about reforms of fiscal federalism, it is often argued that the number of jurisdictions should be reduced by mergers in order to exploit economies of scale. If there are economies of scale, the lack of their exploitation, i.e. a higher number of communities, should have a negative impact on economic performance. Urbanization, measured by the share of people living in urban areas, is included to

capture the argument from new economic geography that economic centers are more strongly developing than the periphery. Finally, a dummy for the canton of Basle and a language dummy are included as standard controls (the results of both are not reported).

The analysis uses yearly data from 1980 to 1998 deflated to the year 1980. The subscript $i = 1, ..., 26$ indicates cantons and $t = 1980, ..., 1998$ indexes years. The empirical analysis is performed using a pooled cross-section time-series model. The consistency of OLS-estimates depends on the exogeneity of the regressands. In order to tackle the problem of possible endogeneity of the grants variable, we use an instrumental variable technique with cantonal dummy variables as instruments. Finally, year effects to circumvent time dependency are included and the standard errors are corrected by the Newey-West method.

6. Results

The test strategy is, first, estimating the model without any instruments of fiscal federalism by OLS. In a second step, we include the decentralization variables in turn and add the remaining variables of fiscal federalism like grants, tax competition and so on in a third step. The OLS results in *column (1)* of *Table 3* indicate that the basic equation performs relatively well. As usual in the estimation of production functions of this type, investment, human capital and labor are highly significant and have the expected positive signs. Population is significant at the 5 percent level. The language dummy does not have any significant effect, while the time dummies are highly significant. The estimated coefficients of the production factors add to 0.8 which is significantly different from zero. Constant returns to scale are thus not fully achieved, but the sum of estimated elasticities falls only slightly short of it.

Adding the decentralization of spending to the model in *column (2)* does not change much. The decentralization has the expected positive sign, but is far from any significance level. The same holds with respect to the decentralization of revenue in *column (3)*. However, as *column (4)* indicates, matching grants have a negative impact on economic performance and are significant on the 1 percent level. This may point to the negative incentive effects of the Swiss fiscal equalization system (Schaltegger and Frey, 2003). It might however as well be the result of a reversed causality such that the cantons with a higher GDP get less matching grants. Moreover, the tax competition variable has a positive impact on GDP per capita and is significant on the 5 percent level. The higher the neighbors' tax rates, the smaller is the difference between the canton's tax rate and that of its neighbors. The lower is however also a canton's GDP per capita showing that tax competition is not harmful to economic performance of the Swiss cantons, but that it might indeed force them to efficiently allocate public resources.

Moreover, fragmentation of a canton in a higher number of small communities only has a marginally significant impact on economic performance. This result is dampening the hope for strong efficiency gains from community mergers that are declared policy in a few cantons. Finally, urbanity does not have any significant impact on economic performance.

Table 3: Regressions of real cantonal GDP on fiscal federalism indicators and controls, 26 Swiss cantons, 1980-1998

Variable	OLS	OLS	OLS	OLS	TSLS	TSLS
Capital investment	0.124***	0.127***	0.128***	0.172***	0.178***	0.180***
	(6.93)	(6.75)	(6.74)	(8.73)	(8.52)	(8.37)
Education spending	0.195***	0.201***	0.202***	0.103***	0.101***	0.103***
	(5.42)	(5.01)	(5.02)	(3.07)	(2.83)	(2.93)
Labor force	0.467***	0.477***	0.478***	0.307**	0.234*	0.235*
	(3.28)	(3.27)	(3.27)	(2.41)	(1.80)	(1.79)
Population	-0.453***	-0.465***	-0.466***	-0.306**	-0.235*	-0.234*
	(-3.15)	(-3.14)	(-3.14)	(-2.40)	(-1.80)	(-1.79)
Decentralization of spending	–	0.011	–	–	–	–
		(0.61)				
Decentralization of tax revenue	–	–	0.013	0.017	0.018	0.012
			(0.72)	(1.45)	(1.41)	(0.80)
Lumpsum grants	–	–	–	–	–	0.018
						(0.77)
Matching grants	–	–	–	-0.051***	-0.068***	-0.069***
				(-4.88)	(-6.36)	(-6.46)
Tax difference to neighbors' tax rates	–	–	–	0.004**	0.004***	0.005**
				(2.50)	(2.64)	(2.48)
Fragmentation	–	–	–	-0.016*	-0.014	-0.013
				(-1.92)	(-1.58)	(-1.37)
Urban population	–	–	–	0.019	0.006	0.003
				(0.50)	(0.16)	(0.08)
R^2	0.787	0.787	0.788	0.840	0.836	0.833
SER	0.048	0.048	0.048	0.042	0.042	0.043
Observations	494	494	494	494	494	494
Jarque-Bera	14.111***	12.706***	12.253***	7.853**	5.562*	9.270***

Note: t-values are given in parentheses. All regressions contain 19 year-dummies whose coefficients are not reported. ***,** and * indicate significance at 1%, 5% and 10% levels, respectively. The Jarque-Bera test statistic is a test on the null hypothesis of normality of the residuals.

The results reported in the first four columns of *Table 3* suffer from a particular endogeneity problem. The negative impact of the matching grant variable might simply reflect reverse causality because poorer cantons are supposed to receive higher grants per capita according to the main economic and political arguments but also according to the legal provisions of the Swiss grants system. In order to cope with this endogeneity problem, *equation (4)* from *Table 3* is estimated by TSLS instead of OLS. As instruments, the cross section (cantonal) fixed

effects are used. These results are presented *column (5)* of *Table 3.* Employing an instrumental variable technique does not alter the results. Both, population and labor force, become significant at the 10 percent level only. The fiscal federalism variables are however almost not affected. Fragmentation is now insignificant which more clearly indicates that mergers of communities do not appear to generate considerable economic gains. The estimated impact of matching grants on economic performance increases in absolute value. Including lump-sum grants in addition to matching grants in *column (6) of Table 3* does also not affect the results considerably. Lump-sum grants do not have any significant impact on GDP of the cantons. This is no surprise because those lump-sum grants are much more a revenue sharing arrangement that only partially reflects equalization goals.

Overall the estimated models perform relatively well. Between 79 and 84 percent of the variation of real cantonal GDP can be explained. The Jarque-Bera test statistics indicate however that the hypothesis of normality of the residuals can be rejected at least on the 10 percent level in all estimated equations. Broadly speaking, controlling for outliers does not affect the estimation results. In *column (1), (2)* and *(3)*, dummy variables for the cantons of Zurich, Vaud, Jura, Zug, and Schwyz need to be included in order to obtain normality of the residuals (J.-B. (1) = 4.547, J.-B. (2) = 3.784, J.-B. (3) = 3.872) without any notable change in the estimated coefficients. Similar outcomes are obtained for the fourth model and the TSLS estimations by excluding the respective outliers. The results are hence not only robust to the estimation method, but also to the inclusion of outliers.

7.   Conclusions

The purpose of this paper is to test the effect of federalism on economic performance. Starting from the literature on fiscal federalism and economic growth we have analyzed the impact of different instruments of Swiss federalism on real GDP per capita. The results indicate that matching grants have a negative impact on economic performance while tax competition is at least not harmful to economic performance. Tax competition appears to induce cantons to allocate public funds relatively more efficiently such that economic performance of a canton is improved. Fragmentation of a canton in many communities does not robustly affect GDP per capita. All in all, the instruments of competitive federalism in Switzerland are more successful in shaping economic development than those of cooperative federalism.

In addition to the results reported in this paper, additional robustness checks have been performed. The results remain robust to the inclusion of alternative instruments and to additional explanatory variables. In particular, political economy variables like coalition size or ideology

do not affect the impact of different indicators of fiscal federalism. However, additional robustness analyses remain to be done. For example, the impact of transmission channels of fiscal federalism, in particular of tax competition, on innovation of firms in the different cantons needs to be analyzed to obtain more insights in the working of fiscal federalism. Finally, the two other perspectives on fiscal federalism and economic performance, the convergence and national growth perspectives need to be addressed in order to obtain a full picture.

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