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# Funding Transport Systems in a Federal Country

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## Funding Transport Systems In A Federal Country

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### Abstract

Traditionally, responsibility for funding and organising private and public transport systems in Switzerland is shared between the federal, the cantonal and the municipal level. Due to the specific character of transport, mainly its non-territorial or “mobile” character, co-ordination among the different government levels is at the same time essential and very difficult. This paper investigates into the funding of road infrastructures and the respective distribution of responsibilities and resources across different levels of government. It compares a number of empirical data from the current funding framework with normative rules set by fiscal federalism and other public finance theories. The paper has three sections: a first section compares earmarked taxes with road expenditures across the three government levels. A second section presents a cross-sectoral analysis of cantonal vehicle taxes and cantonal road expenditures. The third section sets the federal road subsidies to the cantons against the spillovers resulting from intercantonal road traffic. Although in general the present road funding system with earmarked fuel and vehicle taxes is adequate, it presents a number of shortcomings. Funding is overcentralized, i.e. it gives the federal level too much influence on infrastructural issues in the cantons and leaves them with relatively little implementation flexibility. The municipal level and particularly the larger cities are the main victims of this imbalance between responsibilities (expenditures) and earmarked tax resources. Given this vertical imbalance, a centralisation of the cantonal vehicle tax would point to the wrong direction.

### Keywords

Fiscal Federalism, Transport Infrastructure Funding, Transport Policy, Transport Taxation, Intergovernmental Grants– Swiss Transport Research Conference – STRC 2001 – Monte Verità

## 1. Introduction

The question of how to fund transport systems has gained more attention in the last few years. There are a number of reasons for this newly emerged interest. The general economic slow-down in the 90ies required budget cuts that also reached the transport sector, which made a more efficient utilisation of financial resources necessary. The large new transport infrastructures such as the New Transalpine Railway lines has raised the question how and particularly by whom they have to be funded. Given the need for additional resources for national motorway infrastructure and maintenance, the question arises as to how and by whom the additional cost have to be borne. The question of environmental taxes and fees has raised the question of how to integrate them into the existing framework of transport funding.

Above all there is a large proposal for a fiscal federal reform, the so-called “Nouvelle péréquation financière” or “Neuer Finanzausgleich”. Despite its title, this project is more than just related to fiscal equalisation. It encompasses a large number of issues pertaining to federalism in general, such as the allocation of tasks and resources to different levels of government and a reform of the financial, institutional and administrative relationship between them. The transport sector is particularly concerned for this reform for several reasons. First, all three government levels have responsibilities as well as own earmarked tax resources. Second, the three levels are interlinked through large amounts of subsidies, transfers and tax sharing mechanisms. Actually, the transport sector is the most important joint task in Switzerland and will be heavily affected by any kind of reform concerning the institutional fiscal federal framework and the way governments collaborate among each other.

This paper therefore aims at contributing to the question of transport funding within the theory of fiscal federalism. This approach has not been tested yet in transport policy and transport funding. It analyses the revenues and expenditures and the use and allocation of funds to different levels of government in Switzerland. It uses empirical material from Swiss transport and public finance sources to test theories and principles of fiscal federalism, and it derives possible reforms for transport funding within and across levels of government. Given its greater complexity and the richness of data available, we concentrate on the road sector, i.e. the funding of road infrastructure and maintenance. Although public transport has not the same funding structure (there is no such comparable thing to the vehicle tax or the fuel tax), many of the principles derived may however be transferred to public transport (rail, bus or other) funding.

## 2. Fiscal federalism theory and the financing of transport systems

The theoretical framework to address multilevel public policies is *fiscal federalism*. Fiscal federalism is a public finance discipline that analyses the vertical structure of government. It explores in normative as well as in positive terms the roles of the different levels of territorial units and the ways they collaborate among each other. Fiscal federalism has a more functional (what responsibilities and resources should be allocated to which government level) and a more institutional approach (how do different governments behave and interact under a certain institutional framework, and how should this institutional framework to be shaped to reach political objectives). Fiscal federal issues therefore address the assignment of functions, taxes and other public resources to different government levels and their interaction. These issues also aim at analysing the behaviour of governments within the existing institutions.

Transport infrastructure policies and funding are a rich area for the test and application of fiscal federal theories. A number of questions may be addressed through fiscal federalism: The assignment of fuel and vehicle taxes to different levels of government, the best mix of fixed and variable taxes for road infrastructure funding and their earmarking, the responsibility and funding assignment for different kinds of road types, the design of transfer systems for road construction between the federal and the cantonal or the cantonal and the municipal level or the design of equalisation measures between territorial units with a different transport infrastructure endowment. Fiscal federal theories also pertain to more organisational procedures like monitoring of cantonally implemented road projects or the use of normative procedures for the calculation of intergovernmental grants.

The following chapters present three elements for application of fiscal federal theories to transport infrastructure. The first pertains to the vertical imbalance between expenditure and revenue assignments to the three Swiss government levels and particularly the burden that arises thereof for central cities and small urban cantons. The second pertains to the cantonal autonomy with respect to the cantonal vehicle tax and whether this tax should be centralised at the federal level. The third pertains to the gap between the current transport territorial spillovers and the grant system that has actually been designed to internalise and offset them. Each chapter starts with a short theoretical introduction, followed by an empirical test mainly with data from the Swiss road account and some guidelines for fiscal reform. The data pertain mostly to the year 1995. Except for the introduction of the heavy vehicles tax, its partial re-

distribution to the cantons and its partial earmarking for rail infrastructures (the so-called Fund for Public Transport created in 1998), the transport fiscal federal framework has not changed since.

Given its emphasis on testing the application of a public finance theory, this paper does not concentrate on recommendations or reform proposals. However, normative recommendations will not entirely be left out. Fiscal federalism has developed a number of “guidelines” or “guiding principles”, which reforms may be taken on hand. One of these guiding principles is “fiscal equivalence”. The term “fiscal equivalence” dates back to Mancur Olson’s public finance contributions. Fiscal equivalence means the correspondence of beneficiaries, taxpayers and decision-makers for public services, meaning that the level or area of service provision covers the area of those paying for it. Fiscal equivalence may be used as methodological framework for responsibility and resource allocation as well as vertical and horizontal collaboration in a multilevel government for specific public services such as road infrastructure or public transport provision. It can be considered a territorial translation of the beneficiaries-pay- principle (BPP) insofar as it aims at covering cost by those who cause them. The difference is that it is not related to individuals but to territories; it is a spatial principle. This allows for drawing conclusions even for funding local public goods where individual funding is by definition impossible. Applied to road construction where individual funding is at present politically out of question, fiscal equivalence may be used as a guiding principle for road infrastructure responsibility and road-related tax assignment as well as for the use of vertical and horizontal collaboration forms between different governments.

### **3. The vertical funding imbalance**

#### **3.1 The lack of resources to the municipal level**

Road infrastructure is – apart from social security - the only important policy area in Switzerland, which is based on the beneficiaries-pay- principle (BPP). Road users are funding their infrastructure through special taxes such as the fuel and the vehicle taxes, which are earmarked basically to road infrastructure purposes. At federal as well as at cantonal level there exist specific financial funds and accounts designed to co-ordinate revenues and expenditures for the roads. Revenues and expenditures are summarised in different financial Funds such as the (federal) Road Fund, and road-related expenditures and revenues and the respective benefits or deficits are compared with the help of the so-called road account. The application of the BPP, which somewhat withdraws road infrastructure expenditures from the usual political negotiations, stands in contrast to the funding system in most other OECD countries (except Germany) and has certainly contributed to at once the comparatively low level of fuel taxes and the high quality of the road network.

An integrated view at all government levels together and the whole period from 1985 to 1995 reveals that the amount of earmarked taxes is roughly equal to total road expenditures. However, if scrutinised for any of the three government levels, the picture changes. This is shown in table 1 where the total earmarked tax revenue for one single government level is set against the total expenditures of that level. Earmarked revenues are basically the different national fuel taxes, the cantonal vehicle tax and various municipal fees. Intergovernmental transfers are federal-cantonal or cantonal-municipal earmarked subsidies for road infrastructure. Expenditures result from the responsibilities for the national, the cantonal and the municipal roads respectively, construction as well as maintenance. The first column shows the gross revenue from earmarked taxes, the second column the net expenditures after earmarked transfers from upper level governments, and the third column the net surplus/deficit resulting from the comparison of tax revenue and expenditures for every level.

Table 1: Gross road expenditures and revenues from road-related taxes for the three government levels (1995), in Billion CHF

	<b>Gross revenue from road-related special taxes</b>	<b>Road expenditures after upper government transfers</b>	<b>Surplus/deficit</b>
<b>Federal level</b>	4.3 Mia	3.0 Mia.	1.3 Mia.
<b>Cantonal level</b>	1.6 Mia.	1.6 Mia.	~ 0
<b>Municipal level</b>	0.2 Mia.	1.7 Mia.	- 1.5 Mia.
<b>Total</b>	6.1 Mia	6.3 Mia.	- 0.2 Mia.

Source: Blöchliger et al. (2000), based on Road account (Strassenrechnung) (1995) and National Accounts (Staatsrechnung) (1996)

Table 1 shows an interesting result:

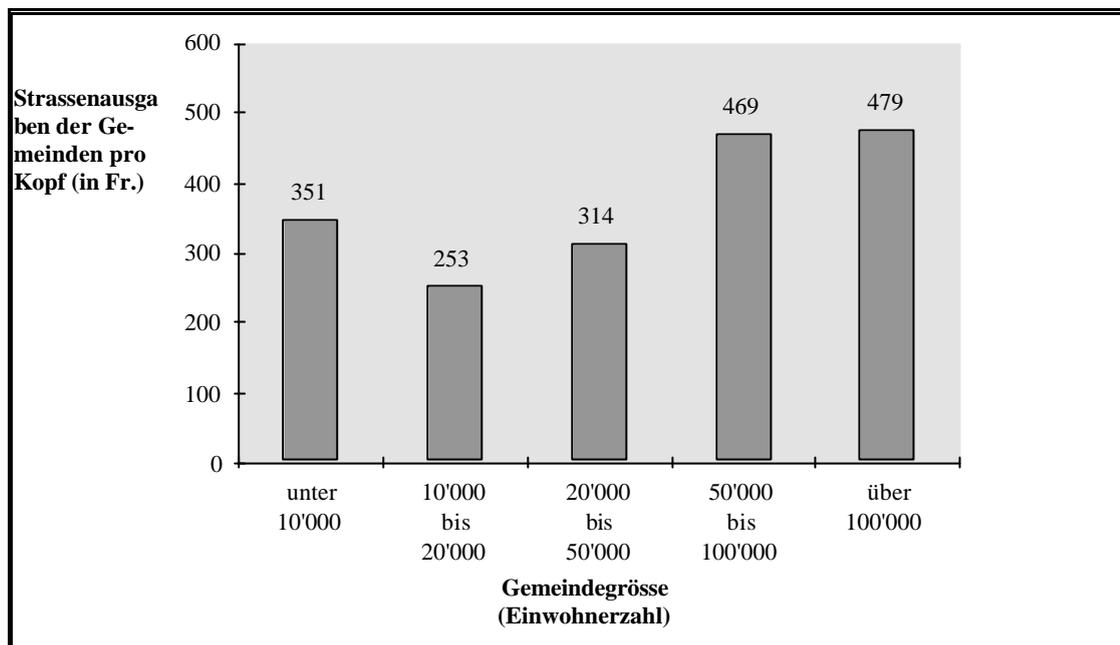
- Globally, the road account or the comparison of special road taxes to total road expenditures is in equilibrium. A total of 6.3 billion Swiss Francs of revenues in 1995 equals roughly a 6.3 billion of Swiss Francs for road related expenditures.
- The vertical division between federal, cantonal and the municipal level however shows a striking imbalance: While the federation achieves a surplus of yearly 1.3 billion Swiss Francs and the cantons are roughly levelled out, the municipalities have to bear a deficit of 1.5 billion Swiss Francs.
- The municipalities have to bear a double disadvantage: on one hand, they have, unlike the federation and the cantons, no significant earmarked taxes to levy. On the other hand they are not entitled, such as the cantons are, to large amounts of inter-governmental transfers. Unlike the other government levels, municipalities have to cover their road expenditures through general tax revenue.

Put in other words: In comparison with a correct application of the BPP, the system of road related tax revenue – mainly the fuel tax - is skewed towards the federal level. To a certain extent, the federal level achieves a surplus at the expense of the municipal level. This may present a particular burden to those municipalities, which have to carry high road expenditures – on one hand very small, mountainous villages and on the other hand large cities. This latter expenditure burden will be treated in the next section.

### 3.2 The burden to the cities

The lack of own resources and the need to fund road expenditures is particularly felt in larger cities. Larger cities have to bear higher cost per capita for road construction as is shown in figure 2 where cost per capita are set against the size of municipalities.

Figure 1: Municipal size and road expenditures, per capita



The curve in the figure 1 is clearly U-shaped with a maximum for the five largest cities of the country. These cities (Zürich, Basel, Geneve, Lausanne and Berne) have more than 100'000 inhabitants. The per capita expenditure in these cities is almost as twice as high as in the smaller towns of around 10'000 to 20'000 inhabitants.<sup>1</sup> Given the missing earmarked tax revenue at the municipal level, the burden to build and maintain roads through general taxes is particularly high in the large, i.e. the centrally located cities. The gap between smaller and larger towns is much larger for road infrastructure than can be observed for most other policy areas.

The higher per capita cost may be caused by an effect called the central burden, i.e. the asymmetric load of the roads of the central cities and their agglomeration. Today's traffic flows are centripetal, i.e. people are commuting from the outside to the cities in the morning and commuting back in the evening. The roads in the central city tend to be more frequented by car drivers from the agglomeration than vice versa. This means that the central city has to carry a net burden of car-kilometers with the respective cost associated. A careful calculation for the city of Basel reveals a net burden of around 9 percent of total traffic circulation in

<sup>1</sup> The other end of the U-shape, i.e. the higher cost for municipalities under 10'000, is probably due to indivisibilities: road construction and maintenance causes some fixed minimum cost that in small settlements are distributed among fewer inhabitants

Basel, which amounts to around 10 million Swiss francs (10 percent of cantonal road expenditure). This burden does not yet include external or environmental costs, such as those that directly lead to public expenditure e.g. for health care or environmental protection. We have therefore quantified only one aspect of the central burden problem, and certainly not the most pressing one. However this example already shows that the vertical imbalance of the road funding system leads to a clear horizontal asymmetry and a lack of fiscal equivalence between the large central cities or cantons and their conurbation.

Reforms of this asymmetry mainly pertain to the creation of so-called “agglomeration associations” covering the area of the functional commuting zone. These associations should be independent bodies funded by cantons and municipalities. In order to be self-sustaining financially and to guarantee fiscal equivalence, fees like road pricing or parking fees would be an adequate solution. Although the central city burden issue is basically an intra-regional and not a federal problem and should therefore be mainly tackled by the territorial units of the functional area, the federation may issue some regulations to give incentives for the creation of such associations. Given the vertical imbalance of the fuel tax revenue, a financial participation towards these associations should not be out of question.

## 4. Tax autonomy and cantonal road expenditures

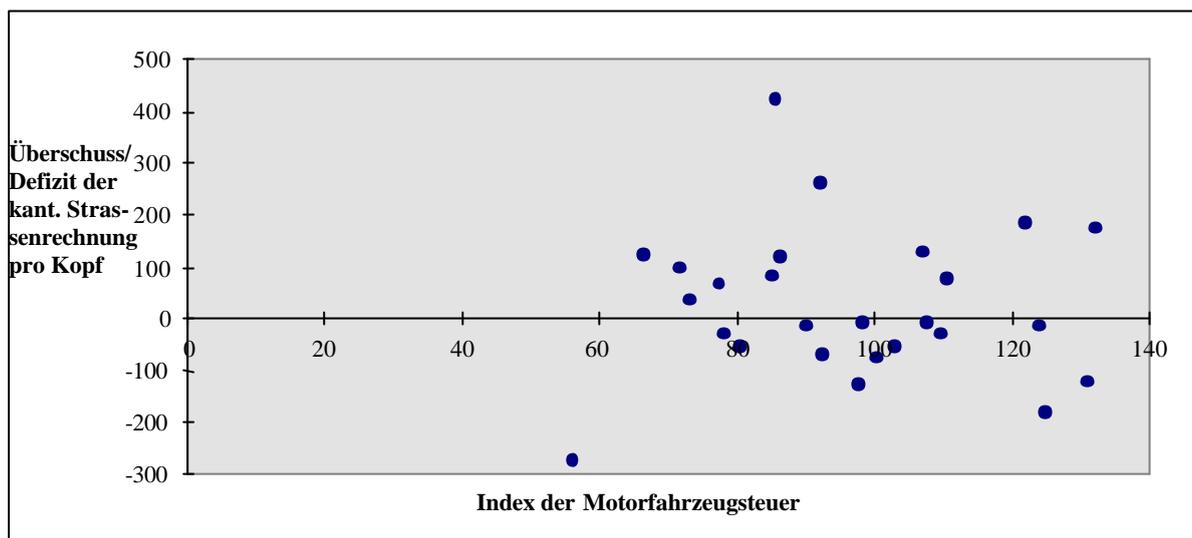
Fiscal federal theory inspired by public choice theorists states that in order to reach decision-making coherence, different government levels assuming expenditure responsibilities should also be given the respective taxing power. Taxing autonomy has two effects: First, it allows the population for expressing its preferences with respect to the amount of the desired public good and its respective tax price, as it is one of the classical mantras of fiscal federalism and primary advantages of decentralised decision-making. Second, and this has increasingly been put forward by public choice theorists, the direct link between the provision of the public good and its tax price, decided upon in elections and votes, exerts pressure on expenditures and increases budget discipline. It is therefore interesting to analyse how the population makes use of its tax autonomy to express preference differentials, and how politicians shape expenditures and react to budget constraints set by different or changing tax rates.

The cantons in the field of road infrastructure policy dispose of an autonomous tax resource, the so-called vehicle tax. The cantons are free to set tax base and tax rates of the vehicle tax, there is no federal regulation on that subject. Although therefore differing somewhat from canton to canton, the vehicle tax is basically a car ownership tax with a fixed amount that depends on size, weight or motor strength of the car. In the words of infrastructure funding, where paying for infrastructure use is often said to be split up into a fixed and a variable amount, the fixed amount somewhat represents and satisfies the “access right”. Considering this, the vehicle tax can also be defined as purchase of an access option. In all cantons the vehicle tax is earmarked and enters road funds comparable to the federal road fund. Altogether, the vehicle tax covers around 60 percent (with considerable inter-cantonal disparities) of the cantonal road expenditures, the remaining 40 percent being covered by federal grants already mentioned in chapter 3. Compared to the national average, the index of the tax rates of the vehicle tax varies between 58 and 130, showing larger disparities than e.g. the income tax.

Given the significant taxing power through the vehicle tax, it is interesting to analyse how the cantons use their tax autonomy. It is of particular interest to analyse tax rates and the respective tax income in relation to the volume of road expenditures per capita, e.g. whether higher tax rates lead to higher or lower cantonal road expenditures. The results of the correlation between tax rates and the surplus or deficit of the cantonal road account are shown in figure 2. The latter shows by the horizontal axis the index of the vehicle tax in percent (Switzerland = 100). The vertical axis indicates the balance of the cantonal road account, i.e. the cantonal

road expenditures after deduction of all federal grants and the revenues from the vehicle tax. Again, all data relate to 1995.

Figure 2: Indices of cantonal vehicle tax and the balance of cantonal road accounts, per capita, 1995



This figure reveals no correlation between cantonal vehicle tax indices and the balance of cantonal road accounts; the  $r$  squared is  $-0.02$ . At the average, the difference between total expenditure and total tax revenue remains the same, regardless of differing tax rates and differing revenues associated with those. This means that cantons with higher tax rates have higher road expenditures, cantons with lower tax rates have lower road expenditures. In general, it is revenues that determine expenditures. Therefore, although the result has not been tested for causality, one may argue that higher vehicle tax rates and the higher revenue associated with it lead to higher road expenditures. Given the all-too-familiar political debates on vehicle tax rises and the outcome of the respective votes in several cantons, this conclusion at least does not appear too illogical.

We made two tests to support the validity of the hypothesis:

- The level of tax rates may depend on total per capita road expenditure, i.e. cantons with roads expensive in construction and maintenance would require higher taxes. This is not the case; it is neither the financially weak nor the mountain cantons that have high tax rates.
- The level of taxes may be inversely related to the amount of grants from the federation, i.e. cantons with high grants from the federation could relieve their own tax bill. This also is not the case, the correlation coefficient is at  $-0.04$ .

Considering this, two different points could be highlighted:

- The cantonal population indeed does make use of the cantonal vehicle tax autonomy by using it as an instrument for deciding on the amount of road expenditures. With this respect, different tax rates would reveal preference differentials.
- Tax revenue defines expenditures. Higher tax revenue therefore entails expenditure increases. The aspect, that lower vehicle tax revenue leads to lower road expenditures and higher vehicle tax revenue leads to higher road expenditures should not be ignored.

With respect to both points put forward, centralising the vehicle tax at the federal level would have two disadvantages. First, it would wipe out cantonal autonomy and take away the populations ability to show its true preferences on the volume of road construction. Second, it would break the link between expenditure and revenue responsibilities at the cantonal level and could thereby generally reduce financial and budget discipline in the road infrastructure sector. This in turn could lead to a general road-related tax increase.

## 5. Federal grants for cantonal road construction

The federation and the cantons are vertically interwoven through a variety of grants, which are funded through the fuel tax and a little general tax revenue. The federation pays around 30 to 40 grants under different titles and purposes to the cantons on a conditional, earmarked basis, mainly for specific aims like major road constructions, natural disaster prevention or environmental protection. In addition, a 12 percent share of total (federal) fuel tax revenue is handed over unconditionally to the cantons. Put together, these grants cover the remaining 40 percent of road construction and road maintenance cost that are not covered through the cantonal vehicle tax or cantonal general taxes.

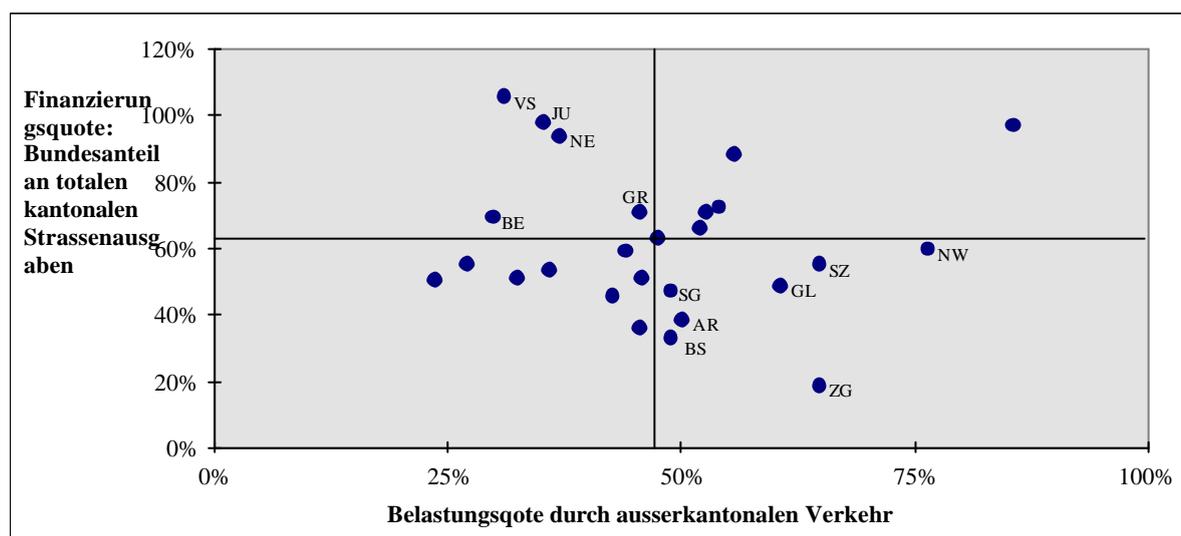
Literature much discusses the issue of intergovernmental grants, especially on what ground grants should be allocated and how their amount should be determined. There are basically three reasons or objectives for introducing intergovernmental grants. The first is closing the fiscal gap (since taxing power is usually more centralised than expenditure power, grants have therefore to equalise responsibilities and resources) through tax sharing agreements. The second is reducing fiscal disparities through vertical or horizontal equalisation mechanisms. The third is internalising territorial spillovers, i.e. upper level governments correcting for positive or negative territorial externalities that emanate from the provision of subnational public goods. Given that tax sharing agreements and equalisation mechanisms belong (mainly) to fiscal, not that much to transport policy, the conditional road grants can basically be justified on the ground of spillovers between subnational territorial units.

What are these spillovers? Basically they are car drivers from canton A using the roads of canton B, i.e. this phenomenon emerges as they cross the borders of the territorial units where they pay their taxes. Since car drivers from all cantons use the roads belonging to any other canton, this creates a system of mutual spillovers. These have to be internalised through federal grants. The internalising grant has to cover the part of the cantonal road expenditures that is caused by the drivers from other cantons. Under the assumption that all drivers cause the

same per-user cost<sup>2</sup>, the ratio of the grant to total expenditure should equal the ratio of “external” to total road-kilometers on the chosen cantonal road network.

The question whether the current conditional grants do really internalise the respective spillovers is analysed in figure 5 below. It shows, on the vertical axis, for every canton the federal share of total cantonal road expenditure and compares it, on the horizontal axis, to the share of “extra-cantonal” road traffic (= traffic on the roads of a specific canton stemming from other cantons). The share of the “extra-cantonal” road traffic has been calculated with the help of the Swiss transport model. The horizontal and the vertical lines show the respective federal average for both shares.

Figure 5: Comparing the share of federal road grants and the share of extra-cantonal road traffic



The figure reveals two interesting results:

- The average share of federal road grants is 62 percent whereas the average share of extra-cantonal road traffic on any given cantonal road is only 48. The funding share is therefore higher than the amount of the territorial externality resulting from inter-cantonal traffic. The financial contributions somehow “over-internalise” the existing spillovers.

<sup>2</sup> Actually in order to define the amount of the grant the *marginal cost*, i.e. the additional cost caused by “external” car drivers should be taken into account. Given that it is impossible to determine the marginal cost within a framework of joint production, we assume that every car driver bears its *average cost*.

- There is no visible correlation between the federal grant share and the extra-cantonal traffic share for *any given canton*. Some cantons have grant shares that are much higher than their extra-cantonal traffic share, for others the opposite holds true. There is furthermore no obvious variable that could explain the observed deviations from the average.

So, to draw a conclusion from these observations: The system of intergovernmental road contributions not only over-centralises transport-related financial decision-making, the erratic behaviour of the observed ratios also reveals no visible effect with respect to a targeted coordination of inter-cantonal road projects. Reforming the system of intergovernmental road contributions would on the one hand mean reducing the overall amount of conditional grants from the federation (and using them either for the national roads or reducing the tax rates). On the other it would mean relating the assignment of grants much closer to the actual level of observed territorial externalities, i.e. the level of burden to a single canton caused by extra-cantonal traffic.

## 6. Summary and conclusions

Fiscal federalism is a theory dealing with questions of assignment of responsibilities and resources to different levels of government and the financial and administrative relationship between and among them. Transport policy, particularly road construction and maintenance, is one of the most rewarding policy areas for studying fiscal federal issues in Switzerland. Therefore this sector has been chosen to test normative issues for funding transport systems by the public sector. This document concentrated on analysis; reform proposals played a marginal role only. However, under the heading of fiscal equivalence, a number of recommendations was made. Applying this principle does not only lead to a more responsible and fairer redistribution of tasks and duties in the road construction sector, it also might lead in the long run to a more responsive and careful use of the earmarked resources provided through fuel taxes.

Fiscal federalism has not yet been much used to analyse transport funding issues. With regard to the scope of possible application, together with traditional welfare theory, institutional economics and public choice theories, this field may be extended, given its new significance in transport issues. Research fellows may find it useful to analyse new transport policy issues under the angle of fiscal federalism, e.g. the use of user fees and privatisation of national roads, the funding of regional public transport or the redistribution of financial resources that originate from environmental taxes. Others may be more attached to the co-ordination and monitoring mechanisms that are used in order to guarantee coherence in road construction and maintenance as well as in financial planning. Public finance theorists specialised in public choice theory may find it interesting to analyse more carefully the relationship between taxing and expenditure power or the analysis of the distributional impacts of the road fund. Everybody finds ample and detailed material and data on institutional and financial topics within the transport sector, such as the road account or the railway account. In sum, more theoretical and empirical analysis of fiscal federal mechanisms may increase our knowledge on efficient, sustainable and financially viable transport systems.

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