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Local environmental user charges in Switzerland: Implementation and performance

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Abstract. This paper deals with the management of three environmental policies at the local level: clean water distribution, sewage and wastewater treatment and household solid waste collection and treatment. The argument is that applying the benefit principle for financing these services will enhance allocative efficiency and contribute to induce environmental friendly attitude. The original contribution of the paper is to mix political economy, law and accounting in a coherent process – which also corresponds to the Directives 2000/60 and 2008/98 of the European Parliament in the fields of water policy and solid waste.

The Swiss example given in the second part of the paper serves as a good case study for issues that arise as other countries evaluate user charges. The tested hypothesis for Fribourg canton is that the cost coverage ratio (CCR) of the three functions is an accurate measure of performance in the management of the three environmental functions. CCR is assessed with raw data and treated data. The data cover the 168 communes of the Canton Fribourg for the 1996-2009 period. The results show a convergence to CCR=1, but also some accounting practices that deviate from theory.

Keywords: benefit principle of taxation, cost coverage ratio, environmental accounting, environmental legislation, environmental policy, environmental taxation, household solid waste, polluter-pays principle, user charges, user-pays principle, water distribution, waste water treatment

1 Introduction

In 2000 and 2008, the European Parliament and Council have issued directives for community action in the field of water and waste policies. The second one should have been implemented by 2010, but this is far from being the case at the moment this paper was written. The European directives also consider the organization and the implementation of these policies in a multi-level government system (Dafflon, 2013). It recommends that these policies should be decided at the central level, but implementation should be local. Yet little consideration has been paid by the economic scientific community to the implementation and management of these regulations: the issues have been left to lawyers and civil engineers. Environmental economic policy is mostly devoted to macro issues like the climate changes and the sustainable use of natural resources; micro problems are often set aside or neglected. This paper focuses on these issues at our door step. It analyses how the European recommendations can be best implemented and efficiently managed at the local level.

Three environmental policies are considered: clean water distribution, sewage and wastewater treatment, and household solid waste collection and treatment. The research questions are how these policies should be organised and managed at the local level and whether applying user charges for financing these services will contribute to induce environmental friendly attitude and promote fiscal efficiency and accountability? Yet implementation of the benefit principle requires robust guidelines to achieve these objectives – not to be found in theoretical models, but in learning by doing practices.

The argument is developed in two parts. In the first one, the foundations of environmental management at the local level are based on simple theoretical arguments. The contribution of this paper is to mix the approach of political economy, law and accounting in order to build a relevant performance indicator: the cost coverage ratio (thereafter: CCR). The following stresses the differences between a Pigouvian tax and user charges. Section 3 presents the legal framework needed for environmental management in a decentralized political structure. Section 4 details the accounting system that is necessary in order to obtain correct information for policy management, pricing and production efficiency.

The second part of the paper demonstrates how these fundamentals can be implemented. Section five develops a possible technique for defining and measuring the performance in order to assess the feasibility of our proposal. The tested hypothesis is that the CCR is an accurate measure of performance in the management of the three environmental functions. The practical analysis and experiment are tested on the three mentioned functions at the local level in a Swiss canton (Fribourg) over a period of fourteen years (1996-2009). First we control that environmental capital and current costs are exhaustively accounted for in the three functions over the fourteen years period, and correct the statistical data if needed. Second, we calculate the CCR path over the period.

The results permit to verify the robustness of the method and to formulate recommendations for implementation. (i) Well designed user charges can attain full CCR, with comprehensive cost calculation. (ii) User and polluter-pays tariffs give price signals that promote allocative efficiency and managerial accountability. (iii) Full information and transparent accounting reduce strategic behaviour from economic agents and politicians.

2 The political economy of environmental user charges

Environmental fiscal policy is most often associated with Pigouvian taxation. Yet there is a great deal of misunderstanding in theory and confusion in practice between environmental taxes and environmental user charges. One of the reasons is possibly that, for political acceptability, Pigouvian taxes are often redistributed and earmarked to environmental policy objectives, financing incentive grants and the like. These are considered as counterparts for the taxes. User charges are theoretically founded on the benefit principle of taxation (using the term “taxation”, the vocabulary is misleading); they are individual payments for individually received services. Apparently, both are compulsory payments, both have counterparts: thus the confusion. But the fundamental divergence is that earmarking is issued from political motivations (acceptability of the tax) and is not generic to the tax, whereas the service and the user charge paid for it are by nature inseparable. The first subsection deals with these differences. The second subsection recalls the general arguments in favor of the user-pays (polluter-pays) principle.

2.1 The distinction between environmental taxes and environmental charges

Environmental policies include a wide range of instruments: standards, subsidies, fiscal instruments, tradable permits, voluntary agreements, etc. The two fiscal instruments are environmental taxes and environmental charges, which derive from two different economic concepts. Figure 1 helps to clarify the issue. It is organized around two criteria:

- the objective (in columns) refers to the purpose of the State when it introduces a fiscal instrument, either to raise revenues for the public budget (“fiscal” in the first column) or to influence the behaviour of agents in a certain way, here in a more environmental-friendly way (“incentive” in the second column);
- the counterpart criterion (in rows) indicates if the payer receives a service in exchange of his

payment (in line with the benefit principle in the second row) or not (first row).

	fiscal objective	incentive
Sovereign State without counterpart	Income tax VAT Vehicle tax **I.**	Pigouvian tax CO_2 tax Environmental **IV.**
Benefit principle with counterpart	Connection charge **II.** Drinkable water user charge Waste water discharge fee Solid waste charge Environmental	**III.** Landing emission charges

Source: adapted from Pillet, 2006, p. 53.

Figure 1 Illustration of the difference between tax and charge

This classification leads to four types of instruments:

I. Traditional taxes, such as income tax or VAT, which are unrequited payment levied to finance the general public budget.
II. Causal charges paid in exchange of a good (water, passport, etc.) or a service (solid waste collection). Those instruments are based on the benefit or user-pays-principle.
III. Specific environmental charges: for example, emission charges and landing fees in connection with air quality and noise.
IV. Pigouvian tax and the like.

The Pigouvian tax (IV) is a corrective incentive tax paid without counterpart, whose aim is to internalize environmental externalities and modify the agents' behaviour via a higher price-signal. It refers to the Pigouvian normative proposal of internalizing the difference between the private and the social marginal cost via "extraordinary restraints" implemented by the State in order to restore an optimal allocation of resource (Pigou, 1932). A Pigouvian tax is not earmarked; it should be paid to the general public budget. Since an environmental tax also yields fiscal revenue, a right-to-left arrow is represented in Table 1. Furthermore the environmental tax refers to the actual implementation of a Pigouvian tax in the real world (Daguet, 2012). Baumol and Oates (1971) called it the effective tax, which is set according to environmental standards rather to the marginal externality that is complex to assess.

User charges (II) are based on the benefit principle: current and capital costs of a public service are apportioned among economic agents according to the exact benefit each of them derives from the consumption of the service (Buchanan, 1968). Thus, a clear and direct link is established between the service delivered and its financing. Furthermore, the relation between the payment and the benefit is proportional: the more one uses the service, the more he will pay for it. The service has to be totally financed by the yield of the charges (full cost coverage); it does not burden the general public budget. The benefit principle represents the entry of market rules in the fiscal sphere: it introduces a direct connection between the one who uses the service and the one who pays for it. The benefit principle is

however a normative concept that needs some adaptations to be transferred in practice (technical criteria and value judgements), where it becomes the user-pays principle (Dafflon, 1998; OCDE, 1998; Schiavo-Campo, 2007).

Environmental user charges must be paid by individual agent in exchange of a counterpart service; individual payments are inseparable from the relevant individual services. The sum of individual payments should cover the service costs. But user charges also include an incentive part represented with the left-to-right arrow in Table 1. First, they give a corrective price-signal aimed at obtaining a more efficient use of the service. Second, the tariff can be designed in such a way that users will be more environmentally responsible. These are clear objectives stated in the two European Directives 2000/60 and 2008/98.[1]

2.2 Advantages of the user-pays principle

The user-pays principle aims at increasing the efficiency in producing a particular public service through both the quasi-market rules it introduces and the possibility of benchmarking costs and pricing in the jurisdictions producing a similar service. It has several advantages from an allocative (bullets 1, 2 and 3 below) and budgetary stands (bullets 4 and 5):

1. It avoids excessive demand because it includes the cost component in the decision of the agent who has to pay for the wanted service. It gives the real cost of the service and thus encourages a sparing use of the service (Dafflon, 1998).
2. It avoids free rider behaviour because prices and services are closely linked.
3. It can lead to an improvement of environmental quality. If the service concerns an environmental service, standards often indicate the ways the service should be provided and treated (clean water supply or wastewater treatment for example). Moreover, a sparing use of the service also improves the environmental quality.
4. It can solve some aspects of financing the public sector. Indeed, it relieves the general budget by introducing a causal charge paid only by the one who uses the service (Sjoquist and Stoycheva, 2012).
5. It requires the introduction of cost accounting in public budget (see section 4). Clear accounting of production costs, information transparency and possible benchmarking processes are key elements of better accountability in those jurisdictions which are applying the user-pays principle.

The user-pays principle also raises equity issues. The agent must pay the price of the service according to its cost, whatever its personal situation in terms of revenue and wealth. Ignoring ability-to-pay can be seen as "unfair". However, user charges are implemented to cover the costs of a service (allocation function) and apportioned according to the use of a service. They are not for targeted-redistributive policies. The connected argument is that the user-pays principle unloads the general budget and thus frees money for redistributive policies.

3 The institutional and legal frameworks of user charges

The implementation of the user-pays principle requires robust legal frameworks. In Switzerland, local governments apply three environmental user charges: for the supply of clean (drinking) water, for

[1] Article 9 of Directive 2000/60 prescribes member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs in accordance in particular with the polluter-pays principle. Water-pricing policies (to be implemented by 2010) provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive. Article 14 of Directive 2008/98 states that the costs of solid waste management shall be borne by the original waste producer or by the current or previous waste holders. In accordance with the polluter-pays principle.

sewage and wastewater treatment services and for solid waste collection and treatment.

The institutional organisation is the following: the federal legislation sets out the standards of services: the bio-chemical quality of clean drinking water, the maximum pollution admitted for wastewater and solid waste rejects and the quality target that de-pollution processes should attain in the wastewater and solid waste treatments. The cantonal level coordinates the policy implementation and the territorial map of the services. The cantons also issue the production regulation, control and sanctions. The local level (individual communes or communes in public-law association) is responsible for the production of the services, service delivery, issuing the user charge tariffs. Financial management of the services falls in their responsibility in order to cover the costs of the three services.

The Federal High Court has issued case laws that constrain the autonomy of the commune in two directions: [1] in deciding the user charge tariffs and [2] in imposing specific managerial financial rules.[2] These rules are valid for the three functions, of course with specific adapted regulations for each of them.

[1] The tariff must be decided by the local legislative (people's assembly or local parliament). It must explicitly states the following four points:

(i) the definition of who are the users subject to the charges;
(ii) the object of the user charge (designation of the services which are submitted to the user charge tariff);
(iii) the criteria for the calculation of the individual charges in the tariff;
(iv) the maximum amount of the user charges.

If one of the previous points is not properly formulated and written in the voted local ordinance, any user can contest in court the calculation and (semester or annual) payment bill he receives for the service (Knapp, 1991).

[2] Four managerial financial rules also result from past case laws and have been repeatedly reasserted by the Court since more than thirty years.

- "*Equivalence*": the charges must be proportional to the benefits received by the user. The recommended tariff is binomial: potential users have to pay an access charge related to investment costs – this is a sort of insurance premium in exchange for the guarantee to benefit from the service when needed; the second component of the tariff must be related to the effective use of the service.
- "*Equal treatment of equal*": user charges are related to the services provided and cannot be apportioned following other not-related criteria – for example the distinction between residential houses and secondary or vacation residences in tourist resorts is not permitted.
- "*full coverage of the costs but not more*": on a medium time horizon, total (access and current) charges cannot excess total (current, maintenance and investment) costs. User charges cannot be disguised taxes: any annual excess of revenue must be duly reserved for the same function and appears explicitly in the balance sheet. There cannot be compensation between the three functions. Financial reserves can be used for leveling out possible imbalance through time.
- "*time causality*": defines the moment in time when the obligation to pay arises. For the access tax, it is the potential access to the service which fixes the obligation (the "insurance" aspect of the service). For the current tax, it is the effective measured consumption of the services.

[2] On this, for example: Arrêt du Tribunal fédéral suisse du 7 juillet 2003, Decision of the Swiss Federal Supreme Court, July 7, 2003; reference in BGE 129 I 290 considérant 3.2; also more recently the Arrêt du Tribunal fédéral suisse du 4 juillet 2011, référence ATF 2C_740/2009.

4 Accounting principles

The two previous analytical pieces can now be brought together. On the one side, the political economy of user charges commands that environmental services should be paid by beneficiaries according to the user-pays principle in proportion to the services obtained. On the other hand, the rules given by the Federal Court ensure fairness and accountability in the financial management of functions paid according to the benefit principle. In practice, this means that clear accounting principles have to be implemented so as to guarantee a quid-pro-quo correspondence between payments and expenditures. Transparent accounting information is a key component of the environmental management issues. In addition, in the Swiss law there cannot be one single general "environmental function": the law does not permit compensation between one service and the other.

The accounting system must provide two classifications, functional and economic nature, that correspond to the needed information:

- The functional classification is organised in chapter that represent the activities of the state. For example in the the Swiss Harmonized Public Accounting System (HPAS - CDCF, 2008, p. 201), chapter 7 head is "protection of environment and land planning" and comprises the following major heads: 71 water distribution, 72 waste water management, 73 solid waste management, 74 protection against natural disasters, 75 Fauna, flora and landscape protection, 76 protection against air and noise pollution, 77 cemeteries. Also, if the production function is not homogeneous, it could be further divided in minor heads: thus for 72 waste water management, the HPAS gives 720 sewages and 721 waste water treatment plant.

- The second classification in HPAS gives the economic nature of expenditures and revenues (line-item in the budget and account such as: personal, insurance, vehicle maintenance, insurance, administrative material, energy, financial costs, etc).

These points of analysis are not simply purely technical assemblage of words and numbers. It is absolutely necessary to establish the true costs of the production functions, possibly with a distinction between functional major and minor heads. With this information, it is possible to calculate the true activity-based costs, the average and marginal costs, and to distinguish between fixed and variable costs (Dafflon, 1998 and 2010; Cokins, 2007). The organization of the user charge tariff depends from these calculations. Detailed information on user charges tariffs can be found in Dafflon and Daguet (2012) and Dafflon (2010 and 2013).

5 Implementation and performance analysis in Fribourg

The aim of this section is to verify the implementation of the user-pays principle at the local level in the canton of Fribourg for three specific environmental functions: (i) clean water supply, (ii) sewage and wastewater treatment, and (iii) household solid waste collection and treatment. We also measure the performance: the benefit principle is correctly applied if the cost coverage ratio = 1 for each of the three functions [CCR = revenues / expenditures; without internal double accounting entries]. With CCR=1, the proceeds exactly cover the spending: the function is self-financing via the corresponding user charges. The requirement of cost coverage corresponds to the logic of the user-pays principle in political economy and to the legal requirement.

Verification and the performance analysis are realised in three steps. First, for the 168 communes in the canton of Fribourg (thereafter: LGs[3]) for the period 1996-2009. Data for the three functions are gross data, i.e. untreated data from the functional accounts of the communes, collected from the

[3] The canton of Fribourg counted 259 communes (LG for local government) in 1995. Owing to the cantonal policy for the voluntary amalgamation of communes, there were 168 in 2010. The 168 LGs serve for the analysis. Data for amalgamated communes have been added to obtain the figures for the new communes.

Service des communes[4] (subsection 5.1). In the second step (subsection 5.2), we draw attention to the LGs in one of the seven cantonal districts, the Lake District, which comprises 26 municipalities.[5] The Lake District serves as sample in the detailed analysis because it is the most representative district in the canton (over-cutting language and religions minorities, distribution of the working population, socio-demographic characteristics (Dafflon et al., 2004). The detailed analysis of the Lake District LGs is given for five years (2005 to 2009). In this subsection 5.3, the published gross data are retreated according the accounting principles necessary for a correct application of the benefit principle, as explained in Section 4.

There are two reasons for this analysis in three steps. First, since the results in the time-series for all LGs are rapidly converging to CCR = 1 for the three functions, we question (and test) why LGs would have been so virtuous in financing environmental policies? LGs have no room of manoeuver in selecting the objectives (section 3 above), and no particular incentive to achieve the pre-set federal standards – they act as agent of a double principal. The federal government sets the general objectives of the three environmental policies. The canton decides the implementation rules and coordination requirements between communes. The only local interest is that with a performance CCR approaching 1, the financial burden on the general budget lowers, and so the pressure on taxation. The second reason is to test the method: statistical data give macro information; but the polluter-pays principle is effective only if properly implemented in the individual LGs, and for that we need accounting results of the individual communes.

5.1 Results for the 168 communes (gross data)

The communes were given the power to finance environmental functions through user charges in 1984. The starting positions on the first referred year were dispersed. As can be seen in Figure 2, CCR was 54% for household solid waste collection and treatment, 82% for sewage and wastewater treatment and already 99% for clean water distribution. Over the period 1996 – 2009, important efforts were accomplished in order to improve the financing performance. In 2009, CCR was 94% for wastewater, 97% for household solid waste and 98% for water. Figure 2 shows a remarkable improvement, which needs to be scrutinized in more details.

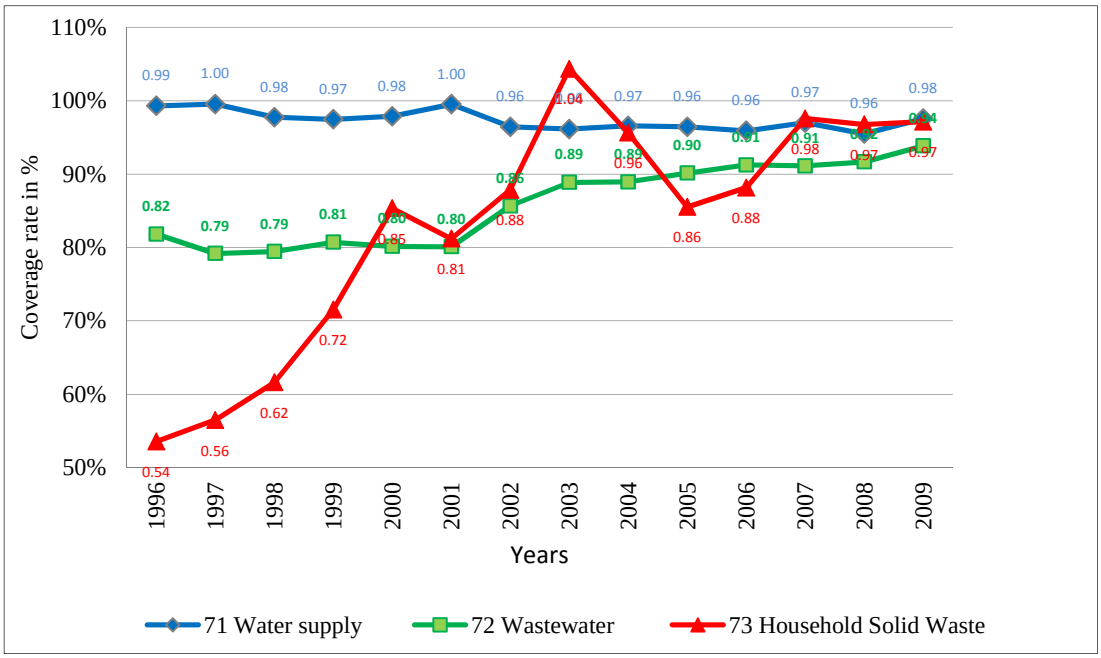
5.2 Results for the communes of the Lake District: gross data

Figure 3 recapitulates the results of the same analysis but for Lake District only. The timely trends mirror that of all the LGs. However, the LGs' individual scores within the districts register rather wide dispersion between the communes for one particular year, and from one year to another for a particular commune. The dispersion ranges from 22% to 224% for [71] water, from 3 % to 158 % for [72] sewage and wastewater treatment and from 0% to 133% for [73] household waste.

Such important dispersion needs further investigation and analysis. It can be due to one or a combination of the following causes:

(i) better information concerning the obligation to attain CCR=1;
(ii) better awareness of environmental issues;
(iii) the pressure of tax competition, which obliges communes to maintain or even lower their tax coefficient on individual income taxation and corporate profit taxation, and partly compensate with higher earmarked user charges.

[4] The Service of communes is the cantonal bureau in charge of supervising LGs in the canton.
[5] The Fribourg Canton (one of the 26 Swiss Cantons) is divided in 7 administrative districts: Broye, Glâne, Gruyère, Sarine, Lac (Lake in the text), Singine and Veveyse. Districts are not LGs, but deconcentrated agencies of the cantonal government. However, their perimeter also serves for LGs in special functional jurisdictions (economies of scales, horizontal cooperation).



Source: Authors elaboration; gross data from the Service des Communes, canton Fribourg.
Note: the 2003 peak in [73] corresponds to an up-date of the user charge billing in the capital town which, owing to its importance, impacts on the total result.

Figure 2 CCR, functions [71], [72], [73] for 168 communes of Fribourg, 1996-2009

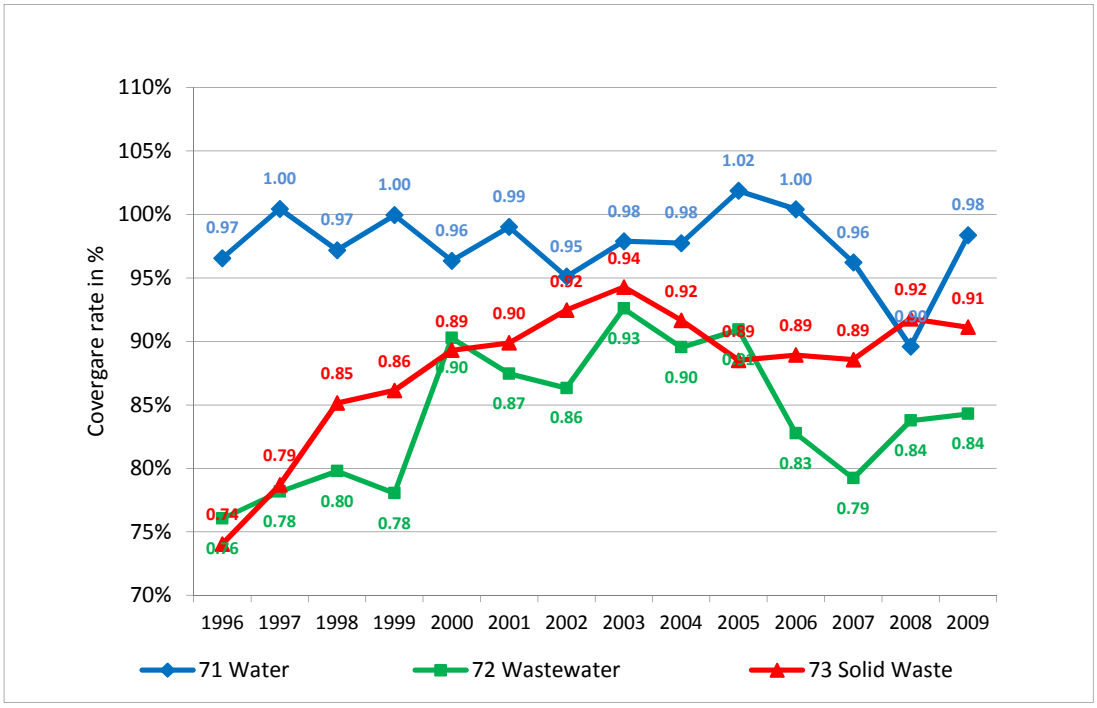


Figure 3 CCR, functions [71], [72] and [73], Lake District, 1996-2009

5.3 Results for the commune of the Lake District: treated data

The observed general trend towards a better cost coverage of environmental expenditures through user charges needs to be analysed in detail in order to correct the results if necessary and to measure the real performance. The analysis covers the 26 communes of the Lake District for the last five years, 2005-2009[6], in order to smooth results and avoid particular situations. Data are treated in two ways:

(i) Double internal accounting entries have to be identified and partly cancelled; only monetary expenses and revenues are considered (incremental accounting):

$$\text{CCR1} = \frac{\text{Revenues} - (480)\text{ Credit entry from Reserve}}{\text{Spending} - (380)\text{ Debit entry to Reserve}} \quad (1)$$

(ii) Accounting controls, on both spending and revenues sides, are made in order to check the right implementation of the user-pays (polluter-pays) principle. Effective controls are summarized in Table 1. If entries ***a***, ***b*** and ***c*** are not accounted for, then the commune under-estimates the true spending: the cost coverage ratio is too high. And the contrary for entry ***e***. With ***d***, there were situations where interest of amortisation entries were written in the book but no asset value appears in the balance sheet. But according to the Federal Court, no asset means that the capital investment is totally amortized. Revenues in excess must aliment the earmarked functional reserve and cannot be brushed out non justified accounting tricks.

Table 1 Accounting controls criteria

Spending	***a***	Recording of workforce spending (wages and social insurance contributions)
	b	Recording of interests for public work assets in the balance sheet
	c	Recording of amortization for public work assets in the balance sheet
	d	Recording of a value in the balance sheet in any interests or amortization
Revenues	***e***	Recording of the interests for earmarked reserve in the balance sheet

With these corrections, the second CCR is:

$$\text{CCR2} = \frac{\text{Revenues} - \text{Credit entry from Reserve} + e}{\text{Spending} - \text{Debit entry to Reserve} + (a + b + c)} \quad (2)$$

In detail, the gross data have been corrected for equation (1) for all communes; and for equation (2) in the following way: if missing, (**b**) negative interest (4%) on asset value, (**c**) amortization on asset value (3.33% for for Clean Water Supply, 4.27% for Waste water and 6.5% for Solid Waste) and (**e**) positive interest on earmarked reserve (1%). No correction has been introduced for ***a*** since we do not have information on how much labour force are necessary for the management of a specific function in a particular commune.

Table 2 recapitulates the percentage of "virtuous" communes. In general, expenditures are correctly entered for water supply: this is probably due to the fact that this function has already a long tradition of meter-pricing both in rural and urban communes. Wages and labour-related expenditure are not

[6] To give an idea of the work the analysis represents: it corresponds to scrutinizing 390 functional main head (26 communes x 5 years x 3 heads for clean water distribution, wastewater and solid waste) with around 20 entries per head/per year, that is around 8000 entries in the book in total.

exhaustively accounted for in functions [Sewage and Waste Water] and [Solid Waste]. For sewage and wastewater treatment, it can be partly explained in view of the local management of the function: in many small municipalities, the surveillance of the sewages system is part of road maintenance duties. Table 2 also shows a general neglect in attributing interests of the reserve to the relevant functions.

Table 2 Percentage of virtuous communes

Function = main head	Control criteria		Average 2005-2009	2005	2006	2007	2008	2009
clean Water Supply	a	wage	90%	88%	88%	92%	88%	92%
	b	interests	88%	92%	85%	88%	88%	85%
	c	amortization	83%	77%	77%	88%	85%	88%
	e	interests of reserve	29%	19%	23%	31%	38%	35%
Sewage and Wastewater	a	wage	63%	62%	65%	65%	62%	62%
	b	interests	83%	85%	81%	85%	85%	81%
	c	amortization	78%	85%	69%	73%	81%	81%
	e	interests of reserve	45%	38%	42%	46%	50%	50%
solid waste	a	wage	79%	73%	77%	77%	85%	85%
	b	interests	86%	88%	88%	85%	85%	85%
	c	amortization	87%	92%	88%	88%	81%	85%
	e	interests of reserve	66%	62%	65%	62%	69%	73%

The general results for the corrected data are illustrated in Figure 4 for the three functions. The gross data in dotted lines correspond to the results given in Figure 3 for the referred years 2005-2009, the corrected data to CCR2. The performance evaluation must distinguished function Clean Water Supply from the two others.

[71] Clean Water Supply

On the five-year period, the corrected data give a much higher performance than the statistical gross values. The reason appears clearly in the detail analysis of the LGs' accounts. Amortisation and interest in the expenditure ledge of the current account are maintained for substantial amounts although the asset values written in the balance sheet are low or inexistent – the historical value of the asset has been totally amortized. This is explained by the fact that the water distribution networks in the communes were established already in the 1960s. The observed CCR2 higher than 1 corresponds to a sustainable investment policy for replacement and development. In the controlled sample, the excess of revenue is correctly earmarked in a specific reserve for future investment.

[72] Sewage and wastewater treatment

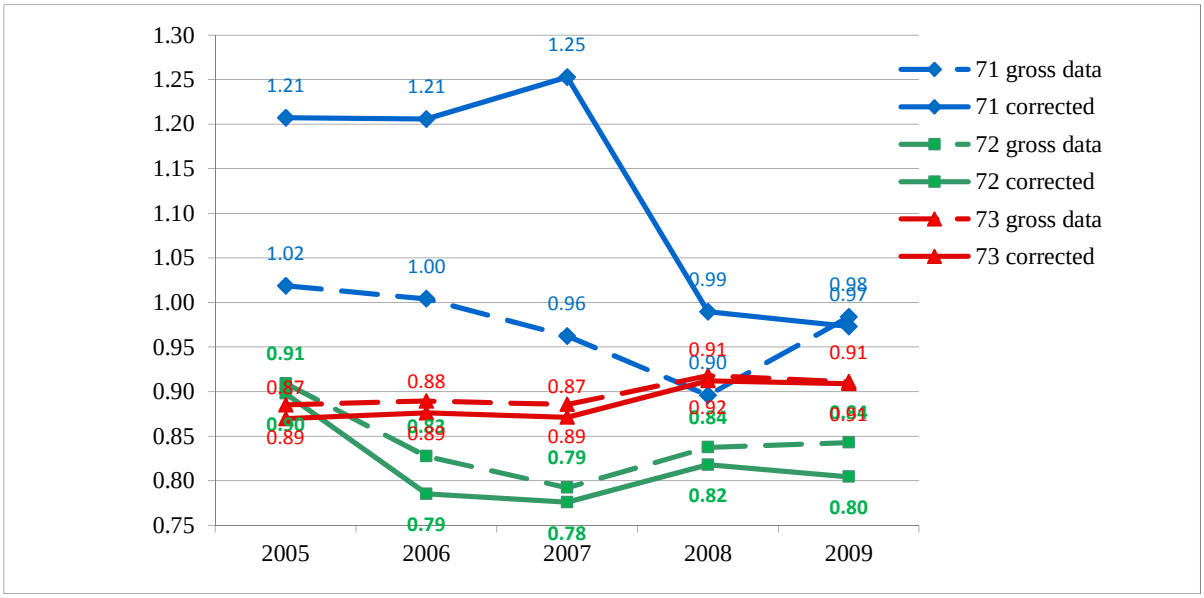
The gross data already indicate that the cost coverage ratios, between 91 and 84 %, are not sufficient. The corrected data worsen the results to ratios between 90 and 80%. The price signal is not adequate and the user-pays principle is not respected. This is a rather poor performance.

Amortisations were insufficient and were corrected in 45 annual situations out of 130. In addition,

amortisations were exclusively calculated on the historical past value of investment assets. In the sample, no commune respects the federal 1997 requirement that in addition, the communes have to take into consideration the pre-financing of the replacement of the existing equipment (financed through an additional "replacement charge" assessed on present beneficiaries of the service).

[73] Solid waste collection and treatment

For this function, the gross data cost coverage ratio run between 89% and 91%; the corrected data between 87% and 91%. The difference between the two series is not important. The most probable reason is the absence of important investment for this service: in almost all communes (all in the sample), solid waste collection is outsourced to private specialized firms; solid waste treatment is organised at the cantonal level in Public Private Partnership. The tariff, in CHF per ton, varies according to the nature of the solid wastes; prices are reduced for shareholder communes.



Source: authors' calculation on corrected data

Figure 4 CCR and CCR2 for [71] [72] [73] 2005-2009, communes of the Lake District

6 Conclusions

The conclusions of this paper take two roads: one relates to the method, the other to the performance measurement; we add some further points concerning the case study which serves as a laboratory. Although the experiment refers to communes in the Swiss canton of Fribourg, the method explained and the technical details for the measure of performance can be extended to most local government in Europe, that is the geographical territory that the European Directives 2000/60 and 2008/98 cover. The reason is that the regulatory framework that has to be respected results in very similar implementation laws in the specific countries within the European area; also the concepts behind the user-pays and polluter-pays are now widely accepted, if not yet implemented.

First, the method:

- ✓ The implementation of the benefit principle for managing environmental policies at the local level is possible and will enhance allocative efficiency in giving the right price signal.
- ✓ In practice, the benefit principle has to be transformed into the user-pays and polluter-pays

principle. This transformation requires very precise and detailed legal specifications. The aim is to avoid asymmetric information, moral hazard and strategic behaviour both from the jurisdictions which will have to apply the principles for financing the services and from the beneficiaries of the services.

- ✓ For the user charges to give the right price-signal, it is necessary to clarify the production function of the service and distinguish intermediary services from final consumption.
- ✓ The quid pro quo relation between costs and financing must be explicit and clear. This requires an adequate accounting system. The HPAS in use is sufficient, but it must be adequately applied.

Second: performance measurement

- ✓ The performance analysis we propose is founded on a simple measurement: the cost coverage ratio. The hypothesis is that the user charge gives the right price-signal if CCR=1 or 100%. The lower the ratio below 1, the poorer the policy management and the worse the allocative efficiency. A ratio higher than 1 corresponds to a disguised tax unless the excess of revenue is earmarked for the specific function financed through user charges. A compensation fund should receive excess revenues and would allow to smooth the user charges through time in future situations when CCR<1.
- ✓ Verifying the CCR requires a good technical understanding of the production function of the service, coupled with an inclusive knowledge of the accounting system. One cannot simply consider gross statistical data without in-depth investigation of its accounting counterpart.
- ✓ The CCR is a good performance indicator for allocative efficiency because CCR=1 gives the right price-signal, but one cannot automatically conclude that productive efficiency is at the optimal (for example because economies of scale in production would still be possible).

We add some suggestions for the specific situation of the communes in the canton Fribourg, which served as laboratory.

- ✓ First, it appears essential that the supervising authority (the canton, the Service des communes) issues clear accounting guidelines for the communes in order to obtain the true costs of the functions. In practice, the need to go from ratio CCR1 to ratio CCR2 could be substantially reduced if the arguments in Table 4 were correctly accounted. With exact accounting, CCR1=CCR2, a result which would largely simplify the application of the proposed method.
- ✓ The result in [71] water supply shows an over-pricing of the current delivery of drinking water. Despite the fact that the excess of revenue flows into an earmarked reserve, it would be more efficient to have a tariff with the user charge per cubic meter and a distinct replacement charge since the tax bases are not identical: effective consumption for the price of water; potential service (insurance and potential use) for infrastructure replacement and development.
- ✓ For [72] wastewater, there are two problems. (i) In many communes the actual tariff does not cover the costs. An increase is necessary to obtain the right price signal. (ii) User charges, already insufficient for the present current budget, do not include replacement charges, a legal obligation.
- ✓ LGs' tariff in [73] solid waste is insufficient to cover cost in a majority of communes. It has to be adapted to give the right price-signal.

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