

Bureaucracy and the flypaper effect: Evidence from intercommunal fiscal equalisation in the canton of Vaud*

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Unlike classical theoretical expectations, our empirical study shows that financial transfers to decentralised governments increase local public expenditures much more than would be triggered by an equivalent rise in local income. This empirical evidence of the presence of a flypaper effect is achieved using panel data from 375 municipalities located in the Swiss canton of Vaud covering the period 1994 to 2005. During that time there was a major change in the financial equalisation scheme. Furthermore, our study confirms the analysis of the public choice theory: the effect depends partly on the degree of complexity of the municipal bureaucracy. These results show that local bureaucratic behaviour may impede the effectiveness of a financial equalisation scheme that aims to reduce disparities in local tax.

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A diferencia de las clásicas expectativas teóricas, nuestro estudio empírico muestra que las transferencias financieras a los gobiernos descentralizados incrementan los gastos públicos locales mucho más de lo que podría hacerlo un aumento equivalente de la renta local. A la evidencia empírica de la presencia de un efecto flypaper llegamos

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utilizando datos de panel de 375 municipios localizados en el cantón suizo de Vaud, para el período 1994 - 2005. Durante ese tiempo hubo un cambio importante en el esquema de perecuación financiera. Además, se confirma el análisis de la teoría de la public choice: el efecto depende en parte del grado de complejidad de la burocracia municipal. Estos resultados muestran que el comportamiento burocrático local puede impedir la efectividad de un esquema de perecuación financiera que tiene por objetivo reducir las disparidades en la imposición local.

INTRODUCTION

Equity considerations call for grants in favour of poorer jurisdictions (i.e. with a weaker fiscal capacity) in order to avoid the situation that two identical taxpayers living in two different jurisdictions could end up paying a very different tax bill for the same amount of public services. According to the classical theory of fiscal federalism, lump-sum general grants¹ (i.e. grants determined exogenously and freely usable by the beneficiary jurisdiction) are preferable to any other form of grant when the aim is to reduce such inequalities. This normative affirmation is based on the expectation that lump-sum general grants produce the same effects as an equivalent increase of taxpayer income (Bradford and Oates 1971).

In contrast, matching and specific grants (i.e. grants determined on grantee expenditures and on which the grantor imposes some conditions of use) are considered an inadequate instrument of fiscal equalisation. In fact, these grants are not transparent because they also pursue allocative goals. In addition, the size of the grant being a function of the expenditure related to the provision of a specific public service, such grants affect the relative price of public services in the grantee communities. In this way, they induce the grantee communities to increase their spending rather than lower their tax rates as generally aimed (Dafflon 1995: 23).

Until recently, the instruments adopted by the Confederation and the 26 cantons to mitigate fiscal inequalities, both between cantons or between municipalities, clearly belonged to the latter kind of grants. Thus, before the adoption of the new fiscal equalisation and division of tasks between the Confederation and the cantons (RPT) in 2008, the equalisation of cantonal fiscal capacity was done in an unsatisfactory way through the

¹ For a larger description and discussion of each kind of existing grant see King (1984: 86ff.).

addition of an equalisation component to several federal matching and specific grants. These components took the form of a higher rate of subsidising when such grants were aimed at a canton identified as fiscally weak (see Dafflon 2004). The same instruments were used by most cantons to reduce inequalities in municipal tax rates (Soguel 2004).

The main argument mobilised in favour of the 2008 reform focused on the efficiency gains arising from suppressing any cantonal incitation to excessively increase their expenditures. This suppression was possible by moving toward a fiscal equalisation based on general grants (Mottu 1997, FC 2001: 2227). In the cantons, the same considerations progressively led their fiscal equalisation to rely more and more on general grants rather than on matching and specific grants (Mischler and Dafflon 2003). Indeed, despite the many reforms already undertaken in this policy area between 1990 and 1999 (Widmer and Rieder 2003: 204), in 2001 an overwhelming majority of the cantonal chancellery (21) attributed great importance to the reform of its cantonal fiscal equalisation².

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However, several empirical studies question the theoretical expectations of the effects of lump-sum general grants (Hines and Thaler 1995). According to these studies, these grants stimulate the expenditures of the granted jurisdiction more than expected and therefore lead only to a slight reduction of the tax burden. This phenomenon is called the “flypaper effect” following the assertion of Arthur Okun that “*it appears that the grantor’s money tends to stick in whichever sector (public or private) it arrives*” (quoted in King 1984: 102).

The limits of a purely economic approach to the analysis of fiscal equalisation have been already reported in the recent literature on fiscal federalism. Among these limitations, it is now largely recognised that it is not possible to formulate theoretical expectations about the impact of political reforms while ignoring the political context in which these reforms unfold. In particular, Oates (2005) underlines the necessity of looking at how political actors may divert the objectives of a reform in order to better pursue their personal interests at the expense of voters and taxpayers. Similar to the concerns of the public choice school, this observation led to the development of various explanations of the flypaper effect (see Bailey and Connolly 1998).

² Source: IDHEAP/BADAC, Database of the cantons. Importance of reform projects. Vertical fiscal equalisation (canton-municipalities). 2001 (C4.22c). Page viewed the 10.09.2013, 14h.

The aim of this paper is to illustrate and empirically test the foundations of the alleged relationship between bureaucratic complexity and the size of the flypaper effect at the local level. The hypothesis of such a relationship is based on the improvement of the model proposed by King (1984) using the insights of Breton and Wintrobe (1975) regarding the popular model of bureaucratic behaviour by Niskanen (1968, 1975). Our argument is that the higher the bureaucratic complexity of a municipality, the higher the cost to supervise its activity in terms of other actors (politicians and/or voters), and then the higher the autonomy of the local bureaucrats in the definition of the public spending. Since local bureaucrats have preferences for a higher expenditure level than the other actors, this should lead to a larger flypaper effect in the granted municipalities with a higher bureaucratic complexity.

Section One presents the classical model of fiscal federalism, King's model and our alternative model of partial bureaucratic power. Section Two presents our empirical field: a rich dataset covering 224 municipalities of the canton of Vaud between 1994 and 2005 (12 years). These data are particularly interesting because since the reform of cantonal fiscal equalisation was implemented in 2001, these municipalities received equalisation grants having the same characteristics of lump-sum general grants. Section Three focuses on the empirical approach, presentation and discussion of results. A regression analysis is conducted to test whether these equalisation grants lead to a flypaper effect in the recipient municipalities. In addition, we also check whether this effect is homogeneous for every municipality or varies according to the local bureaucratic complexity. Finally, in our conclusion we summarise our results and present some suggestions.

THEORETICAL FRAMEWORK

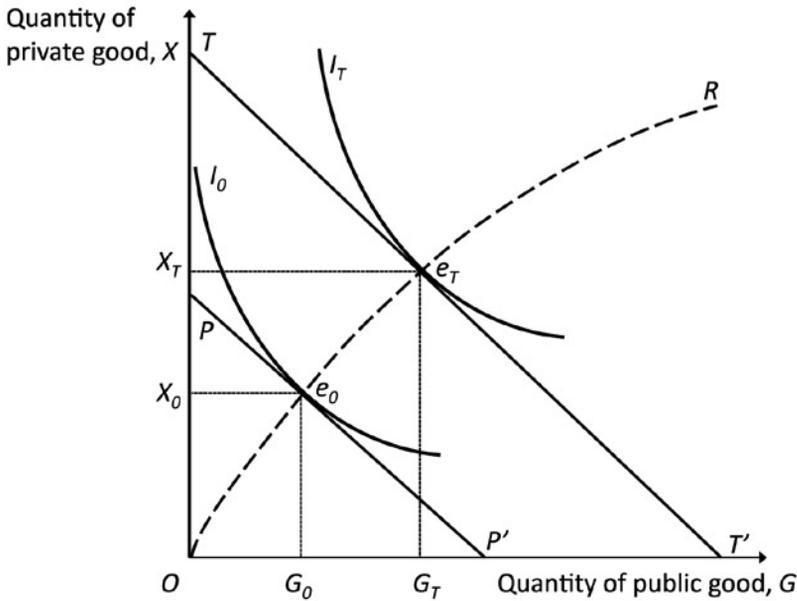
1. CLASSICAL THEORY ON INTERGOVERNMENTAL GRANTS

The traditional theory on the impact of lump-sum general grants on public budgets relies on a median voter demand model as shown in Figure 1³. In this model, the grantee community is seen as an individual decision-maker having the same preferences as the local median voter. Based on that, the model predicts that an increase in disposable income should have a similar influence on public expenditures as the receipt of a gen-

³ See King (1985: 88-90) for a larger overview and discussion on the postulates of the classical model.

eral grant of the same amount (Bradford and Oates 1971, Shah 2007). The model demonstrates this by assigning an income expansion path R to the community. This path illustrates how community demand for private and public goods varies with the rise in disposable income. The point e_0 represents the ideal consumption of these two goods under the budget constraint PP' according to the preferences between public and private goods consumption of the community as mapped by the indifference curve I_0 . Private goods can be interpreted as the amount left to free disposal of the citizen-taxpayers. Public goods correspond to the expenditures financed by local taxes. In this initial situation, the local community receives no grant.

Figure 1: Impact of a general grant according to the classical median voter model



Consider now the impact of a lump-sum general grant on the general equilibrium. Schematically, the amount received by the grantee community, measured in terms of potential additional consumption of public goods, is equal to the distance $P'T'$. Measured in terms of potential additional consumption of private goods, it is the distance PT . As a result of the grant, the budget constraint therefore moves parallel from PP' to TT' .

Let us recall that a general grant (as opposed to a specific one) could be allocated in any proportion between public and private goods. Also note that the model is entirely based on the grantee community. Thus, the theoretical expectations are the same independently of the horizontal (between communities of the same institutional level) or vertical (between communities of different institutional levels) nature of the grant⁴.

Given the indifference map, the new optimum is established at the point of tangency e_T between the indifference curb I_T and the new budget constraint TT' . The amount of private goods consumed increases from X_0 to X_T , the public goods from G_0 to G_T . Observe that these movements would have been exactly the same if the community would have seen its disposable income increase by the same amount of the grant (for example as a result of economic growth). In fact, in such a case, we will also see a translation of the budget constraint equal to PT (or $P'T'$). To sum up, the classical theory justifies the expectation that a general grant increases public spending by the income elasticity of median voter demand (Culis and Jones 2009: 388).

2. DISHARMONY OF INTERESTS AND THE FLYPAPER EFFECT

Contrary to expectations based on the classical model, several empirical studies have concluded that general grants *led to an excessive rise in public spending in the recipient community, and to too little tax relief, and were not spent in the same way as any other increase in the community income* (Brennan and Pincus 1996: 230). This phenomenon, the flypaper effect, has been mainly studied in the United States⁵. The salient finding is that the impact on public spending (i.e. on the consumption of public goods) of general grants is 5 to 10 times higher than that arising from an increase in disposable income. Similar results were obtained concerning other federal states such as Australia (Dollery and Worthington 1995), Belgium (Heyndels and Smolders 1994) or Canada (Winer 1983, Hammes and Willis 1987). However, European studies show little interest in this phenomenon.

The clash of interests between the median voter and other actors active in the decision-making processes has immediately been raised as an expla-

⁴ However, in the case of a horizontal grant, the possibility that some collectivities could move from the grantee to the grantor condition has to be taken in account. We will discuss this in the next section.

⁵ For an overview see Bailey and Connolly (1998), Hines and Thaler (1995) and Gramlich (1977).

nation for the flypaper effect (Wilde 1968, Gramlich 1977). The main model taking this conflict into account is the application by King (1984) of the model of bureaucratic behaviour formerly popularised by Niskanen (1968). The idea behind this model is to temper the classical model with a public choice perspective. According to Niskanen (1975), the public budget is the result of a negotiation between the representatives of the median voter (the sponsor) and the members of the bureaucracy (the bureau). The sponsor and the bureau have conflicting interests: the first seeks to ensure his reelection by maximising the welfare of the median voter⁶, the second tries to maximise the public budget because his pay, power and prestige increase with it (Culis and Jones, 2009: 389). In other words, the sponsor desires a production of public goods as close as possible to the one demanded by the median voter (exactly what is predicted by the classical model) and the bureau to a far higher one.

The relationship between the sponsor and the bureau could be modelled as a bilateral monopoly. The bargaining refers to the amount of public goods to be produced by the bureau and the allocated budget to this production. However, the two actors do not possess the same bargaining power: two factors clearly strengthen the power of the bureau at the expense of the sponsor. First, the bureau is the only entity that is aware of the public goods production function and could then conceal this information from the sponsor and thereby create a clear asymmetry of information. Second, the bureau has an agenda-setting power through which it could limit the possibilities for the sponsor to amend budget proposals.⁷

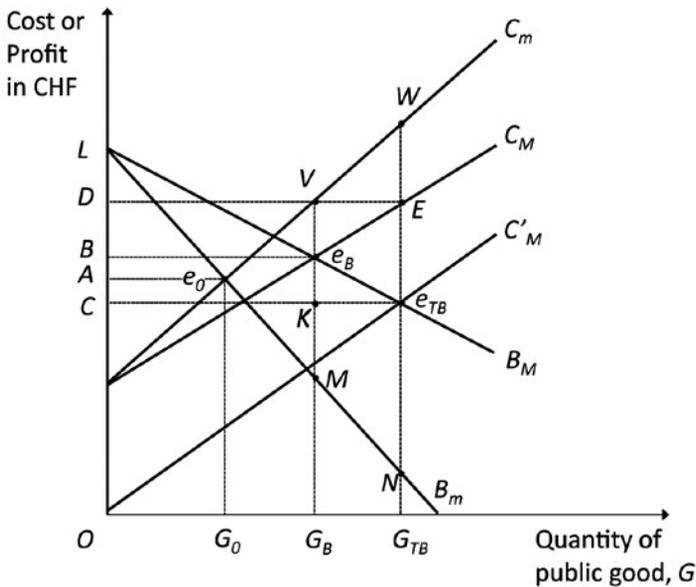
A lot of scholars consider these two factors (asymmetry of information and agenda-setting power) strong enough to allow the bureau to impose public goods production identical to the one which could be imposed by a private monopolist (Wyckoff 1991: 331). Because of this, the bureau can

⁶ The fidelity of politicians to median voter demands could also be questioned. McGuire (1975) observes that the flypaper effect could be explained by the action of spending-maximising politicians. However, this kind of additional explanation does not call into question the contribution of the bureaucratic behaviour model: Bailey and Connolly (1998: 346) note that both politician and bureaucrat behaviour could contribute to explain the flypaper effect. In order to clarify our approach, in this paper we focus only on the bureaucratic behaviour.

⁷ See Romer and Rosenthal (1979) for a more general model relying on the idea of agenda-setting power.

choose any level of production provided that it does not exceed available revenues. In addition, it must make sure that the sponsor does not come to the conclusion that the suppression of the bureau offers more benefits than keeping it active. The maximal budget under these two conditions is realised when the bureau chooses a public goods production level that equalises total benefits (B_T) with total costs (C_T) as Figure 2 illustrates. The horizontal axis measures the quantity G of public goods produced by the bureau. The B_M curve reflects the average benefit provided to citizens ($B_M=B_T/G$). The C_M curve reflects the average cost of production before the grant ($C_T=C_M/G$). The resulting equilibrium point e_B allows the bureau to produce the quantity of public goods G_B with a budget that leaves the sponsor indifferent or marginally in favour of maintaining the bureau. However, the sponsor loses a part of net surplus compared to the social optimum where the marginal cost C_m equalises the marginal benefit B_m (equilibrium point e_0 with a quantity G_0 lower than G_B).⁸ It should be noted that G_0 is the quantity of public goods produced according to the classical model.

Figure 2: Bureaucratic behaviour and effect of general grants



⁸ The loss of surplus for the sponsor when moving from e_0 to e_B (and from G_0 to G_B) is equal to e_0VM .

Figure 2 also illustrates the effect of bureaucratic behaviour after a general grant is received. Following King, because of the monopoly status of the bureaucracy, the received grant should be entirely captured by the public budget, or even cause an additional increase in expenditures. Indeed, a general grant reduces the average cost to be financed by the sponsor as showed by the curve C'_M .⁹ According to this information, the sponsor is willing to accept an increase in production from G_B to G_{TB} with a new equilibrium point e_{TB} . In this case, the reduction of the average cost is entirely funded by the grant $e_{TB}CDE$ that becomes part of the budget available to the office. This budget passes from $e_B G_B OB$ to $ODEG_{TB}$. What remains is to find a additional funding equivalent to $e_{TB}G_{TB}G_BK - e_BKCB$ (e.g.: through a tax increase). In other words, the grant leads to an increase in expenditures greater than the amount received. The total profit goes from $OLMG_B$ to $OLNG_{TB}$, with an increase of G_BMNG_{TB} lower than the cost increase G_BVWG_{TB} .

3. COST TO CONTROL THE BUREAU AND THE FLYPAPER EFFECT

According to Miller and Moe (1983), the monopoly power of the bureau described by Niskanen results solely from the inability of the sponsor to adopt the appropriate tools to better monitor the activity of the first. The magnitude of the flypaper effect generated by the bureaucratic behaviour is then seen as a function of the way *the legislature organises itself for decision making* (p. 320). Similarly, Conybeare (1984) observes that *restoring a reasonable degree of bilateral monopoly to the problem produces results more consistent with the empirical evidence* (p. 498). For these authors, the flypaper effect caused by the bureaucratic behaviour could vary between communities depending on the power relationship between bureau and sponsor.

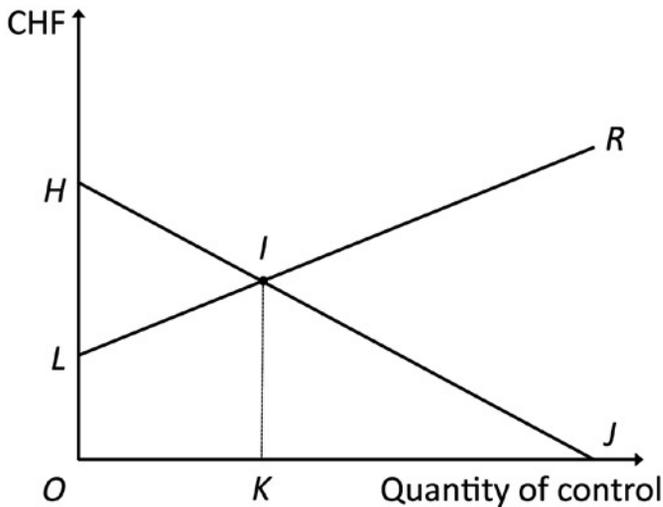
We take this in consideration by applying to the previous model some changes based on these originally proposed by Breton and Wintrobe (1975) in regards to Niskanen's model. The difference between the optimal budget for the sponsor and the one obtained by the bureau can be reduced through various instruments *servng to control costs and as a deterrent against distortion of information* (Breton and Wintrobe 1975: 199). Figure 3 models the search for an optimal volume of control for the sponsor.¹⁰

⁹ In the case of a lump-sum general grant, the mean transfer per unit of public goods decreases with the increase of G . Thus, the vertical distance between the curb CM and the curb C'_M also decreases with the increase of G .

¹⁰ The notion of control should be understood in a broad sense including the seeking for better information and/or a better decision-making framework.

The LR curve represents the marginal cost of using additional (or more sophisticated) control instruments. The higher the volume of control, the easier it will be for the sponsor to force the bureau to adopt a budget closer to the one desired by the median voter (i.e. the one predicted by the classical model). The maximum benefit arising from the use of these tools is then equal to the budget requests of the office beyond the optimal budget for the sponsor. This benefit is illustrated by the curve of marginal benefit HJ . At the point J , the marginal benefit is zero because the control is so strict (albeit very expensive at the margin) that it prevents any difference between the two desired budgets. The optimal volume of control K is the one for which the marginal benefit equals the marginal control cost. The sponsor reduces by the amount $OHIK$ the excessive spending arising from the bureaucratic behaviour at the cost $OLIK$. The total budget (including control costs) is then lowered by the amount LHI and is in such a way closer to the one preferred by the median voter.

Figure 3: Optimal volume of control for the sponsor



The size of the LHI area depends on the marginal cost of the control. On the one hand, the marginal cost could vary according to the cost of the disposable control technology (Breton and Wintrobe 1975: 202). On the other hand, the complexity of the bureaucracy could increase the control costs (Tullock 1975). In this paper we focus on this second factor,

because it is the one for which differences between communities generally occurs. A larger bureaucratic complexity leads to a displacement of the LR curves upward and then moves K to the left. This movement mechanically decreases the area LHI and then increases the difference between the adopted budget and the one desired by the median voter and then by the sponsor.

The increase in cost is not necessarily linear. Indeed, a large bureaucracy comes with more complexity due to the specialisation of the public servants, the ramification of the flowcharts and the diffusion and/or juxtaposition of tasks and responsibilities. Bureaucratic activity then becomes more difficult to grasp for the bodies in charge of its monitoring. In terms of the flypaper effect, this kind of relationship between bureaucratic complexity and the control cost becomes a larger phenomenon in communities with a complex bureaucracy than in communities with a simpler bureaucracy.

EMPIRICAL FIELD: THE NEW FISCAL EQUALISATION IN THE CANTON OF VAUD

This section explains how the previous theoretical framework applies to our empirical field: the case of the intermunicipal fiscal equalisation 2001-2005 in the canton of Vaud. Until the end of the year 2000, the canton of Vaud applied an indirect form of fiscal equalisation in order to reduce the fiscal inequalities between its municipalities¹¹. These transfers, called equalisation supplements (“suppléments péréquatifs”), were closely linked with a number of vertical specific matching grants¹². The 375 municipalities were classified according to their fiscal capacity into 13 groups having the right to a different rate of subsidising: the lower the fiscal capacity of a municipality the higher was the subsidising rate used to determine the grants in its favour. This system was a source of inefficiencies and failed to reduce the fiscal gap between richer and poorer municipalities.

In 2001, a horizontal fiscal equalisation was introduced as part of a larger reform project (EtaCom) which aimed to disentangle the relations between the canton and the municipalities and so the equalisation supplements were progressively suppressed. The goal of the new fiscal equal-

¹¹ See Soguel and Tangerini (2002) for a larger description and criticism of the equalisation supplements system.

¹² In the last year of application, the grants involved were those for school building, repair of roads and sidewalks, water treatment, waste management and forestry projects.

isation was to reduce the gap between the higher and the lower local tax rates. This had to be achieved with an equalisation fund fully financed by the municipalities according to their tax capacity only and redistributed between them according to a complex formula based not only on their tax capacity (with a weight of 50%), but also their needs (33.3%) and their tax effort (16.7%). Table 1 illustrates the number of net recipients and net payers, and the mean and median per capita transfer in CHF (either gain or loss) for the years 2001-2002, 2003-2004 and 2005. A higher number of grantee municipalities compared to grantor ones was observed and the net gains are spread in a more normal way than the net losses.

Table 1: Descriptive data on the transfers generated by the fiscal equalisation

	2001-2002	2003-2004	2005
Grantees (N)	261	245	233
Mean gain (CHF)	154	128	127
Median gain (CHF)	163	131	123
Grantors (N)	109	125	142
Mean loss (CHF)	294	337	331
Median loss (CHF)	195	195	194

Source: Statistical service of the canton of Vaud (STATVD)

The literature indicates the mis-specification of grant type as a common mistake in many empirical contributions (Bailey and Connolly 1998: 339-340). It is then worthwhile to analyse in which way such transfers could be assimilated to lump-sum general grants as required by the theoretical models previously illustrated. These transfers could be assimilated without much discussion to general grants because they are freely usable by the municipalities in order to increase expenditures, decrease tax burdens or a mix of both. King (1984: 87-88) identifies two kind of general grants: lump-sum general grants and effort-related general grants. In the first case, the amount of the grant is fixed. In the second case, the amount of the grant depends on the actions of the grantee. Inevitably, the second kind of grant could generate a price-effect similar to a matching grant.

In order to apply our theoretical model, we have to demonstrate that the municipalities have no control on the formula used to determine the

transfers. In our situation, this seems to be the largely the case. On the one hand, since tax capacity depends on the tax revenues per capita raised by the canton in each municipality, it escapes municipal control. On the other hand, despite the apparent complexity of the “needs” factors, the only indicator used in this case is the size of the local population. This is clearly an indicator which is impossible for any municipality to manipulate.

Some doubts may be raised regarding the tax effort part of the formula. In fact, this factor depends on the tax rate applied by each municipality: the higher the tax rate, the higher the gains from the fiscal equalisation. Therefore, a municipality could potentially increase (or refuse to decrease) its tax rate in order to get more from (or pay less to) the equalisation fund. This incentive is weak because the fiscal effort takes the smaller weighting of all the other components of the formula (16.7%) and then weakly influences the amount of the grants. It should also be noted that the tax capacity does not only influence the distribution formula, but it is also the only factor that determines the financing of the equalisation fund. Then, its contribution to the determination of the equalisation grants is much higher than 50%. Thus, we can by and large consider the transfers of Vaud’s fiscal equalisation as lump-sum general grants. However, because of the tax effort part of the formula, we will be very careful with interpretation in the event of a weak flypaper effect.

All empirical contributions on the flypaper effect, with only some minor exceptions, cover the case of a vertical transfer from the federal state toward states or from a state toward its municipalities. In our case, the transfers are purely horizontal: what the net beneficiary municipalities get is directly paid by the other municipalities. In order to maintain a high degree of similarity with existing empirical works, our analysis will cover only the 224 municipalities that were net beneficiaries of fiscal equalisation on every year between 2001 and 2005. It could have been possible to also analyse the other cases. In fact, the literature offers some examples of analysis on the impact of disappearing grants on public budgets (Gamkhar and Oates 1996, Stine 1994). This situation is similar to the one faced by grantor municipalities. However, there exists a strong collinearity between the net losses and the income of the municipalities and this raises overwhelming econometrical problems, something which is not the case when only municipalities experiencing net gains are retained in the sample.

METHODOLOGICAL SECTION

1. MODEL SPECIFICATION

The methodology used to test the existence of the flypaper effect and its explanatory factors consisted of two distinct phases (Dollery and Worthington 1996: 262). To begin, the expenditures of the municipalities were regressed against the community median income, the amount of lump-sum global grants received and contextual variables acting as control variables. In our case, given the panel form of the data, the model to estimate takes the form of equation 1:

$$EXP_{it} = TOWN_i + a_1 INC_{it} + a_2 PH_{it} + a_3 YEAR_{it} + \sum_{m=4}^n a_m X_{mit} + \mu_{it} \quad [1]$$

EXP_{it} are the public expenditures of each municipality i for every year t , $TOWN_i$ are the fixed effects for each municipality, INC_{it} is median income of the taxpayers in each municipality, PH_{it} is the net amount received by each municipality because of the fiscal equalisation, X a vector of n other explanatory variables and a the coefficients to estimate. In addition, a trend variable $YEAR$ (having a value between 1 and 12 for each of the twelve years analysed) was introduced because the local public expenditures historically display an upward trend. This way, we avoided falsely attributing this historical evolution to the equalisation grants (Brooks and Philips 2008: 254). Finally, the equation is estimated using standard-errors clustered at the municipality level as suggested by Moulton (1990).

The comparison between the estimated coefficients a_1 and a_2 enables us to see whether the fiscal equalisation in the canton of Vaud generates a flypaper effect or not. A non-significant difference between the two means that the classical model alone is enough to predict the impact of the fiscal equalisation: identical amounts of equalisation and income increase leads to the same increase of the public expenditures. In contrast, a significant difference with $a_2 > a_1$ indicates the existence of a flypaper effect equal to the difference between the two coefficients. The eventual case with $a_1 > a_2$ is not covered by our theoretical framework.

If a flypaper effect is identified, the initial model is usually extended to test the link between the magnitude of this phenomenon and several factors which, according to theory, should influence it. The empirical literature on the link between bureaucracy and flypaper effect is limited. To our knowledge, only two testing strategies exist. Strumpf (1998) uses a variable obtained by interaction between a variable equivalent to our

variable PH and an indicator of citizen attention on political and administrative activity. Bae and Feiock (2004) adopt a less demanding strategy. First, they split their municipality sample into two categories according to form of government. Then, they form a binary variable reflecting the membership of each municipality to the first category and create a test variable from the interaction of this dummy and a variable similar to PH.

Our theoretical model predicts a positive relationship between the bureaucratic complexity and the magnitude of the flypaper effect. However, they provide no information about the functional form of this relationship. This is the reason why we use a strategy similar to that of Bae and Feiock. As a first step, we split our sample into three municipality groups according to the complexity of their administration (high, moderate, low). These groups are distinguished using the categorical variable B, with $B^+=1$ when the municipality has a very complex bureaucracy (0 otherwise), $B^-=1$ when the bureaucracy has a low complexity, $B^+=0$ and $B^-=0$ when the bureaucratic complexity is at an intermediary level. We illustrate the criteria used to operationalize this variable in the next section. In a second step, we interact the variable B with our variable PH (equation 2).

$$EXP_{it} = TOWN_i + a_1 INC_{it} + a_2 PH_{it} + a_3 YEAR_{it} + a_4 PH_{it} B^+ + a_5 PH_{it} B^- + \sum_{m=6}^n a_m X_{mit} + \mu_{it} \quad [2]$$

This equation enables us to test whether the municipalities in the two extreme categories (+, -) have a flypaper effect that is significantly different from the one observed for the municipalities with an intermediary bureaucratic complexity. This will be the case if the coefficients a_4 and a_5 differ significantly from zero. In addition, our theoretical expectations are to observe a positive sign for a_4 and a negative one for a_5 .

2. OPERATIONALISATION OF THE MAIN VARIABLES

The empirical literature on the flypaper effect usually uses one of two types of indicators as dependent variable: total or per capita current expenditures (Dollery and Worthington 1996) and expenditures by function with a focus on educational spending (Feldstein 1975, Bowman 1974).¹³ In order to control for the huge population differences between

¹³ More rarely, scholars may use the discretionary revenues of the local communities (Ladd 1993).

Vaud municipalities, we use the current expenditures per capita.¹⁴ An analysis based on expenditures by function is not possible for two reasons. On the one hand, the categorisation of expenditures made by local administrations is unreliable. On the other hand, many small municipalities don't assign public servants to specific functions.

Note that we subtract from the current expenditures two cash drains imposed on the municipalities by the cantonal authority: the so-called social bill (*facture sociale*) and the contributions to the equalisation fund. The first deduction neutralises the effects of the fluctuating municipal participation in financing cantonal social security. The annual size of this compulsory expenditure varies according to the evolution of cantonal social expenditures and the share of it at the charge of the municipalities. Since the social bill and its local share constantly increased between 2001 and 2005¹⁵, it is vital to neutralise its impact on the local budget to avoid ascribing it to the equalisation grants.

The second deduction is necessary because, for a municipality who is a net recipient of the fiscal equalisation, the contribution to the equalisation fund is just a short-lived expenditure. In fact, this expenditure is largely compensated by a larger fiscal equalisation grant. For the same reason, we use the net per capita gain of each municipality from the fiscal equalisation scheme as indicator of the PH variable. This amount is "net" because it is the difference between the amount received from and the amount paid to the equalisation fund.

To estimate the impact of an increase in median income on local budgets and to compare it with the impact of the equalisation grants, we need an indicator reflecting the median income in each municipality. Unfortunately, this indicator for all Vaud municipalities exists only starting from 2005. As a proxy, we relied on the average cantonal tax paid by

¹⁴ Unless otherwise noted, data comes from the statistical service of the canton of Vaud (STATVD). All monetary figures are expressed in constant francs (2005).

¹⁵ The social bill amounted globally to 414 millions in 2005, 403 millions in 2004, 325 millions in 2003 and 293 millions in 2002. In addition, the local share of the bill was 40% in 2002, 45% in 2003 and 50% from 2004. See <http://www.scris.vd.ch/Default.aspx?docID=6187> for more details. The bill is distributed between the municipalities mainly according to their tax effort. This could lead the municipalities toward a higher than necessary tax rate in order to artificially reduce their share of the bill. However, such phenomenon doesn't affect the size of the flypaper effect because it would affect median voter preferences in the same way as those of the decision-makers.

local taxpayers. The tax paid is then multiplied for the ratio between the cantonal median income and the cantonal mean of the average cantonal tax paid in 2005 in order to obtain the measurement order closest to that of the median income.

Table 2: Summary statistics of the main variables

Name	Indicator	Mean	S.-D.
EXP	Municipal expenditures per capita less the amounts paid to the equalisation fund and for the cantonal social bill (at constant prices - 2005).	2966	783
INC	Local median income (at constant prices - 2005).	35'703	8'895
PH	Net benefit from the intercommunal fiscal equalisation (at constant prices - 2005).	151	68

Note: Mean and Standard-Deviation for the PH are based on 2001-2005 only.

Source: Statistical service of the canton of Vaud (STATVD)

The operationalisation of the categorical variable B is vital to ensure robust results. This exercise is made more difficult by the limited existing literature on the relationship between bureaucratic complexity and size of the flypaper effect. The ideal indicator would clearly be the ratio between the number of public servants and the size of the population. Such an indicator wouldn't simply measure the size of the bureaucracy, but rather its proportionality in regards to municipality needs. Unfortunately, this solution is not open to us because of data availability: there is no existing data on the number of public servants working in the municipalities of the canton of Vaud.

However, the expenditures per capita in wages of the municipalities are a fair good proxy for the number of public servants¹⁶. It is on these expenditures that we base our variable measuring bureaucratic complex-

¹⁶ At first glance, this indicator could be seen as biased. Indeed, the wage costs (class 30 of the Swiss chart of accounts) is a good fit when it comes to reflect the complexity of public sector in large municipalities. In contrast, it captures this factor less correctly for the small ones. Indeed, in the latter category some wage costs are externalised, eg. through outsourcing or through unions or associations of municipalities, and are not

ity. We first divide these expenditures by the resident population and then calculate its logarithm in order to reduce the impact of outliers on the extent of the indicator. B^+ is equal to 1 for those municipalities for which this value exceeds the average by more than one standard-deviation. These municipalities are considered as possessing a (relatively) high bureaucratic complexity. B^- is equal to 1 for those municipalities for which this value is lower than the average by more than one standard-deviation. These municipalities are considered as possessing a (relatively) low bureaucratic complexity. Table 2 presents the results of this categorisation.

Table 3: Categorisation of the municipalities according to their bureaucratic complexity

Year	Categorisation criteria:		Distribution of the municipalities in three categories according to their bureaucratic complexity		
	Logarithm of wage expenditures per capita		...high	...average	...low
2001	Mean	S.-D.	67	88	69
2002	6.282	0.247	62	95	67
2003	6.281	0.251	65	84	75
2004	6.292	0.235	62	92	70
2005	6.270	0.235	63	89	72
	6.234	0.236			

3. OPERATIONALISATION OF THE CONTROL VARIABLES

We use four control variables¹⁷. First, we wanted to control the potential effect of the economies of scale on the expenditures level. Indeed, a large municipality is supposed to spread its fixed costs over a larger population

captured by the group 30 but by the group 31 (supplies and consumables used). However, this bias should be relativised. In fact, it could be expected a far lower cost of control in the smaller municipalities because of the closer relation between citizens and bureaucrats. Therefore, as a proxy of control, our indicator is not undermined (and maybe it is even improved) by the fact that the wage costs underestimate the size of the public sector in small municipalities.

¹⁷ Among these four control variables there is no political variable. This is justified by the fact that the municipal fixed effects already capture the influence of the political preferences on local expenditures.

compared to smaller municipalities (Oates 1972). At the same time, the economies of scale could be gradually eroded by the emergence of additional costs connected with urban congestion. In our equation, the main part of these differences is already captured by the fixed effects for each municipality. However, the fixed effect doesn't take into account any annual increase in population size and the fact that such an increase could mechanically decrease public expenditures per-capita. In fact, since public services generally adapt with a delay to the demographical evolution, it is necessary to control for this factor (Weicher 1970: 380). The POP variable, corresponding to the natural logarithm of the resident population at the end of the year, aims to take this phenomenon into account. The literature also suggests considering the evolution of the population density. Since the robustness tests show that density and population size both capture the same variance, we kept only the variable POP.

The age distribution of the population is often cited as a factor explaining local public expenditures (Weicher 1970: 383). It was imperative to include some variables capturing the effects of this distribution into our model because, as noted by Hamilton (1983), overlooking them could lead to an overestimation of the flypaper effect. Therefore, we used two indicators: the percentage of the population aged 65 or older (AGED) and the percentage of the population aged 14 or younger¹⁸ (YNG). As was the case for the population, this indicator will capture the impact that any age distribution variation will have on public expenditures and not the structural impact of an historical high percentage of old or young people, the latter being already captured by the municipal fixed effects.

In 2004, the canton of Vaud radically changed the distribution of tasks between the canton and its municipalities. This change resulted in a strong decrease in local expenditures. We used the instrumental variable D4 to control for this structural change. For each municipality, this variable has in 2004 and 2005 the level the variable DEP (current expenditures) showed in 2004. If this factor is correctly specified, its coefficient should be negative. In this way, we integrated the reduction of local expenditures arising from the reform into our model and therefore avoided that its effects distort the coefficient estimates of the other variables.

¹⁸ The ideal indicator would be the share of residents still in mandatory school (16 years or less). However, we dispose only of the data for five years of age class. Then, our choice was limited between 14 years or less and 19 or less. Since the first led to the best econometrical estimations, we kept it.

Table 4: Summary statistics of the control variables

Name	Indicator	Mean	S.-D.
POP	Natural log of the population resident in the municipality.	6.15	1.30
AGE	Percentage of the population aged 65 or more.	14.89	3.87
YNG	Percentage of the population aged 14 or less.	20.39	3.68
D4	Expenditures of the municipality in 2004 (at constant prices - 2005). Instrumental variables used to capture the structural impact of the new task distribution between the canton and the municipalities.	2836	693

Note: Mean and Standard-Deviation for the D4 are based on 2004-2005 only.

Source: Statistical service of the canton of Vaud (STATVD).

EMPIRICAL SECTION

Table 5 presents the coefficient estimates obtained using the two models described above (with and without the categorical variable reflecting bureaucratic complexity). We estimate these models both in a linear and a log-log form. This precaution is necessary in light of Becker's observation (1996) that the magnitude of the flypaper effect can strongly decrease depending on whether functional form is adopted.

Only two of the four control variables have a significant coefficient: POP and D4. The first identifies a decrease in public expenditures per capita when the resident population of a municipality increases. However, this result shouldn't lead to mistakenly thinking that a higher population is correlated with lower public expenditures per capita. In fact, the municipality with the largest population (Lausanne) is also the one with the highest public expenditures per capita. Our result just indicates that a marginal increase of the resident population at the year t leads to a decrease in public expenditures per capita of the same year. The second variable correctly identifies a clear-cut decrease in local expenditures after the new tasks distribution. Finally, marginal variations in the relative size of the two age classes that we take into account don't affect public expenditures per capita in the case of Vaud's municipalities.

Table 5: Coefficient estimates for model 1 and model 2 (linear and log-log)

	Model 1 Linear	Model 1 Log-Log	Model 2 Linear	Model 2 Log-Log
INC	0.007** (0.002)	0.106** (0.026)	0.007** (0.002)	0.108** (0.025)
POP	-1240.118** (243.165)	-0.444** (0.087)	-1195.061** (250.965)	-0.426** (0.090)
AGED	-8.273 (8.108)	-0.051 (0.035)	-8.305 (8.215)	-0.053 (0.035)
YNG	12.252 (8.063)	0.067 (0.049)	11.320 (8.038)	0.065 (0.049)
D4	-0.212** (0.011)	-0.032** (0.001)	-.214** (0.106)	-0.032** (0.001)
PH	0.655** (0.155)	0.011** (0.002)	0.580** (0.194)	0.010** (0.002)
PH × B ⁺	-	-	0.476* (0.219)	0.005* (0.002)
PH × B ⁻	-	-	-0.230 (0.297)	-0.003 (0.003)
YEAR	23.002** (6.447)	0.008** (0.002)	22.860** (6.452)	0.007** (0.002)
R ²	0.811	0.799	0.813	0.799

N=2688. Standard errors are clustered at the municipality level.

Municipality fixed effects are included in all models.

**Significant at the 1% level, *significant at the 5% level, “significant at the 10% level.

In its linear form, model 1 shows a strong flypaper effect: for each one franc per capita of equalisation grant, expenditures per capita appear to increase by 0.66 francs. This result has to be compared with the estimates of the impact of an increase in median income on these expenditures. The estimate coefficient for INC gives a correct estimation for the income-effect under the assumption that the municipalities can potentially tax all median income. This is actually not the case given that taxpayer income is taxed at three levels (federal, cantonal and communal) and that local

taxation is limited by cantonal law. For this reason, the estimated coefficient has to be compared to the marginal local tax rate. In 2005, the marginal tax rate (local and cantonal together¹⁹) for an income of 100'000 was 16.57% for an unmarried individual without a child, 13.00% for a married individual without child and 10.23% for a married individual with two children (AFC 2005). If we split this rate equally between the municipality and the canton, it means that local marginal taxation was between 5.1% and 8.3%. With such figures, the estimate coefficient of 0.007 means between 8 and 14 cents of expenditure increase for each franc of additional median income. This effect is then between 4.5 and 8 times lower than the one observed for a franc of equalisation grant. Therefore, the equalisation grants seem to have led to larger expenditures than the ones expected according to the median voter's preferences.

Model 2 partially confirms our hypothesis of a link between the flypaper effect and bureaucratic complexity. On the one hand, the interaction between the categorical variable B and the volume of equalisation grants PH shows that one franc of equalisation grant leads to a far higher increase in expenditure per capita in the municipalities with a more complex bureaucracy (B^+). In total, the expenditure increase for each franc of grant in these municipalities slightly exceeds the unity ($0.58+0.48$) and it is approximately the double the one observed for the municipalities with an average bureaucratic complexity (0.58). This result seems to indicate that the model of complete bureaucratic power applies perfectly to municipalities with a higher bureaucratic complexity. On the other hand, the estimates for the municipalities with a low bureaucratic complexity are less sharp. Indeed, even if the estimate coefficient for the variable $PH \times B^-$ is negative, indicating an increase in expenditures below the average, it is not significant²⁰.

The log-log models enabled us to test the sensitivity of the estimates to the choice of functional form. Obviously, the estimated coefficients are then elasticities and cannot be directly compared to the estimates obtained with the linear form. To nevertheless make a comparison, Table 6 presents the marginal propensities calculated for the log-log model. The

¹⁹ Data are referred to the capital city Lausanne.

²⁰ For a robustness check, we tested our models (with both functional forms) while introducing an additional interaction term $INC \times B^+$. It resulted in a non significant and extremely weak coefficient estimate. Therefore, we can conclude that bureaucratic complexity only affects the impact of the received grants.

marginal propensities are calculated with the means of the involved variables.²¹

Table 6: Estimations of the marginal propensities

	Model 1 Linear	Model 1 Log-Log	Model 2 Linear	Model 2 Log-Log
$\delta\text{EXP}/\delta\text{INC}$	0.007**	0.009**	0.007**	0.009**
$\delta\text{EXP}/\delta\text{PH}$	0.655**	0.211**	0.580**	0.202**
$\delta\text{EXP}/\delta\text{PH.B+}$	-	-	0.476*	0.098*
$\delta\text{EXP}/\delta\text{PH.B-}$	-	-	-0.230	-0.063
R²	0.811	0.799	0.812	0.799

**Significant at the 1% level, *significant at the 5% level,

The Log-Log coefficients are obtained using the mean value of each variable.

The estimated marginal propensities confirm Becker's insight (1996): the estimated impact of equalisation grants on expenditures is much lower with the log-log functional form²² (21 cents for each franc of grant). However, unlike Becker's results, the change of functional form indeed reduces the flypaper effect, but does not annihilate it completely. Even if the impact of an increase in median income slightly increases (a coefficient of 0.009 meaning an expenditure increase between 11 and 18 cents for each franc of grant) it is still lower than the impact of a franc of grant.

Model 2 also shows that the impact of a franc of grant is between half and three times higher than the impact of a franc of income in the case of the municipalities with a high bureaucratic complexity for which we observed an increase of 30 cents each franc of grant. At the same time, the estimate coefficient for $\text{PH} \times \text{B}^-$, even if not significant, suggests that for the municipalities with a low bureaucratic complexity the impact of one franc of grant

²¹ The marginal propensities in Table 6 are obtained using all the disposable decimals for the estimated coefficients and not only the three decimals reported in Table 5.

²² At this stage, it is impossible to know which of the two models (linear or log-log) offers the best estimates. In this paper, we limit ourselves to the observation that our theoretical expectations are correct with both functional forms: the flypaper effect appears and it is sensitive to the bureaucratic complexity in the two cases.

tends to be even closer to the impact of one franc of additional income. The absence of significance is probably related to the fact that considering the size of the population and the size of the bureaucracy, the municipalities with an average bureaucratic complexity are closer to the group with low complexity than to the one with high complexity.²³

It should be noted that, to ensure that these estimates do not overestimate the flypaper effect, it is also necessary to determine if a phenomenon of endogeneity exists. Indeed, the equalisation grants are allocated in a large part on the basis of the tax capacity of the municipalities. If a low level of tax capacity, all other things being equal, leads to a low level of expenditures, then there is the risk that the size of the equalisation grant received by the municipalities could be determined by the level of expenditures. If a mutual positive influence exists between these two variables, the risk is to observe an inflation of the estimated coefficients. However, a Granger's causality test (1969) shows that such a risk didn't come into play in our dataset: the relationship between the equalisation grants and public expenditures seems to deploy only from the first variable to the second one without any feedback effect.

Finally, it could be asked whether our findings are reflected in the tax rates decided upon by the municipalities before and after the introduction of the new fiscal equalisation. A macro analysis of the communal tax rates gives an affirmative answer and definitively confirms the existence of a flypaper effect in the case of the canton of Vaud. For that we observed, the mean tax rate between 1999 and 2003 of the municipalities according to their bureaucratic complexity in 2001. Figure 4 illustrates the evolution of these tax rates.

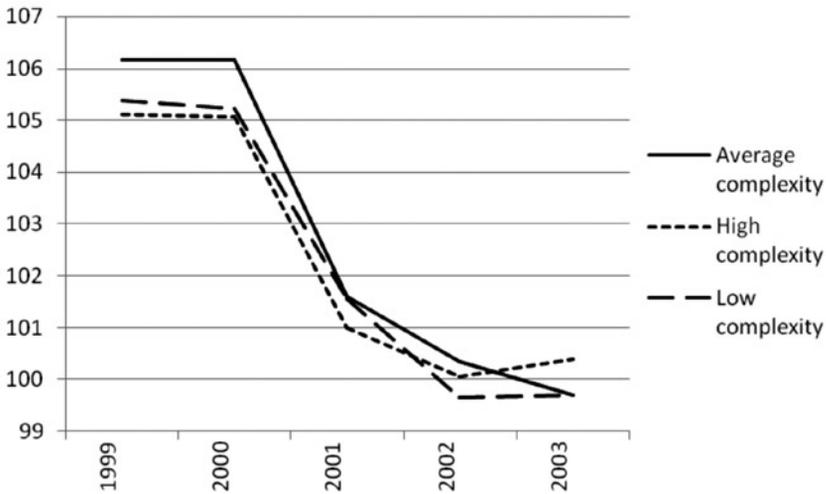
The figure illustrates a clear decrease in tax rates in 2001 with an average decrease of 4.1 percentage points for the municipalities with an average complexity, 4.6 for these with a high complexity and 3.7 for these with a low complexity. It should be noted that the decrease became stronger for the low complexity municipalities only starting in 2002. These results suggest that only approximately half of the equalisation grant amount has been used to reduce the tax rates²⁴. Obviously, this figure has to be relativized because of its purely bivariate approach. However,

²³ This phenomenon could also arise from the fact that the variable B is slightly biased in the case of the small municipalities, as already discussed in the previous section.

²⁴ We calculate this value using a mean value of 19 francs per capita for each of these percentage points and a mean grants amount in 2001 of 154 francs per capita.

the small difference between the decrease in the municipality with an average complexity and these with a high complexity suggests that the log-log functional forms is probably the functional form offering the more correct estimates.

Figure 4: Mean tax rates according to the bureaucratic complexity (1999-2003)



Source: Statistical service of the canton of Vaud (STATVD).

CONCLUSION

Our results show that the introduction in 2001 of a new fiscal equalisation between the municipalities in the canton of Vaud leads to the emergence of a flypaper effect. In addition, they also show that the size of this flypaper effect depends in part upon the degree of complexity of the local bureaucracy. Indeed, a clear flypaper effect is detected in the municipalities that received the equalisation grants, but it is more pronounced in municipalities with a more complex administrative apparatus. In addition, a slight trend toward a weaker flypaper effect appears for the municipalities with a relatively weaker bureaucracy. It is therefore possible to conclude that the bureaucratic complexity is an indicator that could predict, at least partially, the size of the flypaper effect generated by an equalisation grant. However, the fact that bureaucratic complexity plays a role in Swiss municipalities already suggests that this phenomenon could

be even more salient when analysing larger federal subunits like the cantons.

This conclusion, however, needs to be confirmed by further analysis. Indeed, the selected methodological options arose from our desire to simply proceed in a first empirical test of the hypothesis about the variability of the flypaper effect as a function of the bureaucratic complexity of the grantee community. For this reason, we privileged the estimation of relatively simple models and a categorical variable for the bureaucratic complexity with only two modalities. Since our first tests are positive, they open the road for analysis using more sophisticated variables and for their application to other cantonal fiscal equalisation programs in Switzerland.

Despite these limitations, our research shows that it is worthwhile to better analyse the way equalisation grants affect public finances in the grantee communities. The recommendations of the classical theory helped to generalise the use of this type of grants into the federal and cantonal fiscal equalisations. However, our empirical analysis clearly shows that the reality is more complex and asks for a more detailed observation of the context in which such reforms unfold. In fact, classical theory tends to too easily ignore the political decision-making process and the interests of the involved actors. In this sense, scholars have a role to play in terms of furthering the available knowledge and making it available to policy makers.

Although we eventually do not produced any policy recommendations meant to reduce the flypaper effect, our paper raises one important point to keep in mind when evaluating the impact of fiscal equalisation. Fiscal equalisation is not a neutral policy instrument from the point of view of allocating resources between public and private goods. In fact, the reduction of fiscal inequalities between communities comes at a cost: the amounts formerly used by a community according to the preference of its median voters are transferred into another community in a way that impairs the decision-making power of its local median voters. This cost (in the form of public goods overconsumption) is rarely taken into consideration in policy evaluations that generally limit themselves to the observation of the reduced inequalities. However, the question has to be posed: is it worth the effort? Indeed, if the aim is to reduce the differences between the contributive capacities of taxpayers, social policies could be instruments with less adverse effects. Since voters seem to have a weak influence on decision-making processes, let equalisation money

to start in their pockets and not directly in the public budget may reduce their “stickiness” and improve the resource allocation through a more democratic process.

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