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# Fiscal Equalisation and the Flypaper Effect in the Canton of Bern

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Master's Thesis submitted to the University of Bern

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Bern, September 13, 2021

## **Abstract**

Classical theoretical assumptions in public finance suggest that lump-sum general grants have the same effects on local public spending as an equivalent increase in local income. However, during the past decades there has been gathered considerable empirical evidence that intergovernmental transfers in the form of lump-sum general grants trigger much higher public expenditures than an equivalent increase in local median income. This empirical anomaly is referred to as a flypaper effect. The present empirical study aims at contributing to the literature on the flypaper effect using a panel data from the intercommunal fiscal equalisation system of the canton of Bern covering the period from 2008 to 2017. Due to a reform in the year 2012, there exists the possibility to exploit both a sudden increase as well as a decrease in transfers using a difference-in-differences approach. While the baseline regressions provide evidence in favour of a flypaper effect, the difference-in-differences estimates are not able to do so convincingly.

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# 1 Introduction

Fiscal equalisation systems constitute an important institutional feature to many federalist countries. In a country like Switzerland with three different state levels fiscal equalisation systems are also implemented on the subnational cantonal level. Equity considerations play the most important role in the call for fiscal transfers to poorer jurisdictions being fully or partly financed by richer jurisdictions. Generally, there is strong political consensus that the consumption and provision of public goods should not differ substantially between different regions and jurisdictions. The same applies to the tax bills being collected to fund those public goods as too big differences in tax rates among different jurisdictions are considered unfair. At the same time, fiscal capacities may vary a lot between different jurisdictions because of the federal tax and spending autonomy. Furthermore, there might also be exogenous factors at work fostering inequalities in fiscal capacities like for instance geographical and topographical differences in living conditions. Fiscal equalisation systems are thus used to reduce such inequalities and strengthen national and subnational unity in federalist countries. A second set of arguments in favour of fiscal equalisation concerns economic efficiency. As marginal utility gains of consumption are diminishing, redistribution from richer to poorer jurisdiction would lead to an overall net-welfare gain (Baskaran, 2012). Furthermore, equalisation systems also take the function of an insurance scheme that protects jurisdictions against unexpected asymmetric fiscal shocks (Bucovetsky, 1998).

Regarding the different types of transfers available to governments, matching as well as specific grants are not considered an adequate instrument to reduce inequalities because they are allocated to jurisdictions based on specific conditions imposed by the grantor. Such grants pursue allocative goals and therefore distort the relative prices of public services. As a result, they give quite strong incentives to increase spending in grantee communities as the size of the transfers depends on local spending for specific public services. Incentives to lower tax rates on the other hand are low (Dafflon, 1995). Hence there is strong consensus that transfers in fiscal equalisation systems should be based on lump-sum general grants which do not cause any distortions and permit the grantee community to use the transfers freely according to their own preferences. Similar considerations apply to the allocation formulas in fiscal equalisation systems. While the political goal of reducing inequalities between jurisdictions seems to be clear in general, measuring fiscal wealth is not a straightforward task. Allocating grants according to a community's tax revenues would give strong incentives to local governments to make deficits. A possible measure of fiscal wealth must therefore capture a jurisdiction's fiscal capacity. The fiscal

capacity measures the amount of tax revenues a community would be able to collect if it applied a standardized or average tax rate on its eligible tax base. Such fiscal capacity measures cannot be influenced directly by local governments and are therefore considered to be exogenous. However, as local tax bases typically depend on local tax rates, fiscal capacities still can be perceived as partly endogenous. Nonetheless, as direct incentives for strategic budgeting to attract more fiscal transfers are ruled out, fiscal capacity equalisation is thus considered to be first best and is being applied among all cantonal fiscal equalisation systems today. The implementation of the new fiscal equalisation system on the federal level in 2008 thereby had an important influence on all fiscal equalisation systems of swiss cantons, as the newly adopted fiscal capacity equalisation on the federal level acted as role model for many cantons (Rühli et al., 2013 p. 23-25).

Classical theoretical assumptions in public finance suggest that lump-sum general grants have the same effects on local public spending as an equivalent increase in local income (Bradford and Oates, 1971). According to standard median voter theory, one unit of exogenous lump-sum general grants to decentralised governments therefore should trigger an increase in local public expenditures equivalent to a rise in local citizen income, while the remaining part of the transfer is used to cut taxes. However, many empirical studies in the public finance and public choice literature document that one unit of exogenous fiscal transfers triggers significantly higher public spending than an equivalent additional unit of local (median) income would (Hines and Thaler, 1995). This effect known as the flypaper effect constitutes an anomaly, considering that governments should act as agents for representative citizens (the median voter) who maximize their welfare between the consumption of public and private goods. Consequently, every additional unit of exogenous unconditional fiscal transfers should have the same propensity to be spent publicly as an additional unit of local citizen income.

There have been proposed several explanations for this empirical anomaly. A major issue in the empirical literature on the flypaper effect concerns endogeneity. As already mentioned before, transfers are granted depending on a jurisdiction's fiscal capacity. However, the fiscal capacity strongly depends on its local budgetary policy. Communities with higher spending preferences *ceteris paribus* need to set higher tax rates to finance their expenses. This in turn leads to an erosion of the local tax bases, assuming that tax rates and tax bases are negatively correlated. Therefore, local governments in fiscal capacity equalisation systems do have an indirect incentive to set higher tax rates as tax bases will erode and transfers will rise. Correlations between higher expenditures and high transfers hence cannot be interpreted causal. The effect might be driven purely endogenous.

The evidence in empirical studies that try to identify a flypaper effect is therefore often inconclusive. Although many studies find evidence in favour of a flypaper effect, the effect disappears once endogeneity is accounted using natural experiments. Some authors even argue that the flypaper effect is an econometric illusion being based on inappropriate functional forms and the difficulty to account for endogeneity (Becker, 1996). An example of a vanishing flypaper effect once endogeneity is accounted can be found in the paper of Gordon (2004). The author exploits a discontinuity in the allocation formula for school grants in the US. He finds that the flypaper vanishes as soon as endogeneity is accounted for. Another example is Knight (2002), who followed an instrumental variable approach to identify a flypaper effect in federal highway aid grants in the US. The correlation between the federal grants and preferences for public goods spending vanishes as soon as the political instruments were applied (Knight, 2002).

Other studies however find convincing evidence for a flypaper effect, even when endogeneity is accounted for. Dahlberg et al. (2008) exploited discontinuities in the allocation formula of general-purpose grants transferred to Swedish communities by the central government. The allocation formula of this programme grants extra funds to communities who face a net-migration outflow of 2%, which could be exploited empirically with an IV-estimate approach. The evidence in favour of a flypaper effect is very strong. With regards to the previous studies of Knight (2002) and Gordon (2004) the authors point out that the specificity of grants might be crucial for the existence of a flypaper effect. While Dahlberg et al. (2008) analysed the effects of general-purpose (lump sum) grants, Knight (2002) and Gordon (2004) analysed very specific grant programs.

Similar to the approach followed by the Swedish authors, Baskaran (2012) finds strong evidence for a flypaper effect in the fiscal transfer scheme of the German state of Hesse. The author used a set of instruments for municipal transfers receipts based on discontinuities in the allocation formula. More specifically, the fiscal equalisation scheme in Hesse applies different weights on the fiscal need formula for the municipalities. Those weights increase at various population thresholds in a discontinuous manner, which ultimately leads to differences in per capita transfers of up to 13% between communities who might differ in their population by just one inhabitant. Somewhat surprisingly, the correlation between transfers and local expenditures only turned positive and significant as soon as the instrumental variable estimation was applied. Like the paper of Dahlberg et al. (2008), Baskaran (2012) thus was able to contradict the findings of Knight (2002) and Gordon (2004). The flypaper effect therefore seems to be a real phenomenon.

A very specific case of a flypaper effect can be observed in papers analysing a fiscal windfall curse. Unlike the studies trying to identify the effects of annually recurring fiscal equalisation transfers these studies analyse the effects of a onetime fiscal windfall. Berset and Schelker (2019) studied the impact of a unique one-off fiscal windfall in the canton of Zürich. An extraordinarily large tax bill of approximately 360 million CHF led to an extra volume of roughly 238 million CHF entering the cantonal fiscal equalisation scheme. Like in the studies presented before, the propensity to raise public expenditures was over proportionately high compared to the propensity of lowering taxes. However, even more surprising is the fact that this single fiscal windfall had long-term stimulatory effects that persistently changed local spending patterns: “The windfall induced increases in personnel expenses, administrative and operating expenses, and subsidies, and a decrease in revenues from income taxes, as well as an increase in revenues from user charges.” (Berset and Schelker, 2019, p). The authors hence see their findings in line with the literature on the fiscal windfall curse, a phenomenon particularly present in countries that experience a natural resources boom and lack proper democratic institutions. The lack of proper democratic institutions as well as high levels of corruption is often times even considered to be a direct consequence of the resource curse (see Hodler, 2006; Bhattacharyya and Hodler, 2010; van der Ploeg, 2011; Caselli and Michaels, 2013; Borge et al., 2015).

Another interesting feature of the flypaper effect is that it operates in both directions. Gamkar and Oates (1996) for instance found empirical evidence that the spending responses between increases and cuts of grants do not differ significantly. On the other hand, Stine (1994) previously analysed budgetary responses of country governments in Pennsylvania that experienced a period of declining federal grants. The cuts in transfers not only led to a reduction in spending but also a reduction in own revenues. Gamkhar and Oates (1996) referred to this phenomenon as a super-flypaper effect. One may also refer to the results of Berset and Schelker (2019) as a super-flypaper effect, as a one-off fiscal windfall not only stuck to the public budget but even triggered a long-term fiscal response that exceeds to magnitude of the windfall by far.

The theoretical explanations for the occurrence of a flypaper effect are various and will be discussed more closely in the theoretical chapter. One popular reasoning has its origins in Niskanen’s (1975) bureaucracy theory, which will also constitute an important aspect of this master thesis. According to authors like Wilde (1968) and Gramlich (1977) it is the clash of interest between the median voter and the bureaucrats which might explain the stickiness of fiscal transfers. Or to put it differently, the principal agent relationship between citizens (principal) and their governments (agent) is probably not that straightforward as the median theory suggests. Elected politicians face themselves in the position of a principal too, who must



delegate bureaucrats to fulfil their tasks. The public budget is therefore the result of an asymmetric relationship between the elected politicians and the bureaucrats. Some authors even argue that the public budget is the result of a negotiation between the elected officials who represent the median voter and the members of the bureaucracy.

Cappelletti and Soguel (2013) build their empirical analysis of the intercommunal equalisation scheme in the canton of Vaud upon such a theoretical framework. In their paper, which also will constitute an important paper of reference throughout this master thesis, they were able to find evidence of a quite strong flypaper effect. One additional franc of unconditional fiscal transfers is estimated to increase public expenditures by 66 cents, whereas the same increase in local income triggers an increase in public expenditures by only 8 to 14 cents. The flypaper effect approximately even doubles if it is interacted with a measure for bureaucratic complexity. This is consistent evidence to the idea of budget maximizing bureaucrats proposed by Niskanen (1975). One criticism that must be raised in this empirical work, however, is the lack of a proper identification strategy that is able to clear out any endogeneity concerns. Nonetheless, the approach taken by Cappelletti and Soguel (2013) will also be followed in this paper, as it constitutes a convincing theoretical explanation for the underlying mechanisms of a flypaper effect. The aim of this paper therefore is to contribute to the empirical literature on the flypaper effect with an analysis of the intercommunal fiscal equalisation system of the canton of Bern using a convincing identification strategy. Due to a reform of the fiscal equalisation system in the year 2012 there exists the unique possibility to analyse both positive as well as negative fiscal shocks to municipalities. These fiscal shocks are going to be exploited empirically by using a difference-in-differences approach. Regarding this unique empirical setting, this master thesis might be even one of the first empirical papers to be able to assess both the impact of positive as well as negative fiscal shocks using a difference-in-differences approach.

The paper will be structured as follows: The following chapter of this paper will have a closer look on the phenomenon of the flypaper effect. Therefore, a comprehensive review of the theoretical and empirical literature will be performed. This also includes a closer look on the empirical or rather econometric problems that may prevail when trying to identify a flypaper effect. Furthermore, as already has been mentioned before, bureaucracy theory will be reviewed as a possible explanation more closely. The third chapter will give an overview of the intercommunal fiscal equalisation system of the canton of Bern. Besides a detailed description of the different instruments being applied in the systems, especially the reform that became effective in the year of 2012 will be discussed more closely. Chapter four then dives into the methodological part of this paper and explains the empirical strategy being applied. This also includes a

presentation of the operationalisation of the variables of interest as well as the control variables. The results of the different estimates will then be presented in chapter five. Chapter six comprises a set of sensitivity and robustness checks. The last chapter eventually covers the discussion and conclusion. This also includes possible policy recommendations.

The results of the present analyses are quite inconclusive. While there is evidence for a flypaper effect in the baseline regressions, the results of the difference-in-difference estimation are not able to confirm those results in a convincing manner. On the one hand, there exist severe problems regarding the necessary assumptions to be fulfilled for a difference-in-differences estimate. On the other hand, there may also be raised concerns regarding the statistical power of the model. The estimated magnitude of the treatment is admittedly quite small compared to similar empirical works in this field. The flypaper effect therefore remains an important empirical phenomenon to be scrutinized more closely in the future.

## 2 The Flypaper Effect

### 2.1 The Empirical Puzzle

The aim of this chapter is to have a closer look on the phenomenon of the flypaper effect both theoretically and econometrically. Therefore, the most important contributions in the literature are being reviewed. The seminal work in the theory of intergovernmental grants was worked out by David F. Bradford and Wallace E. Oates in 1971. In their paper “Toward a Predictive Theory of Intergovernmental Grants” they were able to show theoretically that intergovernmental lump-sum general grants should have the same effects as an equivalent increase in local income. This notion is based on Duncan Black’s (1948) foundational paper in public choice theory “On the Rationality of Group Decision Making”. Black states in his paper, that under simple majority rule, the equilibrium budget can be derived from the median of the most preferred levels of public goods provision (Black 1948).

The idea of the median voter being decisive when it comes to public spending decisions is probably one of the most known hypotheses in political economy and public choice. It has remained relevant until today and inspired lots of economists to test this hypothesis empirically. However, the evidence of the median voter hypothesis is quite inconclusive. Contrary to most economists, to many political scientists these results are not surprising at all. In political science public budgets are barely the result of democratic politics representing a median voter. There are rather other mechanisms at work, that describe the political economy of budgeting more accurately. Two of the prevailing positions for instance state that public budgets are either determined incrementally on a year-by-year basis following simple autoregressive rules. Or the public budget is foremost determined by socioeconomic variables rather than political variables (Romer and Rosenthal, 1979a). Considering a country like Switzerland which knows a very institutionalised budgeting process under strict rules of the federal debt brake, the structuralist idea seems quite compelling. On the other hand, socioeconomic variables play a very important role too. Many fiscal equalisation systems therefore include some transfers to jurisdictions with excessively high social welfare expenditures. This is also the case in the canton of Bern.

Coming back to the median voter hypothesis, the core of the flypaper effect lies in the puzzling empirical phenomenon of diverging propensities to spend exogenous transfers. Contrary to Bradford and Oates (1971) theoretical prediction, there is a vast empirical literature showing that intergovernmental grants tend to trigger higher public spending than an equivalent rise in local median income would. Arthur Okun called this phenomenon a “flypaper-effect”, noting that “money seems to stick where it hits”, when he was presented empirical results for the first time (quoted in Inman 2008: 1).

The flypaper-effect can easily be shown graphically (Figure 1) in a simplified model of a two goods economy assuming an individual decision maker (or the median voter of a community) with convex preferences over a public good and a private good. For simplicity, the relative price between the public and the private good is assumed to be one. Subject to a pre-grant budget constraint  $BB$  (the total local income) the community will then choose its optimal bundle resulting in the outcome  $A_0$ . The community then receives a lump-sum general grant out of an equalisation system or any other upper-level grant programme. This will give a new budget constraint  $B'B'$ . Following Bradford and Oates (1971) theoretical predictions, which basically can be derived from basic microeconomic theory, such a lump-sum general grant should not trigger any price effects, as only an income effect is at work. This should leave the relative amounts of goods consumed by the community unchanged, resulting in an outcome  $A_1$ . However, such an optimal outcome does often not apply to reality. Many empirical findings show evidence for an outcome like  $A_2$ , which is known as the flypaper effect. The flypaper effect therefore constitutes an anomaly to the median voter hypothesis and the theory of intergovernmental grants derived from it.

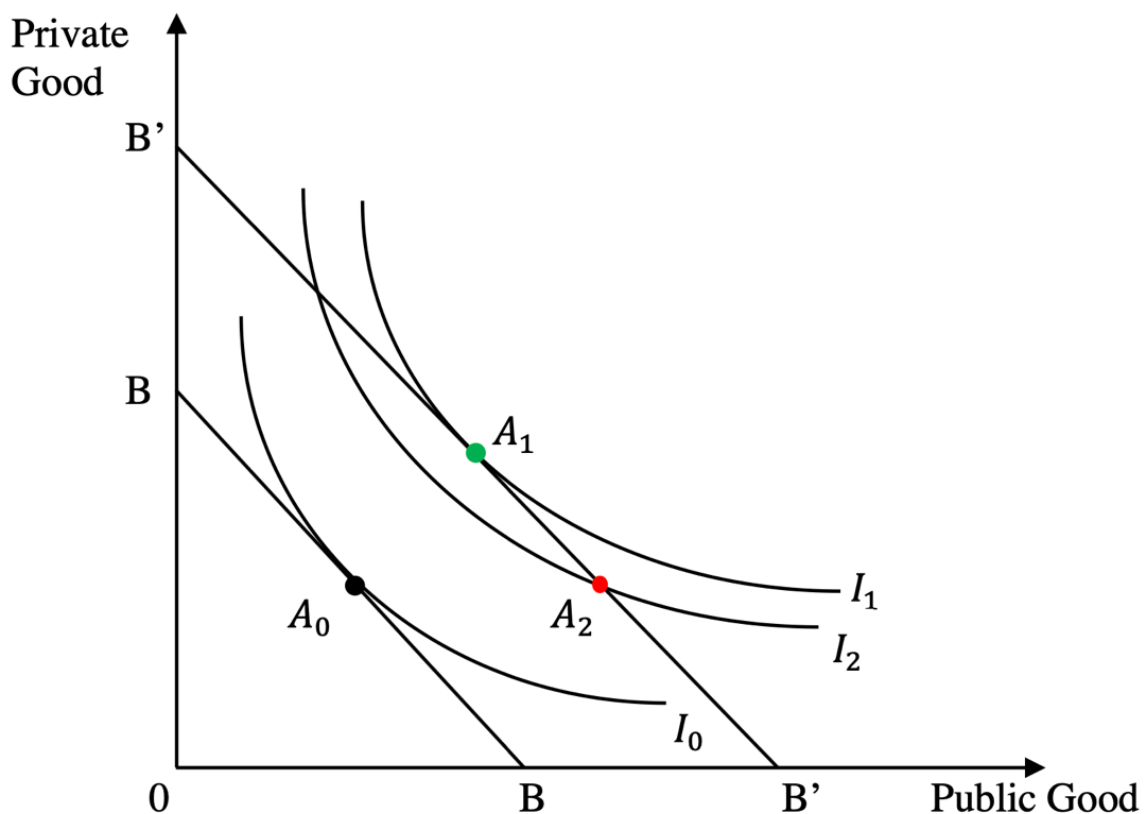


Figure 1: Graphical Illustration of the Flypaper Effect

Rewritten in a simple maximization problem of a representative individual maximizing his utility over a private good ( $c$ ) and a public good ( $g$ ), indexed by  $U(c, g)$  and subject to a budget constraint, the notation looks as follows:

$$\max. U(c, g) \quad s. t. \quad c + p_g g = b + t$$

Where  $p_g$  is the so-called tax price of public spending corresponding to the slope of the budget constraint (Bradford and Oates, 1971, p. 444).  $b$  is the representative individual's pre-transfer budget constraint and  $t$  is the transfer per capita. Again, the tax price of the representative individual is assumed to be one and thus unity with the unit price of a private good. The tax price however varies between individuals with different incomes. Assuming a uniform tax rate for the whole community to fund the public good, richer individuals will obviously face a higher tax price for public spending than poorer individuals do, as their relative cost share of the public good is higher. Poorer individuals with flatter budget constraints therefore will vote for higher public spending as the public goods are relatively cheaper for them. Coming back to Black's (1948) and Bradford and Oates (1971) contributions, it is now also clear that the decisive median voter is the one having the median income or the median slope of the budget constraint, which makes out the equilibrium budget of a community under majority vote.

Empirically, the most basic model to estimate a flypaper effect is specified as follows in the form of an expenditure function of a community:

$$Exp. = \beta_0 + \beta_1 FT + \beta_2 Inc. + \varepsilon$$

where  $Exp.$  denotes expenditures per capita.  $FT$  denotes the total sum of fiscal transfers per capita. The variable  $Inc.$  denotes the benchmark of the representative local median income and  $\varepsilon$  denotes the error term. As lump-sum general grants should trigger the same effects to local expenditures as a rise in local income, the coefficients to spend  $\beta_1$  and  $\beta_2$  should be unity. In the following the coefficients  $\beta_1$  and  $\beta_2$  are simply referred to as elasticities. The correct way of interpreting the coefficients as elasticities will be adopted in the empirical chapter. One additional unit of lump-sum general transfers should hence trigger the same effect on public expenditures as one additional unit of local income, while the remainder part of the transfer goes into the representative individual's consumption of private goods. However, the elasticity of the fiscal transfer  $\beta_1$  is often significantly higher than  $\beta_2$ . This divergence constitutes the empirical phenomenon of the flypaper effect (Becker, 1996).

Critics may now ask why one even cares about this anomaly when the underlying median voter hypothesis relies on an excessively simplified model of the real world being contested by many political scientists and whose empirical evidence, if any, stands on shaky grounds? The flypaper effect remains a big puzzle. Even if the benchmark of the median income is incorrect to predict local public expenditures, so far, there has not been found any alternative that does the job in such a theoretically convincing manner. Furthermore, when having a look on empirical contributions of the opposite case, where transfers go to citizens directly, exactly the opposite is the case (Inman, 2008). The flypaper effect therefore seems to be a reality in public finance with important policy implications. The theoretical and empirical explanations why a flypaper effect might occur, which will be reviewed in the next subchapter.

## 2.2 Possible Theoretical and Empirical Explanations

The theoretical and empirical explanations offered to explain the phenomenon of the flypaper effect are various. As a matter of fact, it will not be possible to offer all of them in the scope of this subchapter. Only the most important explanations will be reviewed, before moving on to a subchapter dedicated to bureaucracy theory.

Two influential explanations concern as Inman (2008) summed them up data and econometric problems, which ultimately lead to biased elasticities of  $\beta_1$  and  $\beta_2$ . The data problem lies in the possible confusion between lump-sum general and matching grants. As already mentioned previously, the latter induce besides an income effect also a price effects, making public goods and services relatively cheaper. Consequently, the transfer elasticity  $\beta_1$  must be greater than the income elasticity  $\beta_2$ . The econometric explanation on the other hand concerns a possible omitted variable bias. The most important omitted variable bias has already been elaborated in the introduction of this paper. Individuals tend to migrate from high tax jurisdictions to lower tax jurisdictions, leading to an erosion of local tax bases and thus to more transfers. Assuming higher income individuals being more mobile and gathering in low tax jurisdictions, the income effect on the provision of public goods tends to be downward biased, as rich jurisdictions do not need to set the same tax rates for the same amount of basic public goods. According to Hamilton (1986) this produces a downward bias of the income effect.

There is quite a broad empirical literature estimating local tax base elasticities, also for the case of Switzerland. Staubli (2018) estimated a tax base elasticity of 0.43 for corporate income. Estimates for individual wealth tax elasticities might even take on a value of 1.8, which is a considerable effect (Brühlhart et al., 2016). No matter how large actual tax base responses are, local fiscal policy preferences do have an important influence on a community's fiscal capacity.

However, Inman argues that the upper bound estimates of the income elasticity of demand for government services ( $\beta_2$ ) in the U.S. at the state and local level combined are at most 0.15. As most of the transfer elasticities of demand for government services  $\beta_1$  exceed this value by far, the flypaper effect remains relevant, even when the income sorting is accounted for (Inman, 2008). Furthermore, as it has been elaborated in the introductory chapter, there are many valuable empirical contributions with convincing identification strategies putting forward strong evidence in favour of a flypaper effect.

Another explanation for the flypaper effect Inman (2008) puts forward concerns a possible failure of the representative voter to make a fully rational choice. Voters of a community may not fully understand how the fiscal equalisation systems work and for what the transfers are intended for. Therefore, citizens might misperceive the income effects of lump-sum general grants as price effects. This idea has been put forward by both Courant et al. (1979) and despite his former theoretical contribution even Oates (1979). Consider for instance a community which finances half of its expenditures with lump-sum transfers. Some voters might misperceive these transfers as matching grants setting the marginal tax price of public spending assumed to be one to  $p_g - (t/g) = 0.5$ . This will ultimately lead to a strong upward bias of the transfer elasticity  $\beta_1$ . However, studies testing this explanation like the ones of Wyckoff (1991) and Turnbull (1998) do not find any conclusive evidence for this misperception hypothesis.

Vegh and Vuletin (2015) provide another convincing theoretical explanation for a flypaper effect as well as strong empirical evidence. The authors build their empirical paper upon a macroeconomic insurance framework. Their hypothesis states that the flypaper effect is correlated with volatilities of transfers and/or private local income. As most jurisdictions depend more on local private income than transfers and assuming that the volatilities between the two sources of public revenues are not perfectly correlated, an increase in transfers will have a weaker effect on the total income variance than an increase in local private income. Therefore, a rise in transfers does not trigger the same amount of precautionary savings as a rise in private income. Consequently, transfers tend to trigger higher public spending than local income. An empirical analysis with a panel data set of Argentinian provinces during the time period from 1963 to 2006 provides strong support for their hypothesis.

Finally, there is also need to pay attention on the right functional form to estimate a flypaper effect. Elisabeth Becker (1996) observed that the magnitude of a flypaper effect might deviate substantially depending on the specific functional form adopted. Linear specifications of the transfer and income variable tend to bias the estimated coefficients towards confirming a

flypaper effect. Becker therefore recommends using double logarithmic specifications to estimate a potential flypaper effect. This paper will apply both specifications for comparison.

## 2.3 Bureaucracy Theory

A very influential explanation for the flypaper effect concerns bureaucracy theory and/or fiscal illusion. Fiscal illusion occurs when the budgeting process is untransparent and voters fail to assess the correct amount of revenues and aid received by their local government. The concept of fiscal illusion is very old and has been elaborated the first time in 1903 in a book of the Italian economist Amilcare Puviani. For Filimon et al. (1982) the reason for this failure, however, is not to be found in the voters' behaviour themselves, but rather in the behaviour of public officials or bureaucrats which seek to maximize their budget. Public officials therefore will try to push the transfer elasticity  $\beta_1$  as close to 1 as possible, meaning that the full amount of the transfer is spent publicly while no remainder part flows into the private consumption of the citizens. Even though Filimon et al. (1982) did not mention Niskanen's (1975) bureaucracy theory in their empirical paper, the underlying assumptions of their empirical paper also apply to Niskanen's (1975) theory.

The three classic assumptions of Niskanen's (1975) bureaucracy theory summarized by the famous public choice scholar Dennis Mueller (2003, p. 365) comprise 1) the monopoly character of a bureaucracy, 2) asymmetric information and 3) agenda setting power. According to the model, bureaucrats do not seek to primarily maximize the sponsors utility. Their utility rather depends on the total amount of public services produced  $G$  and/or the discretionary budget that might accrue. Due to asymmetric information and agenda setting power, which both give important advantages to the bureau, bureaucrats therefore will be able either to maximize the total quantity of the produced public goods or services, or to maximize the discretionary budget. Furthermore, due to the monopoly character of the bureau, there is no competitive pressure that forces the bureau to steadily raise its productivity or lower production costs. In fact, not only is the bureau a monopoly but the sponsor or demander of public services is also a monopsony, a single agent buying the bureau's goods and services. This bilateral monopoly-monopsony relationship is the reason why the relationship between the bureau and the sponsor is not only seen as a simple principal-agent relationship, but rather a negotiating relationship or a bargaining game. The sponsor and the bureau negotiate over the concrete output mix of the budget, while both seek to maximize different and conflicting goals. Whereas the sponsor seeks to maximize his voter share with an optimal budget for the median voter, the bureau will maximize the overall output or discretionary budget (Mueller, 2003, p. 368).



Concerning asymmetric information, the bureaucrats are the only ones to know the true cost of producing public goods and services. Therefore, they are tempted to misinform elected politicians about the true production costs for public goods and may conceal the most efficient ways in providing public goods by indicating unnecessarily costly production methods. Furthermore, it is extremely difficult for the sponsor to assess the concrete value of public goods or services in terms of a produced output. Considering for instance the budget for a police department to maintain public safety, the sponsor obviously can count the amount of equipment used by the police and the number of police officers working at the department. However, there is no direct measure which could assess the units of public safety that is being produced by the police department. The unmeasurable nature of various types of goods and services provided by public officials therefore leads to considerable difficulties concerning the sponsor's capacity to monitor the bureau's activities (Mueller, 2003, p. 363).

Furthermore, agenda setting power gives the bureau the ability to make take-it-or-leave-it budget proposals. With the sponsor not knowing the true costs of a proposal and the bureaucrat knowing the sponsor's true demand curve for public services or goods, this opens quite strong possibilities to the bureau to maximize its budget (Mueller, 2003, p. 365). Another important dimension of agenda setting power is the bureaucrat's possibility to prevent the sponsor from making any amendments to already approved proposals or even cancelling it (Romer and Rosenthal, 1979b).

Figure 2 depicts a graphic illustration of the classic model of Niskanen (1975). Quantity  $G$  is the competitive equilibrium level of public goods produced by the bureaucrat. This is where the marginal benefit (or marginal willingness to pay) curve  $MB$  of the sponsor or the median voter equals the true marginal cost curve  $MC$  of providing the public good. However, from the point of view of the sponsor, this is an inefficient outcome as the total budget provided to produce quantity  $G$  is  $OBCG$ . There hence remains a surplus of  $DBC$ , the so-called discretionary budget. This consumer surplus is known to the bureaucrat but unknown to the sponsor due to asymmetric information. This surplus can be used by the bureau to maximize the total output of  $G$ . The bureaucrat may conceal the true marginal costs of  $G$  and ask for a bigger budget which would result in an output of  $G^*$ . At  $G^*$  the additional costs to the right of the equilibrium equalize the benefits of the triangle  $DBC$ . At this point the sponsor of the budget (the representative politician) is indifferent of maintaining the bureau or not. Any quantity higher than this point, revealing higher total costs than total benefits for the sponsor, bear the risk of the sponsor closing the bureau.

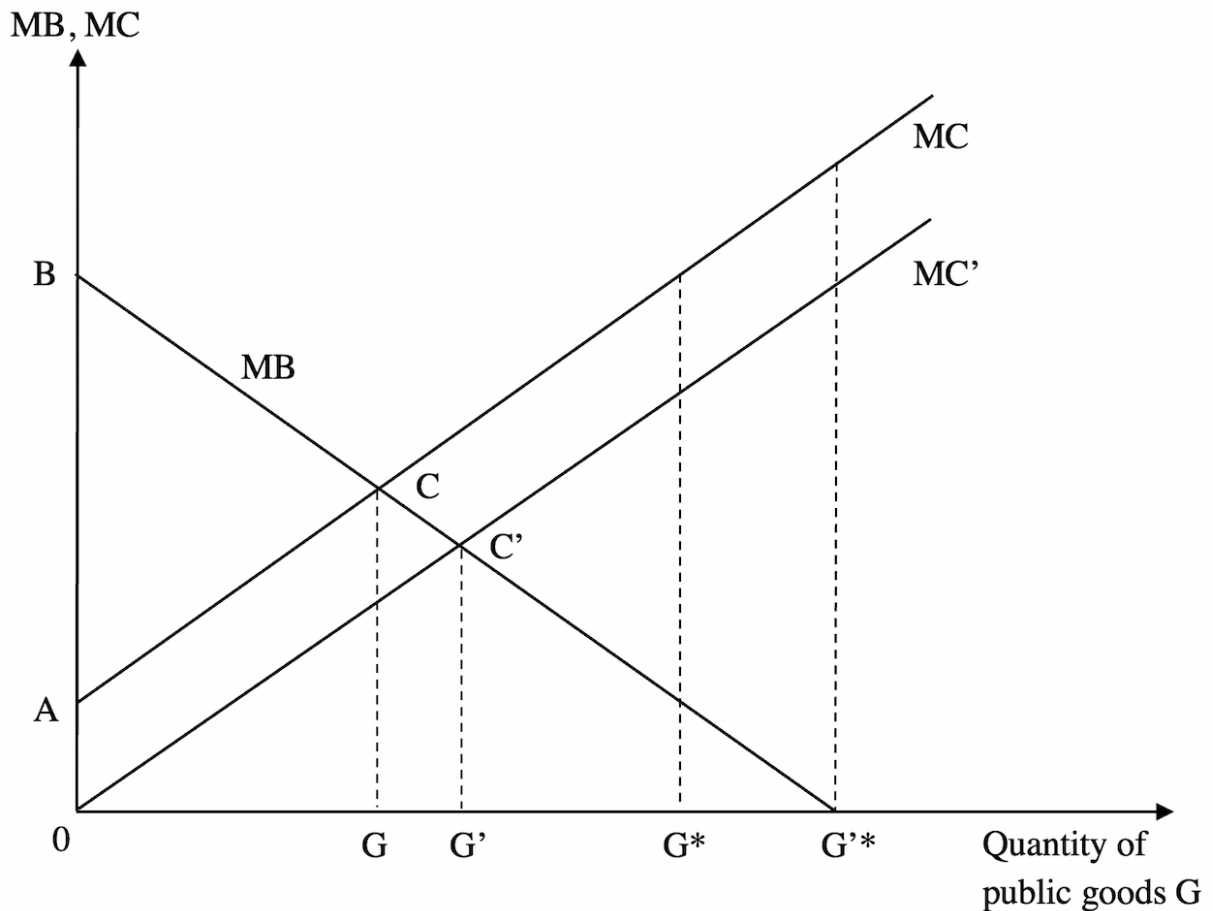


Figure 2: Graphical illustration of Niskanen's bureaucracy theory with a lump-sum transfer

Considering now the case with a lump-sum transfer. The transfer obviously leads to a reduction of the marginal costs of providing public goods and services. The marginal cost curve therefore shifts downwards resulting in  $MC'$ . The competitive equilibrium output increases to the amount of  $G'$ . However, with the sponsor being uninformed about actual marginal cost curve, the bureau may use the additional surplus induced by the lump-sum transfer of  $OCC'A$  to raise the overall output to the amount of  $G^*$ . At this point, the additional surplus would again entirely be captured by the bureau's maximized output. In a very extreme case, like the one being formalized in a model of King (1984) which has also been replicated in Cappelletti and Soguel (2013), the grant may be entirely captured by the public budget and even lead to a further rise in public spending.

Some authors criticized the idea of a bureaucrat relentlessly using budget surpluses to raise the overall output. According to Migué and Bélanger (1974) bureaucrats rather pursue other goals than raising the output public goods and services, as the goal of relentlessly raising the output eventually conflicts with the presumed goal of having larger bureau budgets. Williamson (1964) suggests that the expansion of personnel would be one of them. This would raise the per unit

cost of output and maximize the X-inefficiency or organizational slack (Mueller, 2003, p. 368). Another goal of the bureau could be to have more prestigious office buildings or equipment. The discretionary budget consequently would not be used to raise the overall production of G. It would rather be used directly by the bureau. The reality is probably somewhere in between, where bureaucrats maximize both the discretionary budget as well as the total output. There may of course also exist the more optimistic view that the bureaucrat's utility function not only depends on his own utility but also on the benefits of his sponsor. This view also corresponds to a broad empirical literature in public management showing that public employees compared tend to exhibit a higher degree of intrinsic motivation for their jobs as well as a high commitment to public values (see Weske et al. 2019). The budget maximization assumption however suggests that bureaucrats are highly motivated extrinsically and are solely committed to their own personal goals.

On the other hand, Bretton and Wintrobe (1975) argued that even though the sponsor is considered to have an informational disadvantage compared to the bureau, there are still some monitoring instruments available to ensure a more efficient allocation of the public budget. The difference in the optimal budget for the sponsor and the one being negotiated by the bureaucrat therefore can be reduced. The decisive parameter for the final outcome is the marginal cost of control which will equal the marginal benefit of an additional unit of control. Cappelletti and Soguel (2013) incorporate this idea into their theoretical framework. According to their view, the costs of control or the marginal benefit of controlling the bureau however may not be linear. Cappelletti and Soguel (2013) therefore argue that the costs of control rise disproportionately with the size of a bureaucracy: *“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.”* (Cappelletti and Soguel, 2013, p. 48). Based on this argument, the authors integrate a measure of bureaucratic complexity in their empirical analysis to account for such a relationship. This measure will also be applied in the present empirical analysis. The operationalization of the measure will be explained in the fourth chapter.

### 3 The Fiscal Equalization System of Bern

Like any other canton in Switzerland, the canton of Bern has its own fiscal equalization system that aims at reducing inequalities between different municipalities. Besides the fiscal resources equalization (referred to as disparity reduction) between rich and poor municipalities and a guaranteed fiscal minimum equipment to every municipality on top of that, there exists a set of other important instruments which aim to reduce specific inequalities, compensate difficult geographical and socioeconomic circumstances, and internalise spill over effects between municipalities. All of these instruments have an influence on local public finances and thus need to be accounted for in an empirical analysis. The aim of this chapter is in a first step to present the most important instruments of the fiscal equalization system of the canton of Bern. The second part of this chapter will be dedicated to the reform in the year 2012, which will ultimately be exploited in the empirical analysis. The third sub-chapter will provide some additional information on local public finances in the canton of Bern.

#### 3.1 The Instruments of Fiscal Equalisation System

The legal basis for the intercommunal fiscal equalisation system of the canton of Bern is the law on fiscal equalisation and burden sharing (*german*: “Gesetz über den Finanz- und Lastenausgleich (FILAG)”). The system comprises four pillars aiming to fulfil four different political goals. The first pillar constitutes the core of the fiscal equalisation system and comprises the disparity reduction between rich and poor municipalities with a guaranteed fiscal minimum equipment for the very poor municipalities. The second pillar aims at relieving municipalities bearing special fiscal burdens, which is commonly referred to as fiscal needs equalisation. On the one hand this concerns municipalities with difficult geographical and topological circumstances and on the other hand this concerns bigger cities fulfilling important centre functions to surrounding communities. The third pillar comprises so called associated tasks between the municipalities and the canton. Today there exist a total of 5 different tasks being financed by both the canton and the municipalities. The fourth and last pillar aims at the political goal of promoting the structure-preserving functions of the system as well as promoting municipal mergers.

The first pillar is the main object of analysis of this paper and aims at reducing fiscal disparities between different municipalities. Relatively richer communities are therefore obliged to transfer some fraction of their excess fiscal capacity to relatively poorer municipalities. The exact share of transfers to be received or paid by a municipality is derived by calculating a harmonized tax revenue index for all municipalities. The exact calculation for this index is defined in article

8 of the cantonal law on fiscal equalisation and burden sharing. The harmonized tax revenue index is based on a municipality's harmonized tax revenues. This is done by taking into account all the ordinary tax revenues per capita of a municipality and dividing them with the municipality's corresponding tax rate (or tax multiplier). The tax revenues eligible to calculate the harmonized tax revenue include the individual income and wealth taxes, the corporate gains and capital tax as well as the estate tax for property owners. This aggregate tax revenue is then multiplied by a harmonizing factor, which should equal the weighted average tax rate across all municipalities of the canton. The formulation "should be" is used because the harmonizing factor is determined politically on a year-by-year basis by the cantonal governing council and thus can deviate from the actual weighted average. Finally, the harmonized tax revenue index is calculated by dividing a municipality's harmonized tax revenues with the average harmonized tax revenues across all municipalities of the canton. A simplified formula of this calculation looks as follows:

$$HRI_i = 100 \times \frac{\frac{R_i}{T_i} \times HF}{HR_{BE}}$$

Where HRI is the harmonized revenue index of a municipality *i*. *R* denotes the tax revenues per capita and *T* the corresponding tax multiplier. *HF* refers to the harmonizing index. Finally, the denominator *HR* refers to the weighted average of harmonized tax revenues per capita across all municipalities of the canton Bern (BE). For each variable the average of the last three years is decisive. This smoothens the overall transfers to be paid or received by a municipality. The harmonized estate tax revenues follow a slightly different approach, when being calculated and added to the overall HRI. As the tax base is being defined as the aggregate value of all properties in a municipality, the calculation relies on the official estimates of all properties in a municipality. As the overall logic is still the same, a separate formula will not be depicted here.

Once the index is calculated, every municipality having an index above 100 points must pay a share of 37% of its excess fiscal capacity, whereas poor municipalities profit from transfers corresponding to 37% of the difference between their fiscal capacity to the 100 points. This is the horizontal component of the intercommunal fiscal equalisation system of the canton of Bern. The disparity reduction is being referred to as horizontal, because these transfers are solely financed between the municipalities themselves. On top of that, there is a vertical component being financed by the cantonal government. Municipalities which do not reach a fiscal capacity of 86 points (or 80 points until 2011) after the fiscal disparity reduction are granted a minimum equipment filling up the missing capacity to 86 points. This ensures that every municipality will

reach a certain minimum level of fiscal capacity. Most of the empirical literature on the flypaper effect analyses the impact of vertical upper-level transfers to lower-level jurisdictions. The empirical analysis of Cappelletti and Soguel (2013), which analyses the impact of purely horizontal transfers therefore constitutes an exception. This paper analyses the impact of both horizontal and vertical transfers. Theoretically it should not make any difference to the recipient communities where the transfers come from. The most important prerequisite for a consistent analysis lies in the form of transfers. The transfers need to be granted as general lump-sum transfers to hold Bradford and Oates (1971) theoretical assumptions on the impact of lump-sum transfers valid.

However, according to article 35 of the law on fiscal equalisation and burden sharing the cantonal government is allowed to cut minimum equipment transfers either partially or fully if a municipality is in a very good financial situation. Before the reform in the year 2012 the requirement for such a cut was a below average municipal tax multiplier. The requirement has been amended with the reform in 2012 to a more refined one. Nonetheless, article 35 might have some distorting impact on the later empirical analysis, as communities have an incentive to pursue a budgetary policy of high tax rates and high expenditures to receive minimum equipment transfers. Luckily, these municipalities whose total transfers are restricted due to article 35 can easily be accounted for. Table 1 shows some descriptive statistics of the disparity reduction and the minimum equipment for the years 2008, 2012 and 2016. The mean values of transfers are per capita values.

As one can see in table 1 the ratio between grantee and grantor communities is quite stable across time. The volume of the disparity reduction slightly increased over time. This was mainly caused due to a falsely specified harmonizing factor, which led to an overextension of the fiscal equalisation system. The details will be explained in the next sub-chapter on the reform. The mean transfers of the disparity reduction increased too, as the equalisation rate has been adjusted to 37% in 2012. The number of municipalities being granted a minimum equipment increased between the year 2008 and 2012 by around 28%. This is also due to the reform in which the guaranteed minimum equipment was increased from 80 to 86 points. However, the mean transfer dropped considerably by around 26%. This is on the one hand the result of higher transfers in the disparity reduction, which reduce the transfers needed to guarantee a minimum equipment. On the other hand, this was again a consequence of the falsely specified harmonizing factor which led to some severe distortions. Generally, besides the distortions of the falsely specified harmonizing factor and the temporary effects due to the reform of 2012 which will be

analysed in more detail later, the cantonal fiscal equalisation system of the canton of Bern seems to generate quite stable transfers over time.

Table 1: Descriptive statistics of transfers of the first pillar of the fiscal equalization system

	2008	2012	2016
<b>Disparity reduction</b>			
Equalisation rate	25%	37%	37%
Total volume (CHF)	76.30 mio.	95.95	102.15 mio.
Number of grantees	336	325	299
Mean transfer to grantees (CHF)	200.53	239.00	235.24
Number of grantors	59	57	53
Mean transfer of grantors (CHF)	181.86	200.84	226.00
<b>Minimum equipment</b>			
Guaranteed minimum HRI	80	86	86
Total volume (CHF)	32.13 mio.	35.67 mio.	34.55 mio.
Number of grantees	153	196	166
Mean transfer	281.71	207.71	208.96
Total number of municipalities	395	382	352

Source: Cantonal Finance Administration of the Canton of Bern

Figure 3 depicts the two mechanisms of the fiscal equalisation system graphically. The black 45-degree line shows the initial situation with all the municipalities being ordered according to their fiscal capacities. The blue line depicts the situation after the disparity reduction. Municipalities with a HRI under 100 points profit whereas municipalities with a HRI above 100 points must transfer some of their excess fiscal capacity to the horizontal disparity reduction. The green line shows the minimum equipment, which is granted to every municipality having an HRI under 86 points after the disparity reduction.

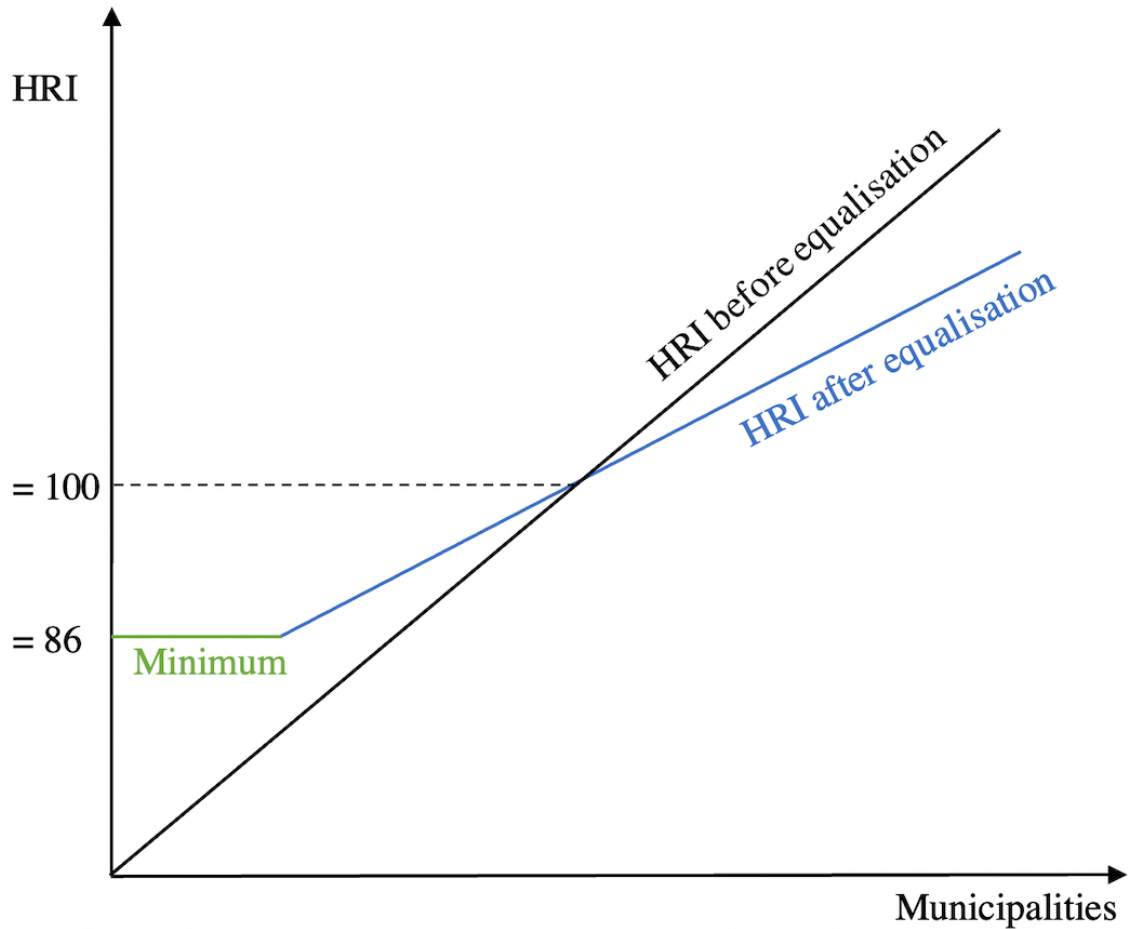


Figure 3: Graphical illustration of the first pillar of the cantonal fiscal equalisation system

From the graphic illustration above we can also see that the incentive structure varies among municipalities with differing fiscal capacities. A popular measure to approximate a municipality's incentives to spend is the tax price of public spending which has already been elaborated in chapter 2.2. With the tax price of public spending being defined as  $p_g - (t/g)$ , where  $p_g$  denotes the pre-transfer tax price (assumed to be one),  $t$  denotes the transfers and  $g$  denotes the total public expenditures, a municipality's tax price of public spending with an HRI above 100 points is greater than 1. This is because its fiscal capacity is not disposable on a one-to-one basis, as the municipality must transfer some share of its excess fiscal capacity into the disparity reduction. Assuming a municipality with an HRI of 150, its tax price of public spending would be  $1 - \left( -(50 \times 0.37) / 150 \right) = 1.123$ . However, as the tax price implicitly assumes transfers to depend on the level of government spending (like in the case of a matching grant) it has more of theoretical than practical value. If one is on the other hand interested in the marginal effects of change in the fiscal capacity, there is another popular measure which describes a



municipality's incentives to attract tax bases to increase its fiscal capacity. This so-called marginal absorption rate has much more practical value.

The marginal absorption rate measures how much of a municipality's marginal gains in fiscal capacity are absorbed by a fiscal equalisation system, either due to higher transfers to be paid or reduced transfers to be received (Rühli et al., 2013, p. 37). In a system like the one in the canton of Bern, with a constant equalisation rate of 37%, the marginal absorption rate corresponds to exactly this number. Municipalities with an HRI above 100 points are obliged to pay 37% of the excess fiscal capacity into the disparity reduction. Therefore, one additional unit of fiscal capacity to such a community would only lead to a net gain of taxable fiscal capacity of 0.63 points. The same applies to municipalities with an HRI between 86 and 100 points. Every additional unit of fiscal capacity to such communities lead to a simultaneous reduction of transfer payments by 0.37, again resulting in a net gain of taxable fiscal capacity of 0.63 units. The marginal absorption rate is thus 37% for all municipalities with a HRI above 86. However, municipalities which profit from the minimum equipment have a marginal absorption rate of 1. Every additional unit of fiscal capacity will reduce the minimum capacity payments on a one-to-one basis.

The previous calculation of the marginal absorption rate is based on a municipality's harmonized tax revenues. In a next step one could also calculate the marginal absorption rate with regards to the effective revenue effects a marginal change in fiscal capacity produces. This rate might deviate from the harmonized rate, as the tax rates vary between different municipalities. A municipality that raises a below average tax rate will have a higher marginal absorption rate in terms of effective revenue changes than a municipality with an average tax rate (Rühli et al., 2013, p. 37). Assuming a municipality that has its tax multiplier at 50% of the cantonal average (or the harmonising factor), a marginal increase of one unit of fiscal capacity would not lead to a net gain of 0.63 in revenues, but to an increase of only 0.315 of additional revenues. This is due to the fact that the marginal increase in fiscal capacity is only being taxed at 50% of the cantonal average. The marginal absorption rate in terms of effective revenue effects for a municipality is therefore depends on the respective tax rate being raised in a municipality. For a municipality being eligible to the minimum equipment, a marginal change in fiscal capacity hence might even lead to a change in effective revenues greater than 1, if the municipality applied a tax rate that is lower than the cantonal average. The incentives to ameliorate site attractiveness to high tax paying individuals or corporations is therefore highly disturbed.

Generally, tax competition in terms of attracting fiscal capacity loses its importance in a federally organised state with a fiscal equalisation system. In Switzerland there has recently been

triggered a debate by a paper of Leisibach and Schaltegger (2019) who analysed the incentive structures of the national fiscal equalisation scheme by calculating the marginal absorption rates of all cantons in terms of the specific revenue effects. According to their computations, some fiscally weak cantons would actually lose revenues, if a new corporation decided to locate its site in the canton and ameliorate the canton's fiscal capacity. This is also one of the predominant points of dispute concerning fiscal equalisation systems. On the one hand, critics of fierce tax competition argue that the weakening of this competition constitutes an integral part of every equalisation system, as it further contributes to the national unity. Advocates of tax competition on the other hand worry that beneficial effects of this competition like the sustained care of site attractiveness and the efficient provision of public goods might be weakened and lead to an overall welfare loss. As a matter of fact, the flypaper effect represents another important indicator of such inefficiencies induced by a fiscal equalisation system. The phenomenon shows that transfers tend to be spent inefficiently compared to standard median voter assumptions.

The second pillar of the fiscal equalisation system comprises transfers to municipalities bearing special fiscal burdens. This concerns municipalities with difficult geographical and topographical living circumstances as well as cities with important centre functions to the surrounding communities. Municipalities whose population density lies below 80% of the median are granted an extra transfer. The same applies to municipalities with sparse settlement structures measured by the length of roads per capita. Municipalities with roads per capita being longer than 80% of the median are granted an extra transfer. This transfer is however cut linearly between an HRI of 140 to 160. Municipalities with an HRI above 160 are not eligible for this program. Furthermore, until the year 2011 the transfers for geographical and topographical living circumstances were only granted to municipalities with some minimal tax rate height. As this legal condition clearly gave negative incentives to lower tax rates it has been abolished with the reform in 2012. Furthermore, the total volume of transfers has been tripled with the reform in 2012, as the cantonal government decided to abolish dues to the maintenance of municipal roads. As a result, the number of municipalities being eligible to this transfer program rose significantly from 137 in 2011 to 242 in 2012. The total volume amounts to 11.5 mio CHF in the year 2011 and 38.7 mio CHF in the year 2015 (Ecoplan, 2017, p. 24-25). Like the minimum equipment transfers, the transfers for difficult geographical and topographical are still subject to article 35 of the law on fiscal equalisation and burden sharing, meaning that they may be cut by the cantonal government if municipalities are in a very solid financial situation.

The compensation to cities with important centre functions consists out of two parts. On the one hand there is a direct transfer to the cities of Bern, Biel and Thun. These cities are the

biggest ones in the canton and considered to fulfil important functions to the surrounding region like for instance broad cultural offers. The cities are thus being compensated for their positive externalities or spill over effects to their surrounding communities. As a matter of fact, until the year of 2012 these centre transfers were partly financed by the surrounding municipalities by 25% to account for this externality character (Ecoplan, 2017, p. 22). The second part of the compensation for cities with centre functions also applies to the cities of Burgdorf and Langenthal. Contrary to the first program, this program does not comprise a direct transfer, but an indirect discharge on the calculation of the harmonized revenues. Due to this discharge the fiscal capacities of these five cities are artificially reduced which leads either to an increased disparity reduction transfer for relatively poor cities ( $HRI < 100$ ) or a reduced equalisation transfer for relatively rich cities ( $HRI > 100$ ). As it has already been elaborated before with the marginal absorption rates, the discharge can easily be converted to a specific transfer. For cities having an HRI above 86 points after the disparity reduction, every discharge in its harmonized revenues corresponds to a net gain of 37% in fiscal capacity of this discharge, as the marginal absorption rate corresponds to 37% (the equalisation rate). If a city had an HRI below 86 points after the disparity reduction, a discharge on the HRI would therefore lead to a one-to-one reduction of the minimum equipment transfers. As no city has a HRI below 86 after the disparity reduction, the calculation for the net gains needs no extra step.

Since the reform in the year of 2012 there also exists a third program in the second pillar of the equalisation system, which aims at relieving municipalities bearing high socioeconomic costs. These costs may be caused by higher shares of unemployed people, foreigners and people receiving special assistance for their retirement. This so-called socio-demographic grant has been implemented in the course of some changes in the third pillar of the equalisation system. While most of such socioeconomic costs have been borne commonly between all municipalities and the canton as an associated tasks until the year 2011, the reform in 2012 aimed at increasing the incentives for municipalities to lower such costs. This happened through different amendments in the third pillar of the equalisation system. The sociodemographic grant therefore was founded as an accompanying measure in order to prevent that some municipalities had to bear to high costs. The total volume only amounts to 12.7 million CHF in the year 2015 (Ecoplan, 2017, p. 26). This is a rather small amount of money compared to the other programs.

All of these three programs of the second pillar are quite common features of cantonal fiscal equalisation schemes across Switzerland. They can easily be accounted for in the empirical analysis. However, it is not quite clear how exactly the programmes of the second pillar should be accounted for, as their impact on the public budget constraint are rather unclear. On the one

hand, as all these programs comprise lump-sum transfers one could argue that they just should be added to the equalisation and minimum equipment transfers to a total net transfer. On the other hand, especially the transfers to sparsely populated municipalities with long roads can be considered endogenous. Furthermore, the distortive legal condition of a minimum tax rate in order to be eligible to the geographical and topographical transfers clearly gave incentives for higher tax rates and thereby higher expenditures. This bears a potential risk of an upward bias concerning the transfer elasticities. Therefore, the transfers of the second pillar will be included as separate controls to prevent such an upward bias.

The third pillar of the fiscal equalisation system of the canton of Bern concerns associated tasks between the municipal and the cantonal level which are to be financed bilaterally between the canton and the municipalities. There are a total of five different associated tasks: Teacher wages, social assistance, social security (including family allowances), public transport and a special fund which was founded in 2012 to account for a new task distribution framework between municipalities and the canton. As the canton bears a relatively higher burden in fulfilling some tasks since 2012, municipalities are obliged to compensate for this extra burden in the latter fund (Ecoplan, 2017, p. 43). For most tasks both the municipal and the cantonal share of the financing is 50%. The share of the municipalities is being paid on a solidary basis according to their population share. This means that the transfers of the municipalities to the funds of the associated tasks affect each municipality's local budget constraint equally. Therefore, the financing of these associated tasks should not have any distorting influence on the empirical analysis.

However, the spending sides of the funds bear potential risks of distortions for the empirical analysis, as the money is not being distributed equally among all municipalities. The fund for public transport induces no redistributive effects between municipalities, as the money flows directly into cantonal projects of public transport which do not show up in the financial statements of the municipalities (Ecoplan, 2017, p. 42). Regarding the fund for social security, the biggest part of the fund flows into special assistance for retired people. This assistance is based on federal law and granted by the cantonal compensation fund. The administration of the individual assistance to the population is done by local administrative branches, which often comprise multiple municipalities. As these administrative branches belong to the cantonal compensation fund, the money flows of the social security fund do not show up in the yearly financial statements of the municipalities. The social security fund therefore has no impact on the empirical analysis. Regarding the fund for teacher wages a concrete assessment of the redistributive effects between municipalities is not possible. The only estimations available have been

conducted between different administrative districts and are estimated to amount at a maximum of 16 CHF per capita (Ecoplan, 2017, p. 32). The redistributive effects of this fund are therefore rather small and should be no bigger source of concern to the empirical analysis. A concrete assessment of the redistributive effects between municipalities is as already mentioned unfortunately not possible.

The greatest source of concern is the fund for social assistance, which is being distributed very unequally among different regions. Most of the money flows to urban regions, namely bigger cities like Biel, Bern and Thun. The estimated balance of these money flows amounts to a surplus of 499 CHF per capita in Biel in the year 2015 (Ecoplan, 2017, p. 37). This is a considerable amount of money. However, as the administration of the social assistance payments is being done by 69 different administrative services, each of which includes the social assistance service of multiple municipalities together, a concrete assessment of the redistributive effects between municipalities would only be possible on the level of these administrative services. The simplest and probably even most accurate way to account for these redistributive effects on the municipal level therefore is to include the share of the population receiving social assistance in a municipality. This data is being provided from the federal statistical office.

Finally, the fourth pillar of the cantonal equalisation system aims at promoting the structure-preserving functions of the equalisation system as well as promoting municipal mergers. However, the fourth pillar does not comprise any concrete legal instruments to fulfil the first goal. The first goal of this pillar is rather a formality, as it results from programmes of the first three pillars. For the second goal there are some legal instruments available to be found in Article 34 and 35a of the cantonal law on fiscal equalisation and burden sharing. On the one hand, the cantonal government may grant a compensation to merged municipalities if they experience severe losses in transfers of the minimum equipment or transfers of the second pillar. Furthermore, the cantonal government may grant project-related grants up to 120'000 CHF to municipalities that prepare a municipal merger. On the other hand, the cantonal government is also allowed to cut transfers to municipalities that resist to engage in political negotiations for a municipal merger. These are again potential sources of distortions in the later empirical analysis. Municipalities that participated in a municipal merger or have been newly founded during the analysed period will therefore be excluded from the empirical analysis. This has also practical reasons. Important data sets from the federal statistical office like for instance the share of the population receiving social assistance do not comprise municipalities that do not exist anymore on their own. An inclusion of these municipalities would hence not be impossible. On the other hand, newly founded municipalities or municipalities that kept their name after a

municipal merge will be excluded too to remain consistent. The number of municipalities having merged to new municipalities is quite high. Altogether there have been founded 17 new municipalities due to at least one municipal merger during the period between 2008 and 2017. These 17 municipalities are comprised of 58 different former municipalities. The total number of municipalities hence dropped from 395 in the year 2008 to 351 in the year 2017.

### **3.2 The Reform and the Estimated Treatment Effects**

The reform of equalisation system in the year 2012 brought some important changes, especially when it comes to the mechanisms of the disparity reduction and the minimum equipment. Hence it is important to have a closer look on the different changes if they are to be exploited in an empirical analysis. In fact, as there have been made changes to three very important parameters of the first pillar, there are also effects at work which make the analysis slightly more complicated. As some changes in parameters tend to counteract each other, the magnitude of the treatment in the difference-in-difference approach will be a little weaker than one would expect on first sight. This is potentially problematic as a little sized treatment will possibly lead to a lack of statistical power. Nonetheless it is worthwhile to try to exploit such a unique reform to contribute to the empirical literature of the flypaper effect.

The greatest need for a reform in the first pillar of the fiscal equalisation system probably lied in a falsely specified harmonizing factor. As already explained in the previous chapter, the harmonizing factor is to be defined by the cantonal governing council year-by-year and should correspond to the weighted average of all municipal tax multipliers across the canton. This principle is mandated in the cantonal law. However, due to some political rigidities the harmonizing factor never changed and tended be inflated compared to the actual weighted average of municipal tax multipliers. Until the year 2011 the harmonizing factor remained unchanged at 2.4. The actual weighted average of municipal tax multipliers however was 1.65. It is unclear why the harmonizing factor was kept unchanged. Generally, it makes little sense that this variable is determined politically. Every fiscal equalisation system needs some sort of harmonizing factor in its allocation formula to calculate the harmonized fiscal capacities. Usually, such factors are not a variable that is being determined politically in a fiscal equalisation system.

A harmonizing factor that does not correspond to the real weighted average of the tax multipliers can lead to undesirable side effects. Until the year 2011 the too high harmonizing factor led to considerable distortions in the disparity reduction and the minimum capacity. It generally led to an inflation of the total volume of transfers, as the harmonized tax revenues per capita were inflated. Furthermore, poor municipalities profiting from the minimum capacity eventually

ended up with a higher actual HRI (measured with a true HF = 1.65) than municipalities in the middle of the distribution that originally were richer (Ecoplan, 2007, s. 42). Such an outcome is clearly undesirable as it could be considered unfair. There was hence strong need to adjust this problem and lower the harmonizing factor to a new true value of 1.65.

Figure 4 illustrates the problem graphically with data from the year 2005. The graph and its two example municipalities are taken from an evaluation report of 2008 conducted by the consulting and research bureau Ecoplan. Before the fiscal equalisation the two municipalities Saxeten and Müntschemier both received disparity reduction transfers which lifted their HRI from 31.73 to 48.74 points and from 74.89 to 81.17 points respectively. After that, Saxeten was to receive a minimum equipment transfer lifting its HRI to 80 points. However, when having a look on the total amount of transfers compared to the actual harmonized tax revenue index specified with a correct harmonizing factor of 1.65, Saxeten ends up with a higher effective HRI than Müntschemier. The falsely specified harmonizing factor therefore led to an overextension of the total volume of transfers, especially those of minimum equipment (Ecoplan, 2007, p. 41-44).

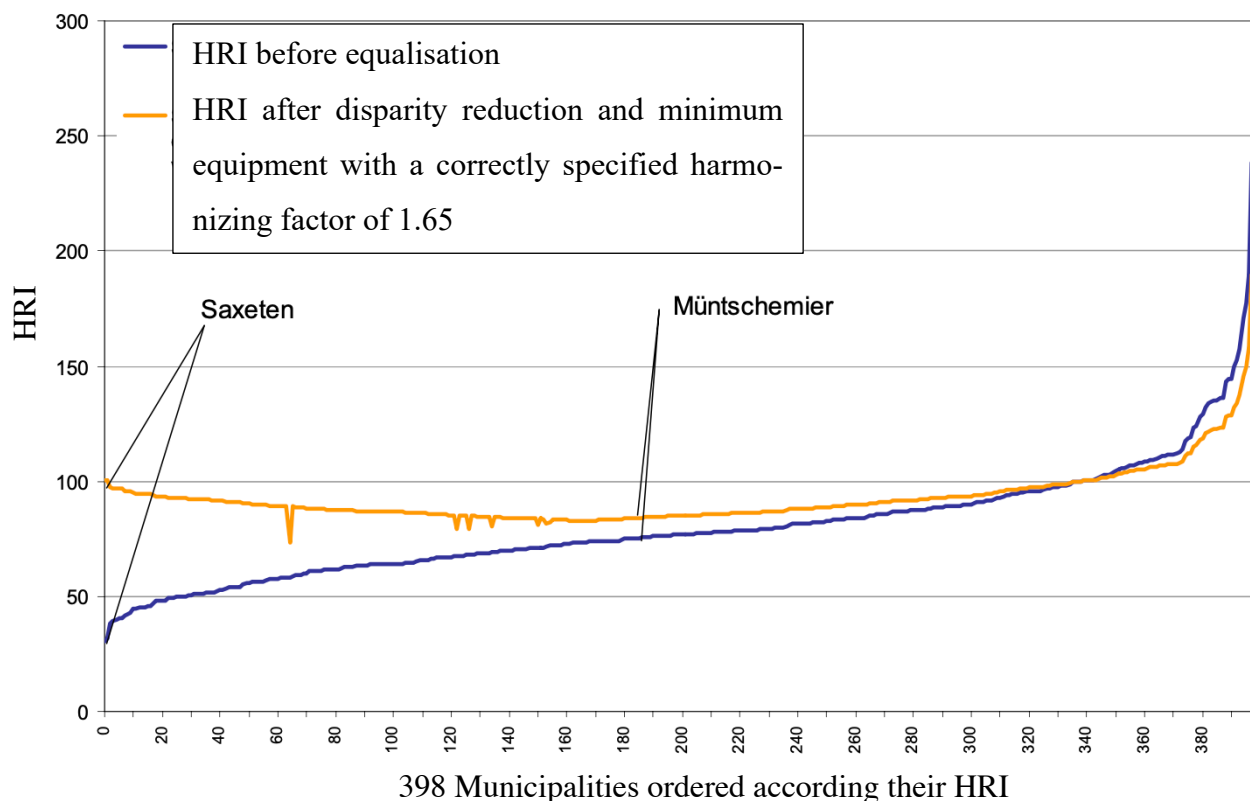


Figure 4: Plot of the distortive effects of the falsely specified harmonizing factor  
(Source: Ecoplan, 2007, p. 43)

However, an adjustment of the harmonizing factor to 1.65 bears problematic effects itself. As the poorest municipalities like Müntschemier ended up at an effective harmonized revenue index of almost 100 points, an adjustment without any counter measures would have led to considerable fiscal shocks to the weakest communities. These municipalities would have lost a fifth of their *ex post* fiscal capacities if the minimum equipment had remained unchanged at 80 points. Therefore, there was need for some accompanying measures to weaken this shock. Eventually, two different accompanying measures were applied. On the one hand the equalisation rate of 25% was raised to 37%. This ensured that the total volume of transfers remained at the same level. On the other hand, the minimum equipment was raised from 80 to 86 points to weaken the fiscal shock of the adjusted harmonizing factor to the weakest communities.

One can now clearly see that the changes in these three important parameters lead to several difficulties concerning the empirical analysis. At least it is quite unclear on first sight how the different changes affect the total net transfers. The raised minimum equipment presumably only results in a positive treatment effect for some municipalities having an HRI just below 80 points after the disparity reduction. However, as the equalisation rate was raised from 25% to 37%, the total difference between the HRI *ex post* the disparity reduction and the threshold of 86 points for the minimum equipment will be reduced after 2012. This will have a negative impact on the total treatment size. In fact, the average HRI *ex post* the disparity reduction for all recipient communities is on average 3.5 points higher due to the raised equalisation rate of 37% after 2012. Therefore, the effect of the raised minimum equipment is presumably only half as big. As the total volume of transfers remained the same after the reform, there has happened a redistribution from the poorest municipalities to the less poor municipalities. The reform hence resulted in an overall loss of transfers for the poorest municipalities. For municipalities with an *ex ante* HRI near 100 points, the reform probably had no significant impact on the transfer height, as the amount of transfer these municipalities receive is relatively low. To sum it up, a concrete assessment of the individual effects of each parameter change on the transfer height is impossible and would go beyond the scope of this work. Considering these difficulties, the treatment size of the reform in terms of a change in net transfers therefore can only be estimated empirically.

Table 2 shows total average predicted transfers per capita before and after the reform for municipalities within different ranges of 5 HRI points *ex ante* the fiscal equalisation. Therefore, the average HRI has been calculated for every municipality. The values are estimated empirically with a simple regression equation having the following form:



$$FT = \beta_0 + \beta_1 Post2012 + \varepsilon$$

Where variable  $FT$  denotes the fiscal transfers per capita and variable  $Post2012$  denotes a dummy taking the value of 1 for every year after 2012. The coefficient  $\beta_1$  should therefore give an empirical estimate of the changes in transfers due to the reform.

Table 2: Empirical estimates of the change in transfers

HRI-range	Observations	Constant	Post 2012	t-value
HRI 100-105	110	-15.27 CHF	3.33 CHF	0.45
HRI 95-100	150	30.29 CHF	-7.70 CHF	- 1.14
HRI 90-95	250	68.96 CHF	- 6.35 CHF	-1.28
HRI 85-90	170	92.11 CHF	25.23 CHF	2.86
HRI 80-85	380	143.75 CHF	26.40 CHF	5.68
HRI 75-80	350	191.58 CHF	51.57 CHF	6.35
HRI 70-75	360	258.62 CHF	81.36 CHF	8.58
HRI 65-70	280	413.17 CHF	45.66 CHF	3.70
HRI 60-65	220	593.99 CHF	-15.48 CHF	- 0.91
HRI 55-60	180	716.12 CHF	-19.15 CHF	- 1.37
HRI 50-55	130	900.75 CHF	-74.12 CHF	- 5.59
HRI <50	140	1190.46 CHF	-226.60 CHF	- 9.31

Notes: The table reports 12 different individual estimates according to HRI ranges of 5 points.

The first column of the table indicates the different ranges of 5 HRI points. The second column shows the number of observations within that range. The third column show the constant of the estimate, being interpreted as the pre 2012 status. The fourth column shows the estimated coefficient for the variable  $Post2012$  which can be interpreted as the average change in transfers due to the reform. The fifth column shows the t-statistics of the estimated coefficients.

As was suspected before, the average change in transfers is relatively small and insignificant for the municipalities having and HRI near 100 points. The differences then start to rise steadily up to roughly 81 CHF per capita for all municipalities having a mean HRI between 70 and 75 points before the fiscal equalisation. This finding is consistent to the previous reasoning that this range will profit from both an increased minimum equipment after the disparity reduction as well as some redistribution of the total transfer volume from the poorest municipalities, which will not pass the *ex post* HRI of relatively richer municipalities anymore. The losses of

transfers for the poorest communities even exceed the gains for the winning communities and amount to 226 CHF per capita. This is a considerable loss in available income. All in all, the reform of the fiscal equalisation system constitutes an interesting policy experiment having created winners, losers as well as a group that has not been affected significantly by the reform. This will be the basis for the later difference-in-differences approach.

Whether an assignment into control and treatment groups based on the HRI index is valid, will be discussed more closely in chapter 4.3. However, a first point of critique must be already dealt with at this point of the paper. This concerns the question whether the HRI remains stable among municipalities before and after the reform. This is actually the case for the ranges that will act as control and treatment groups. The HRI of municipalities with an average HRI between 70 and 75 points (first treatment group), below 50 points (second treatment group) and between 95 and 105 points (control group) show no significant changes in their HRI before and after the reform. An assignment into treatment and control groups according to their HRI is therefore a valid approach.

### **3.3 Accounting Standards of Local Public Finances in the Canton of Bern**

In the year 2016 the municipalities in the canton of Bern changed their accounting standards from HRM1 to HRM2 (HRM *german: Harmonisiertes Rechnungslegungsmodell*). The reform aimed at improving the comparability of local public finances across municipalities of Switzerland and therefore defines for instance clear depreciation rates for assets in the yearly financial statements (Cantonal Office for Municipalities and spatial planning, 2010). As far as concerns the main variables of interest of the accounting data like for instance the total expenditures per capita, the reform did not cause any radical changes to the interpretation. However, as municipalities anticipated the stricter rules concerning depreciation rates, many municipalities made extraordinarily high write-offs that amount to 200 CHF on average in the year of 2015 (see Figure 10 in appendix). Generally, even though there exist harmonized accounting standards, the comparability of specific accounts between different municipalities is still limited, as especially smaller municipalities do not classify all of their expenditures to the respective accounts.

## 4 Empirical Section

### 4.1 Operationalisation of main variables of interest

The data set for the baseline estimates is comprised of all municipalities that show positive net transfers from the disparity reduction and the minimum equipment on every year between 2008 and 2017. The total number of municipalities having positive net transfers during the period of analysis is 233. As municipalities that took part in a municipal merger are excluded from the data set due to availability of data and potential distortions, the data set consists of a balanced panel of 2'330 observations. As usual in the literature on the flypaper effect, observations with negative net transfers are excluded from the analysis. As already mentioned in the introductory chapter, there are some empirical contributions analysing the impact of cuts in transfers or negative transfers. This is basically the situation grantor communities are in. The empirical setting of this paper also provides the possibility to analyse the impact of a significant decrease in transfers on local expenditures. However, as it is unclear at the moment whether negative transfers trigger the same effects as positive transfers, grantor communities will be excluded from the analysis. Furthermore, Cappelletti and Soguel (2013) exclude the grantor communities from their analysis due to high collinearity between the transfer and the median income. In their case this makes sense, as recipient municipalities are also granted transfers on the basis of needs that do not necessarily correlate with the median income. As far as concerns the present empirical setting, a potential problem with collinearity between transfers and the median income can not be ruled out and definitely needs to be accounted for.

Regarding the data on local expenditures there are different possibilities available. First, one might differentiate between total expenditures per capita and current expenditures per capita. Both measures are being used in the empirical literature on the flypaper effect. This paper will use total expenditures per capita as dependent variable for two different reasons. On the one hand, there exists a lack of data measuring the current expenditures (year 2015 is missing) and as the accounting standards changed in 2016 this most probably has an influence on the measurement of current expenditures per capita. On the other hand, expenditures per capita seem to attract much more attention in public debates. Nearly all municipal governments must approve the public budget via a public referendum, sometimes even in community meetings, where the focus is always put on total expenditures per capita rather than current expenditures. The total expenditures eventually also determine whether a budget is balanced or not. This strong linkage between total expenditures per capita and democratic politics, which are theoretically an aggregate of the median voter's interests, give support to total expenditures per capita as dependent variable rather than current expenditures.

In a second step one could also analyse the impact of transfers on different categorisations of expenditures. However, these categorisations are often highly unreliable and incomparable between different municipalities, as municipalities may assign comparable expenditures differently. Especially smaller municipalities do not assign public servants to the specific accounting categories. Furthermore, due to the reform of the accounting standards in the year 2016, the different accounts might have undergone administrative changes, which could lead to distortions. This is not the case for total expenditures per capita. The focus of this paper therefore remains on total expenditures per capita.

Besides the data on median incomes, all data is publicly available data either from the cantonal or the federal administration. The data on median incomes had been provided from a project that uses individual tax data of the canton of Bern. The net transfers per capita are computed by adding the disparity reduction transfers and the minimum equipment transfers. The data on local tax multipliers will only be used for the difference-in-differences analysis. Table 3 shows some descriptive statistics of the main variables of interest.

Table 3: Summary statistics on the main variables of interest

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Expenditures per capita	2'330	4'376.71	1'068.58	2'505.41	10'445.51
Local median income	2'330	54'929	6'294.18	21'278.50	71'158.00
Net transfers per capita	2'330	387.63	291.40	2.39	1'578.40
Local tax multiplier	2'330	1.77	0.18	0.90	2.28

Notes: The table reports summary statistics for the main variables of interest indicating the number of observations, mean, standard deviation, minimum and maximum values. The values of Expenditures per capita, Local median income and Net transfers per capita are in CHF and at constant prices of 2008.

Source: Cantonal finance administration and cantonal tax administration.

The operationalisation of the categorical variable indicating bureaucratic complexity follows the approach of Cappelletti and Soguel (2013). They proxy bureaucratic complexity with two dummies that capture high or low expenditures per capita for public servants. First, the natural logarithm of expenditures per capita for personnel expenses is calculated to reduce distortive impacts of outliers. After that the average value of the logarithm of personnel expenses is calculated for every recipient municipality in every year. Municipalities whose personnel expenses in a specific year exceed the overall average expenditures by one standard deviation are considered to have a complex bureaucracy. Municipalities whose personnel expenditures are below one standard deviation of the overall average are considered to have an uncomplex bureaucracy.

All observations in between will take on the values of 0 for both dummies. Table 4 shows the categorisation of municipalities according to their bureaucratic complexity by every year during the analysed period:

Table 4: Categorisation of municipalities according to bureaucratic complexity

Year	Obs.	Mean	St. Dev.	Complex	Average	Uncomplex
2008	233	6.36	0.39	33	179	21
2009	233	6.41	0.39	33	182	18
2010	233	6.41	0.40	30	180	23
2011	233	6.42	0.41	30	185	18
2012	233	6.42	0.43	30	185	18
2013	233	6.43	0.42	28	188	17
2014	233	6.42	0.43	27	191	15
2015	233	6.45	0.44	30	186	17
2016	233	6.44	0.45	30	185	18
2017	233	6.44	0.46	29	186	18

Notes: The table reports summary statistics for the natural logarithm of personnel expenses of recipient municipalities by year indicating the number of observations (measured as number of municipalities), mean and standard deviation. The columns complex, average and uncomplex refer to the fraction of municipalities with complex, average and uncomplex bureaucratic structures.

Source: Cantonal finance administration.

One fact that immediately stands out when looking at the categorisation of municipalities according to their bureaucratic complexity is the persistent higher share of municipalities with complex bureaucracies compared to uncomplex bureaucracies. This is because the distribution of the logarithmic personnel expenses is heavily left skewed. The kurtosis is furthermore negative which explains the relatively low share of complex and uncomplex bureaucracies compared to average bureaucracies. Regarding those municipalities which have extremely low personnel expenses, there is a potential for a bias which has also been identified by Cappelletti and Soguel (2013). Especially very small municipalities are known for externalising some of the wage costs through outsourcing or through the associated fulfilment of tasks with other municipalities. These expenditures hence will not be captured by the account for personnel expenses but rather by some other account which captures the expenses for the respective task. Cappelletti and Soguel (2013) however argue that this does not undermine the validity of the proxy, as they assume that the cost of control for these municipalities is highly minimized. In fact, one

might even argue that there is no bureaucratic power involved if services are outsourced to private agents that act in a completely competitive environment.

## **4.2 Operationalisation of Control Variables**

The data set includes a total of eight different control variables. The first variable of control is the natural logarithm of the population size. The influence of the population size on expenditures is not quite clear. If the population size would not change over time, the variable would be redundant as the variance in population size would be accounted for by municipality fixed effects. The population size however can change over time. On the short term this would lead to a mechanical change in expenditures per capita downwards. The general influence of the population size on expenditures is however unclear. On the one hand it could be argued that bigger population sizes could lead to economies of scale, as fixed costs are shared among a greater population (Oates, 1972). On the other hand, there may also be congestion effects at work, which let the economies of scale erode. Furthermore, as already mentioned in the previous chapter, cities are being compensated for their centre functions in the fiscal equalisation scheme. This is consistent to the idea, that cities have to bear higher costs due their important functions to the surrounding areas. If both mechanisms are true, economies of scale as well as congestion effects, a u-shaped relationship between population size and expenditures per capita can be assumed. Such a relationship is best captured with a quadratic polynomial in the regression equation. Even though the assumed relationship is true when being tested empirically, the quadratic specification does not add to the overall explanatory power of the model compared to the natural logarithm of the population size. Therefore, only the natural logarithm of the population size will be included in the model as a control variable.

The second and third control variable account for the age distribution among the population, which is considered to have an influence on local spending (Weicher, 1970). The usual approach to account for such demographic influences on public expenditures is to control for the fraction of young and old people in the population. This paper follows the operationalisation of Baskaran (2012) and Cappelletti and Soguel (2013) who control for the fraction of young people being younger than 15 years old and the fraction of people being older than 65 years. This corresponds basically to the fraction of the population which still goes to school and the fraction which is already retired. The federal statistical office gathers detailed data on the age structure for every municipality since the year 2010. As the data set starts with the year 2008, the age structure for the two preceding years has been imputed according to its subsequent trend. If the

age structure would not be included in the data set, this could lead to an overestimation of the flypaper effect (Hamilton, 1983).

The next three control variables account for transfers of the second pillar of the fiscal equalisation system of the canton of Bern. As already mentioned in the previous chapter explaining the different pillars of the fiscal equalisation system, the second pillar comprises transfers to municipalities with special burdens. This includes transfers to cities fulfilling important centre functions, transfers to compensate for difficult geographical and topographical living circumstances and a newly founded transfer program in 2012 to compensate high socio-economic costs. The control for transfers to cities fulfilling important centre functions includes both the direct transfers to three biggest cities as well as the discharge on the HRI, which has been converted to a net transfer following the explanations in chapter 3.2. As some of these transfers could be considered endogenous, they are included as separate controls rather than added to the net transfers. This prevents a potential overestimation of the flypaper effect. The geographical and topographical living circumstances are time invariant and are thus already being accounted for with the municipal fixed effects. However, as the transfers for difficult geographical and topographical living circumstances vary over time and the overall volume tripled after 2012 it is important to include them as a control.

The sixth control is supposed to capture the political preferences of municipalities. This variable seems crucial considering the potential endogeneity problems that could be caused due to tax competition. Municipalities with higher spending preferences *ceteris paribus* need to set higher tax rates. This in turn would lead to an erosion of tax bases which eventually triggers higher equalisation transfers. However, many empirical contributions in the literature on the flypaper effect forego the inclusion of a political control. Cappelletti and Soguel (2013) for instance argue that the municipal fixed effects already capture the influence of political preferences on public expenditures. But this is true only if political preferences are time invariant, which seems a rather unrealistic claim. This paper therefore tries to proxy potential variance in political preferences with the share of leftist parties at national elections. This includes the voter shares of the socialist and the green party, which are the most influential leftist parties in the canton of Bern. Unfortunately, there is no suitable data set that contains voter shares of leftist parties at cantonal elections. The same applies to municipal elections. The inclusion of municipal elections results would be problematic anyway, as the share of independent candidates is much higher on the municipal level (Linder, 1999, p. 100). The voter shares of the national elections are therefore simply extended for the three subsequent years. Even though the overall variance

is considerably reduced with such an operationalisation, the proxy could still provide some useful insights.

The seventh control comprises the share of the population receiving social assistance payments. The inclusion of this control is critical, as social assistance is an associated task being financed on a solidary basis by municipalities and the canton together. As already explained in the third chapter on the different instruments of the fiscal equalisation system, this leads to a considerable redistribution between the municipalities. The local expenditures for social assistance had been fully compensated by the associated fund until the year 2011. After the reform in 2012 there have been made some amendments which aimed at increasing the incentives for municipalities to lower such costs. Municipalities with above average costs for social assistance thereby are not being fully compensated anymore. This mechanism however only affects 20% of the total costs and only for specific program (Ecoplan, 2017, p. 22). The redistributive effects of the cantonal social assistance fund therefore remain very high.

The last control variable accounts for the share of foreigners living in a municipality. A higher share of foreigners is often correlated with higher local expenditures. Most if this effect is driven by the high share of foreigners receiving social assistance, which is already being accounted for. Besides that, foreigners can also cause costs for integration programs. At the same time, foreigners often do not have the same level of income, which reduces the local HRI. If the share of foreigners would be missing this could hence lead to an overestimation of magnitude of the flypaper effect. The data set is from the federal statistical office.

Another variable that is supposed to have an influence on local spending is a control dummy for the existence of a local parliament. The literature analysing the influence of democratic institutions on public expenditures is quite vast and there is a lot of empirical evidence that direct democratic political institutions have a tempering effect on public expenditures. Spoken in terms of public choice scholars, direct democracy is a good instrument to tame the leviathan. Funk and Litschig (2020) for instance estimated that the adoption of a local parliament in a data set of mostly German speaking communes led to an increase of public expenditures by about 6%. The main drivers of this increase are the general administration and education spending. The data set of this paper contains a total of 10 different municipalities and small cities with a local parliament. A complete data set of municipal and city parliaments in Switzerland has been gathered by Andreas Ladner (2016). However, as every single parliament already existed from the beginning of the analysed period, this time invariant variation will already be captured by the municipality fixed effects. The variable thus drops out. Table 5 shows some descriptive statistics of the used control variables.



Table 5: Operationalisation of the control variables

Variable	Operationalisation	Obs.	Mean	St. Dev.	Min.	Max.
LogPop	Natural logarithm of resident population	2'330	6.87	1.09	3.58	10.68
Old	Percentage of population aged 65 or older	2'330	19.18	3.16	10.06	33.33
Young	Share of population aged below 15 or below	2'330	15.13	2.62	5.92	32.77
Leftist	Share of leftist voters at past national election	2'330	20.69	8.85	2.05	52.45
Centre	Transfers for fulfilment of centre functions	2'330	0.34	15.50	-51.36	231.21
SocioDemo	Transfers for high socio-economic burdens	2'330	4.94	4.84	0	25.85
GeoTopo	Transfers for difficult geographical and topographical living circumstances	2'330	110.92	193.99	0	1316.63
Social Assistance	Share of social assistance recipients	2'330	2.44	1.79	0	11.48
Foreigners	Share of foreigners	2'330	7.13	5.21	0	30.31

Notes: The table reports summary statistics for all control variables indicating the name, operationalization, number of observations, mean, standard deviation, minimum and maximum values. Variable Centre includes both the discharge on the HRI and the direct transfer. Values of the variables Centre, SocioDemo and GeoTopo are in CHF. All values in CHF are deflated at constant prices of 2008.

Source: Cantonal finance administration and the federal statistical office.

### 4.3 Baseline Regressions

The specification of the baseline regression follows the classic approach among the literature on the flypaper effect. Its core has already been explained in the chapter 2.1. The model in this paper is specified as a fixed effects model and takes the following form of equation 1:

$$(1) \text{Exp}_{it} = \beta_0 + \beta_1 \text{FT}_{it} + \beta_2 \text{Inc}_{it} + X_{it} + a_i + b_t + \varepsilon_{it}$$

Where  $\text{Exp}_{it}$  denotes the total expenditures per capita in municipality  $i$  at time (or year)  $t$ . Variable  $\text{FT}$  denotes the sum of equalization and minimum equipment transfers per capita. Variable  $\text{Inc}$  denotes the local median income based on aggregated individual tax data.  $X$  is a vector of the above explained controls.  $a_i$  denotes municipality fixed effects and  $b_t$  denotes time fixed effects specified as year dummies. The inclusion of time fixed effects is crucial as there are different years with year-specific effects. On the one hand there is the reform in 2012 that, besides the changes in equalization transfers, included some amendments in the distribution of tasks between the canton and the municipalities. As an effect, average total expenditures among all municipalities have been rising significantly in the years 2012 and 2013 by roughly 400 CHF. A big part of this rise in expenditures was caused due to a change in the framework for teacher wages. As already mentioned before, the implementation of the new harmonized accounting standards HRM2 in 2016 furthermore led to significant adjustments in the form of extraordinarily high write-offs in the pre-reform year 2015.

As already explained in the theoretical chapter 2.1, the magnitude of a potential flypaper effect lies in the difference of two coefficients  $\beta_1$  and  $\beta_2$ . If the transfer elasticity  $\beta_1$  is significantly higher than the income elasticity of demand for public services  $\beta_2$ , a flypaper effect is observed. Following the approach of Cappelletti and Soguel (2013), a specification with interaction effects will be applied in order to assess whether there exists a link between bureaucratic complexity and the stickiness of lump-sum transfers. The regression model therefore takes the following form of equation 2:

$$(2) \text{Exp}_{it} = \beta_0 + \beta_1 \text{FT}_{it} + \beta_2 \text{Inc}_{it} + \beta_3 \text{FT} \times B_{it}^+ + \beta_4 \text{FT} \times B_{it}^- + X_{it} + a_i + b_t + \varepsilon_{it}$$

The second specification includes interaction terms between the transfers and the two bureaucracy dummies  $B^+$  and  $B^-$  indicating complex and non-complex bureaucratic structures in a municipality. The theoretical expectations suppose that the coefficient  $\beta_3$  will take on a positive value while  $\beta_4$  will take on a negative value.

#### 4.4 Difference-in-Differences

As there exist severe endogeneity concerns in the empirical literature on the flypaper effect in general and since such concerns are not always being ruled out convincingly, such as for instance in the paper of reference of Cappelletti and Soguel (2013), this paper will furthermore follow a difference-in-differences approach in order to assess the stickiness of equalisation transfers in the fiscal equalisation system of the canton of Bern. Due to the reform in the year 2012 there exists the possibility to analyse the impact of a sudden rise in fiscal transfers as well as the impact of a sudden cut in transfers. The different groups of municipalities are assigned based on the fact whether they have been affected by a significant change in transfers or not. The regression model for the difference-in-difference estimate takes the following form of equation 2:

$$(3) \text{Exp}_{it} = \beta_0 + \beta_1 \text{Treat}_i + \beta_2 \text{Post}_t + \beta_3 (\text{Treat}_i \times \text{Post}_t) + X_{it} + a_i + b_t + \varepsilon_{it}$$

Where variable  $\text{Exp}_{it}$  again denotes the total expenditures per capita in municipality  $i$  at year  $t$ . Variable  $\text{Treat}$  is a dummy taking the value of 1 for municipalities that had an average HRI between 70 and 75 points. These are the winner municipalities of the reform. The value of 0 is assigned to all the municipalities that have an HRI around 100 points, namely between 95 and 105 points. These municipalities are naturally hardly affected by any changes in the disparity reduction (and the minimum equipment anyway) as their average net transfers are approximately 0. Variable  $\text{Post}$  is a dummy taking the value 1 for every year after 2011. The coefficient of the interaction term  $\text{Treat}_i \times \text{Post}_t$  is of most interest in a difference-in-differences, as it shows the estimate of the treatment effect.  $a$  denotes again municipality fixed effects as well as  $b$  denotes time fixed effects.  $X$  denotes a vector of the already explained control variables.

It is important to note that the local median income does not function as the relevant benchmark in this specification to assess the stickiness of transfers. The median income will only be included as a control variable in its logarithmic form. Whether the sudden rise in transfers remains sticked in the local government budget or flows into the private consumption of local citizens must be assessed via the tax multiplier. Therefore, the same regression model is run with the tax multiplier as dependent variable. The regression model for this estimate takes the following form of equation 4:

$$(4) \text{TM}_{it} = \beta_0 + \beta_1 \text{Treat}_i + \beta_2 \text{Post}_t + \beta_3 (\text{Treat}_i \times \text{Post}_t) + \beta_4 \text{Year}_{it} + X_{it} + a_i + \varepsilon_{it}$$

Where  $TM$  denotes the tax multiplier of municipality  $I$  at time  $t$ . The rest of the equation remains unchanged. 0.01 points of a tax multiplier correspond to roughly 16 CHF according to calculations of the consulting agency Ecoplan (2017). An increase in disposable transfer income of about 80 CHF therefore corresponds to roughly 0.05 points of a tax multiplier. Following theoretical predictions of Bradford and Oates (1971) the increase in equalization transfers should trigger the same effect as an increase in local income. A flypaper effect would thus exist if local expenditures rose significantly while there happens no tax cut. However, it is questionable whether the size of the treatment is big enough to trigger a significant effect.

There is a second option to be tested in the present empirical setting. The size of the treatment for the loser municipalities is much higher. 226 CHF correspond to roughly 0.14 points of a tax multiplier. To test the fiscal response of a sudden decrease in transfers the same two difference-in-differences regression models are run with the treatment dummy taking the value of 1 for every municipality having an HRI below 50 points. The control group remains the same. If the flypaper effect works in both directions, the sudden loss in transfers should trigger a significantly higher decrease in public expenditures than an increase the tax multiplier.

The question for both the winner case and the loser case therefore is: What determines the benchmark for a symmetrical fiscal response according to theoretical neoclassical predictions of Bradford and Oates (1971)? The simplest way to determine such a benchmark is to calculate the ratio of the local mean income spent for public expenditures in the respective treatment group. This should give a very straightforward estimate of optimal goods bundle the median voter choses to maximize his utility. The average ratio of the local mean income spent for public expenditures is 6.8% in a winning municipality with an HRI of 70 to 75 points. The average ratio of the local mean income spent for public expenditures in a loser municipality with an HRI below 50 points is 8.8%. These numbers seem consistent with estimates for the U.S. where upper bound estimates for the income elasticity of demand for public goods and services at the local and the state level combined are at most 0.15 (Inman, 2008). These estimates are also comparable to the case Switzerland, as the country knows similar federally organised state structures. A rise in equalisation transfers therefore should flow almost entirely into a tax cut rather than an increase in public expenditures. However, regarding the opposite case, a sudden decrease in transfers should almost completely be borne by cuts in public expenditures. Considering this fact, it is probably more difficult to identify a flypaper effect after a cut in transfers compared to the cases where jurisdictions are granted higher transfers. As the cut in transfers should be borne by cuts in public expenditures by at least 90% anyway, it will be difficult to identify a clear divergence that goes well beyond those 90%.

Finally, when following a difference-in-differences approach, several assumptions need to be fulfilled for the estimates to be interpreted causally. The reform of the fiscal equalisation system in 2012 basically constitutes a within-canton policy experiment. Generally, there are three main assumptions to be adopted in a difference-in-differences estimation to be considered a causal estimator (see Wooldridge, 2002, Lee, 2005, Angrist and Pischke 2008). The first assumption concerns the assignment to a treatment and a control group, which needs to be random and independent of the outcome variable. The best case would be if the assignment is based on a natural factor like in the case of natural experiment. Regarding the present empirical setting, the assignment clearly did not happen naturally. It therefore constitutes a policy experiment. As the assignment is based on the municipalities' HRI, which is in some way clearly linked to a municipality's budgetary policies, there exists some risk for a self-selection or a manipulation problem. However, there are good reasons to believe why this is not the case in the present setting. On the one hand, municipalities do not have the possibility to influence their resource capacity measured in terms of HRI points directly. If this was the case, the fiscal equalisation system would give extremely strong incentives to municipalities to worsen their HRI in order to receive more equalisation transfers. This is not the case in the fiscal equalisation system of the canton of Bern and probably is not the case for any modern cantonal fiscal equalisation system in Switzerland, as the proper functioning of an equalisation system crucially depends on the assumption that the calculated fiscal capacities are as exogenous as possible. The only possibility left to actively influence a municipality's HRI therefore is a very aggressive location promotion via the local tax rate. However, the incentives to participate in fierce tax competition are limited by the fiscal equalisation system. Furthermore, the HRI is a standardised index. For a change in the resource capacity to be reflected in the HRI requires all other municipalities' resource capacities to remain unchanged. The risk of a self-selection issue due a possible link between the assignment and the outcome variable, given the fact that municipalities have full information on the effects of the reform, hence seems quite unlikely.

The same applies to a potential risk of manipulation. There is little reason to believe that the treated municipalities possibly influenced the specific policy output of the reform and even had the necessary political majority to do so. The reform was elaborated by the cantonal administration and the parliament. Although potential regional favouritism of members of the parliament with their home municipalities seems plausible, it seems unlikely that there existed a systematic link between local governors and the regional members of parliament to gain an advantage in the reform process. The changes in parameters are highly technical and were triggered by the fact that the existing parameters led to strong imbalances of the system. The influence of a

potential political economy during the political process that could have manipulated the reform outcome therefore seems unlikely.

A second assumption that needs to be fulfilled in a difference-in-differences is that there is no shock that is contemporary and collinear to the treatment effect. This assumption can potentially be contested too in the present setting, as the reform in 2012 included different important changes besides the changes in the first pillar. There was for instance a change in the task distribution between the canton and the municipalities, which had a considerable impact on the total expenditures per capita. Furthermore, the allocation formula of the transfers for geographical and topographical living conditions has been adapted, which led to a significant rise in transfers. On top of that, a new transfer for municipalities with high socioeconomic burdens has been implemented. However, as all these changes affected all municipalities equally and independent of their HRI, they should not constitute any greater issue. Furthermore, the new transfer programs are being accounted for as controls. Considering the hypothetical case where municipalities of two different cantons were to be analysed after a reform of a fiscal equalisation system in one canton, a concrete assessment of the impact of a change in one single parameter would hardly be possible, as the treatment variable always captures the reform as a whole. This is not the case in the present setting. The municipalities are all in the same canton and equally affected by the reform with the important and distinguishing exception that the net transfers of the first pillar changed significantly in the treatment group. On the other hand, factors that could cause variation in spending patterns are accounted for by the control variables. To sum it up, there are generally good reasons to consider a difference-in-differences model for the present setting being valid.

The last crucial assumption that needs to be fulfilled for difference-in-differences model to be valid is the parallel trends assumption (Angrist and Pischke, 2008, p. 171). This assumption presupposes that the difference in the outcome variable between two groups should have similar trends in the absence of a treatment. The two groups thereby may differ significantly between each other, but the trends need to run parallel. This assumption is necessary for the estimated coefficients to be interpreted correctly. An upward trend or a downward trend in the control or the treatment group respectively, could lead to an underestimated treatment effect. On the other hand, a downward trend or an upward trend in the control or the treatment group respectively, could lead to an overestimation of the treatment effect. Whether the parallel trends assumption holds true in the present empirical setting cannot be assessed conceptually like the first two assumptions and therefore will be elaborated in the next chapter. Besides a graphical assessment of this assumption, there will also be performed two empirical tests.

## 5 Empirical Results and Discussion

### 5.1 Baseline Estimates

Table 5 depicts the results of the estimates of the two baseline regressions. Both linear as well as logarithmic forms are applied to compare them. As already mentioned in the second chapter, according to Becker (1996) the magnitude of the flypaper effect can strongly vary depending on which functional form is applied. The linear specifications often tend to overestimate the magnitude of a flypaper effect. The first two models do not include dummies for bureaucratic complexity, while the third and the fourth model include them.

Regarding the control variables there are some with a significant coefficient. There is a negative relationship between the natural logarithm of the resident population and total expenditures per capita in a municipality, meaning that expenditures per capita decrease with an increasing population number. However, this coefficient is probably misleading on first sight. On the one hand, there certainly might exist some economies of scale as it already has been elaborated in the previous chapter. On the other hand, the variable LogPop also accounts for the purely mechanic effect of decreasing total expenditures per capita for a marginal increase of the population number in year  $t$ . Generally, the bigger municipalities and cities tend to exhibit higher expenditures than average.

The fraction of young people living in a municipality show a significant negative coefficient in the linear specifications. This finding runs counter to the expectation that a higher fraction of young people still attending school would trigger higher public expenditures. Another coefficient that runs counter usual expectations is the persistent negative coefficient for the fraction of left-wing voters. However, this coefficient shows no significance. The control variable accounting for the fraction of foreigners has a positive sign among all specifications. This corresponds to the expectations. However, the coefficient is only significant in the linear specifications.

Regarding the control variables accounting for transfers of the second pillar of the fiscal equalisation system only the transfers to municipalities with difficult geographical and topographical living conditions show a robust and highly significant positive coefficient. These are also the transfers which bear the highest risk of being endogenous if they were to be included in the net transfers of the first pillar. The coefficients of the transfers for the fulfilment of centre functions are only significant in the linear specifications and have a positive sign. The transfers to municipalities bearing high socio-economic costs have no significant coefficient. This is also the transfer program with the smallest volume.

Table 6: Regression output of the baseline regressions

	(1) Linear	(2) Log-Log	(3) Linear	(4) Log-Log
Net Transfer	0.244 (0.216)	0.0233*** (0.00822)	0.223 (0.230)	0.0208** (0.00945)
Income	0.0127 (0.00904)	0.0421 (0.104)	0.0133 (0.00875)	0.0384 (0.101)
LogPop	-1728.5*** (426.9)	-0.380*** (0.0988)	-1664.1*** (434.3)	-0.356*** (0.0987)
Old	1.288 (16.85)	0.00139 (0.00309)	3.501 (14.68)	0.00196 (0.00289)
Young	-39.04* (20.77)	-0.00477 (0.00307)	-34.81** (16.46)	-0.00405 (0.00262)
Leftist	-6.860 (4.239)	-0.00121 (0.000807)	-5.992 (4.230)	-0.00105 (0.000783)
Centre	3.431** (1.567)	0.000549 (0.000376)	3.176** (1.591)	0.000469 (0.000400)
SocioDemo	11.07 (10.36)	-0.000842 (0.00176)	7.352 (8.731)	-0.00134 (0.00163)
GeoTopo	1.047*** (0.304)	0.000186*** (0.0000566)	0.962*** (0.274)	0.000170*** (0.0000542)
Social Assistance	5.292 (15.18)	-0.00109 (0.00319)	5.367 (13.94)	-0.000789 (0.00310)
Foreigners	23.71** (11.78)	0.00238 (0.00252)	24.40** (11.42)	0.00229 (0.00249)
Net Transfer $\times B^+$			0.537 (0.354)	0.0178 (0.0174)
Net Transfer $\times B^-$			-0.260 (0.199)	-0.00378 (0.0190)
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
$N$	2330	2330	2330	2330
adj. $R^2$	0.837	0.843	0.842	0.846

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Surprisingly, the variable accounting for the fraction people receiving social assistance shows no significant coefficient. In the logarithmic specifications the coefficients even have a negative sign. This runs counter the expectations as the social assistance is an associated task being funded by the municipalities and the canton together. The money of the social assistance fund is thereby being redistributed very unequally among the municipalities. One explanation for these unexpected results might lie in the fact, that the top receivers of the fund are not included in the data set. There are actually two counteracting mechanisms at work. On the one hand, the share of the population receiving social assistance correlates strongly with the resident population. On the other hand, the resident population also correlates positively with the HRI. Therefore, top receivers of the social assistance fund like Biel and Bern are grantors in the fiscal equalisation system and are excluded from the data set. The overall variance of the social assistance variable is hence reduced.

Of course, the coefficients of most interest concern the net transfers of the first pillar of the fiscal equalisation system and the median income. Surprisingly, there is no significant relationship between the median income and the total expenditures per capita among all specifications. The coefficients of the net transfers are significant and positive only in the logarithmic specifications. The difference between the coefficients of the net transfer and the median income is remarkable and is between 16 to 19 times higher for the net transfer. However, for a correct interpretation of the income effect, there still need to be made some adjustments. The estimated coefficient of the income variable in its linear form implicates that municipalities potentially could tax the whole median income (Cappelletti and Soguel, 2013, p. 60). This obviously is not the case in a federalist country where income gets taxed at three different levels, the municipal, the cantonal and the federal level. As usual in the case of municipal taxation in Switzerland, the tax rates at the municipal level are determined by a simple cantonal tax rate which is then multiplied with the already mentioned local tax multiplier. Cappelletti and Soguel (2013) therefore compare the coefficient estimate with the local marginal tax rate assuming an income of 100'000 CHF. Assuming an income of 100'000 CHF and tax multiplier of 1.65, which corresponds to the weighted average tax multiplier of the year 2012, the marginal local tax rate was between 8.00% for a married person with children and 9.24% for an unmarried individual without child (Cantonal tax administration, 2021). Therefore, one additional CHF of median income in terms of actual tax revenue triggers between 13 and 16 cents of additional public expenditures. However, assuming an income of 100'000 CHF seems rather generous. The income effect is probably even a little higher, as the median and average income amount to roughly 55'500 CHF and 64'500 CHF respectively. The marginal tax rates for an income of 60'000 CHF lie

between 7.10% and 8.25%, which gives an income effect between 15 and 18 cents. These numbers implicate a rather modest flypaper effect for the cantonal fiscal equalisation system of the canton of Bern.

However, besides the fact that the coefficients are insignificant, the coefficients also seem to be far too big compared to common expectations on the magnitude of the income effect. As it has been mentioned before, usual expectations on the income effect do not go beyond 10 cents for every additional CHF of median income. There hence might exist a problem with the estimated coefficients due to high collinearity. This would also explain why the median income has no significant coefficient throughout all specifications of the baseline regression. Multicollinearity is not a problem for the model as a whole, but for the interpretation of the individual predictors. A classic symptom for multicollinearity is a very high R-squared with simultaneously low t-values for the individual predictors, like in the present results (Mansfield and Helms, 1982). A common approach to test whether there exists a problem with multicollinearity is to use the variance inflation factor (VIF). The VIF measures how much of the variance of a coefficient is inflated. A VIF that exceeds the value of 10 is considered to indicate a problem with multicollinearity. The calculation of the VIF for all coefficients of the independent variables confirms that there exists a problem with multicollinearity. The coefficients of the median income indicate a VIF above 20 for all four models. The coefficients of the net transfer variable indicate a VIF that is above 10 in three models. Only the coefficient of the second model with its log-log form has a VIF that is slightly under 10.

The multicollinearity issue is a logical result of how the transfers of the first pillar are allocated among municipalities. In a fiscal equalisation system where transfers are allocated according to municipalities' fiscal capacities, the transfer variable naturally correlates with the median income to some degree. A fiscal capacity equalisation scheme therefore constitutes a very difficult empirical setting to identify a flypaper effect with the present regression specifications. The reason why Cappelletti and Soguel, 2013 did not experience this problem lies in the allocation formula of the intercommunal fiscal equalisation system of the canton of Vaud, which combines the disparity reduction or fiscal capacity equalisation with a fiscal needs equalisation (Cappelletti and Soguel, 2013, p. 50). Applied to the present empirical setting of the fiscal equalisation system of Bern this would mean that the transfers of the first pillar are taken together with the second pillar. On the one hand, an aggregated transfers variable that adds the transfers of the second pillar to the net transfers of the first pillar certainly could reduce the collinearity issue. On the other hand, as it already has been elaborated in the third chapter, such an

aggregated transfer variable raises different endogeneity concerns, as the transfer programs of the second pillar could be considered endogenous.

Regarding the models with the log-log form, the collinearity issue is slightly reduced for the coefficients of the net transfer, but still an issue for the coefficients of the median income. A direct comparison between the income and the transfer elasticity is not possible, as the net transfer makes out a much smaller share of a municipality's total income. The income and the transfer elasticities first need to be transformed according to their proportional share to the total expenditures of a municipality (Becker, 1996). This will give comparable estimates of the marginal propensities for the log-log model. The values are calculated by multiplying the estimated coefficients with the respective share of the median income and the transfer income to the municipal income. Table 7 depicts the marginal propensities of the log-log models, calculated with the mean values of the relevant variables.

Table 7: Marginal propensities of the Log-Log models

	(1) Linear	(2) Log-Log	(3) Linear	(4) Log-Log
$\partial Expenditures / \partial Transfer$	0.244	0.263***	0.223	0.235**
$\partial Expenditures / \partial Income$	0.0127	0.00335	0.0133	0.00306
$\partial Expenditures / Transfer \times B^+$	-	-	0.537	0.201
$\partial Expenditures / Transfer \times B^-$	-	-	-0.260	-0.0427
$N$	2330	2330	2330	2330
Adj. $R^2$	0.837	0.843	0.842	0.846

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The estimated marginal propensities give a comparable insight between the linear and the log-log models. As it has been noticed by Becker (1996) and confirmed empirically by Cappelletti and Soguel (2013), the estimated impact of an additional CHF of net transfer is smaller if the logarithmic functional form is applied. In the present empirical setting the magnitude of the flypaper effect is heavily increased. This is due to the fact that the coefficients of the linear specifications are biased because of the collinearity issue. If the income effect is compared to the average local tax rates for an income of 60'000 CHF, the effect is significantly smaller than in the first model and amounts only to 5-6 cents. The size of this income effect thus matches common expectations. The impact of an additional unit of net transfers from the first pillar is

therefore up to five times higher than an equivalent increase in local median income. The magnitude of this flypaper effect is very much comparable to other estimates in the literature (see. Ehrenberg (1973), Ladd (1975), Inman (1978)).

Concerning the link between the magnitude of a flypaper effect and bureaucratic complexity, the third and the fourth model show not systematic link between the flypaper effect and bureaucratic complexity. Even though the signs of the coefficients match the theoretical expectations, the coefficients of the interaction term are not significant. Nonetheless, the magnitude of the flypaper effect is still slightly reduced.

The simplest way in coping with issues of collinearity is to remove the highly correlated independent variable from the regression specification. In the present setting this concerns the median income. This naturally makes it impossible to have a direct comparison between the income and the transfer effect. Nonetheless, many empirical papers on the flypaper effect follow this approach (see Dahlberg et al. 2008, Baskaran 2012 and Berset and Schelker 2019). In addition, they perform regression estimates with the tax multiplier as dependent variable. This estimate is used as a comparison to assess a potential flypaper effect. A significantly positive coefficient of the transfer variable, compared to a non-significant coefficient of the tax multiplier as dependent variable would thus provide evidence for a flypaper effect. Table 8 shows the results of the regression output of the first baseline regression without the median income variable, using both linear and logarithmic specifications. The second and the fourth model are the respective comparison estimates of the baseline regression with the tax multiplier as dependent variable. The standard errors are again clustered at the municipal level.

Like in the estimates before, the first model shows a positive but non-significant coefficient for the linear net transfer variable. The computation of the variance inflation factor again indicates a potential collinearity problem. This is not the case for the rest of the models. All models show highly significant and positive coefficients for the main variable of interest. The coefficient of the natural logarithm of the net transfer variable of the second model is very comparable in its size to the previous estimates. Expressed as a marginal propensity, the coefficient amounts to 0.26. As the transfers apparently show no significant negative coefficient when it comes to tax multipliers as dependent variable but even positive ones, this provides strong empirical evidence for a flypaper effect. The equalisation transfers of the fiscal equalisation system of the canton of Bern therefore stick completely to the public budget, while none of it flows into the private consumption of the citizens via a tax cut. The analogous regression output with the interaction effects testing a systematic link between the flypaper effect and bureaucratic complexity is displayed in the annex. There is again no empirical evidence for such a link.

Table 8: Regression Output of the first baseline regression without the median income

	(1) Expenditures	(2) Tax Multiplier	(3) Log-Exp.	(4) Tax Multiplier
Net transfer	0.218 (0.214)	0.000131*** (0.0000361)		
Log-Net transfer			0.0229** (0.00813)	0.0421*** (0.00933)
Controls	YES	YES	YES	YES
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
<i>N</i>	2330	2330	2330	2330
Adj. <i>R</i> <sup>2</sup>	0.837	0.872	0.843	0.874

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

Of course, it must be noted that the results of Table 8 might be driven purely endogenous. Especially the specifications with the local tax multiplier are probably just an image of the mechanisms of tax competition. Municipalities that set higher tax rates will exhibit lower tax bases. This in turn will lead to higher equalisation transfers, as the harmonized revenues are below the cantonal average. However, considering the robust transfer effect on the total expenditures per capita of roughly 26 cents, the magnitude of this effect exceeds the classical theoretical expectations by far.

A Hausman specification test for third model reveals that the null-hypothesis assuming no systematic difference between a fixed effects and a possible random effects model has to be rejected at the 0.1%-level. Therefore, a potentially more efficient random effects specification is not consistent for this empirical setting. Furthermore, it has to be noted that most of the coefficients of the year dummies are highly significant and can vary between -0.0041 in the year 2011 and 0.12 in the year 2013. This shows that time fixed effects specified as year dummies are necessary to be included.

## 5.2 Difference-in-Differences Estimates

Considering the severe issues of collinearity in the results of the baseline regressions as well as the predominant endogeneity concerns, it seems all the more important to assess a potential flypaper effect with another approach. Table 8 depicts the estimation results of the difference-in-differences models. The table comprises four different models. The first two models show the impact of the reform on the winner municipalities with an HRI between 70 to 75 points. The winner treatment group consists out of 36 municipalities. The first model shows the estimated coefficient of the impact on the total expenditures of the treatment group. The second model shows the estimated coefficient concerning the impact on the tax multiplier. The third and fourth model follow the same specifications of the first two models, but with the treatment group being the loser municipalities with an HRI below 50 points. This group consists out of 14 different municipalities. The control group consists of 26 municipalities with an HRI between 95 and 105 points.

Table 9: Difference-in-Differences regression output

	(1) Expenditures Winner Mun.	(2) Tax Multiplier Winner Mun.	(3) Expenditures Loser Mun.	(4) Tax Multiplier Loser Mun.
Treatment	588.9** (239.6)	0.0383* (0.0214)	-157.4 (256.7)	0.0531 (0.0530)
Controls	YES	YES	YES	YES
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
<i>Municipalities</i>	62	62	40	40
<i>Number of Obs.</i>	620	620	400	400
<i>Adj. R<sup>2</sup></i>	0.879	0.926	0.921	0.937

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

As elaborated previously, a sudden increase in transfer income of a municipality should foremost flow into a tax cut of rather than an increase of public expenditures. The results of the first two models however suggest that exactly the opposite happened in the case of the increased net transfers due to the reform of cantonal fiscal equalization scheme in the canton of Bern. Apparently, the municipalities of treatment group increased their total expenditures per capita by

590.9 CHF, while there happened no significant changes in the tax multipliers. However, the value of the treatment effect in the first model is so extremely high compared to the estimated magnitude of the treatment of roughly 80 CHF that it needs to be interpreted with very much caution. Even though there is evidence in the related literature of a so-called super-flypaper effect in the sense that communities might overreact to changes in transfers, the results first need to be validated concerning a possible violation of assumptions.

In a next step there must be performed some tests to ensure that none of the assumptions to be fulfilled in a difference-in-differences estimation are violated. One of the assumptions concerns parallel trends in the outcome variable between the treatment and the control group. A graphical inspection of the outcome variable in the treatment and the control group is therefore a good starting point. Figure 5 displays two diagnostic plots for parallel trends. The first plot depicts the observed means while the second plot depicts a hypothetical linear trends model between the treatment and the control group.

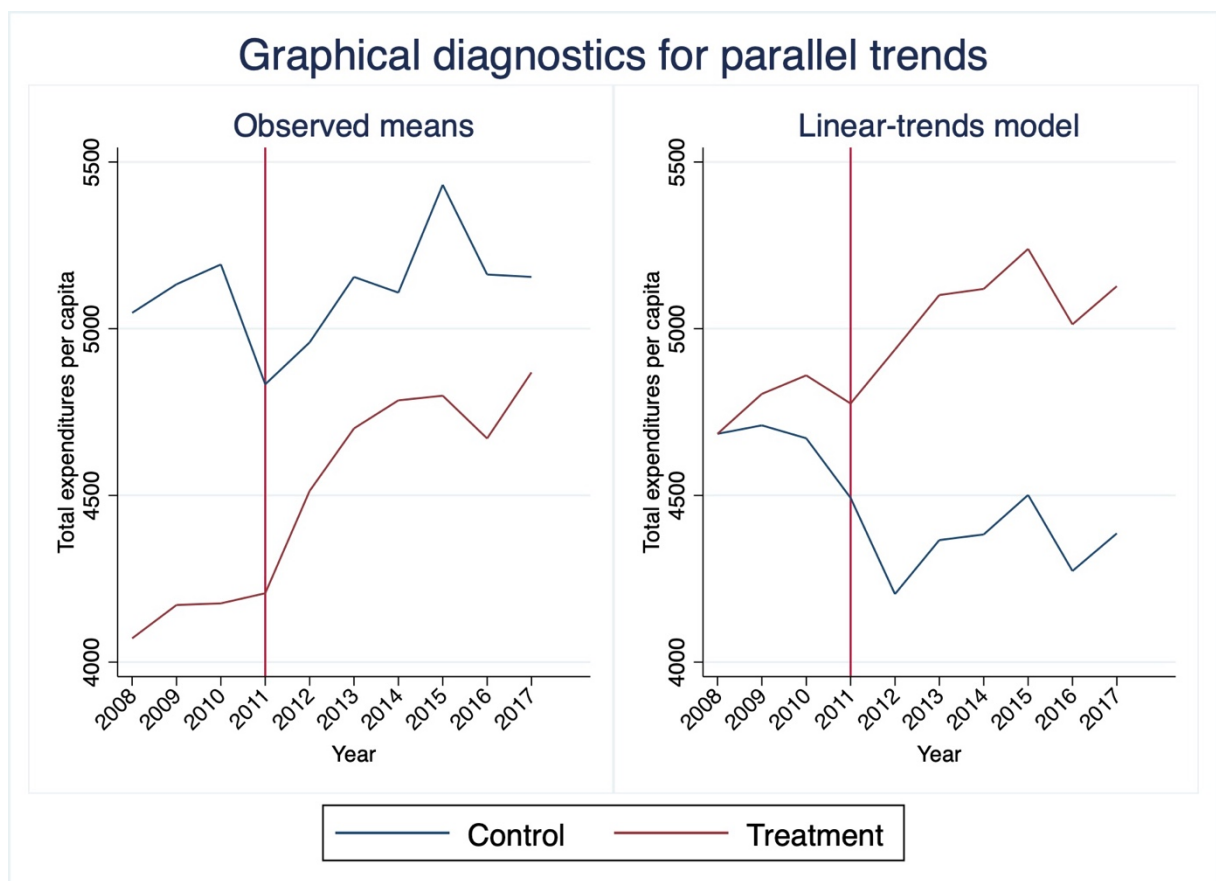


Figure 5: Graphical diagnostics for parallel trends of the first model Dif-in-Dif model

As one can see, the parallel trends assumption is presumably violated as there is a clear upward trend in the outcome variable of the treatment group while the control group experienced an opposite trend prior the reform. Such opposing trends will most likely cause an overestimation of the treatment effect, as both the upward trend in the treatment group as well as the downward trend in the control group will add to the estimated effect of the treatment variable. This would hence explain why the estimated coefficient is extraordinarily high compared to the estimated magnitude of the treatment.

Besides the graphical inspection of the trends in the outcome variable there is also the possibility to perform a parallel trends test which tests the parallel trends assumption in the pre-treatment time period. The F-statistic of this test amounts to 4.00 with a p-value of 0.049. Sticking to a significance level of 10%, the null hypothesis therefore needs to be rejected. A second test that can be applied is a Granger causality test, named by its inventor Clive Granger in 1996. This test will determine whether the treatment or the control group changed their behaviour in anticipation of the treatment. The F-statistic of the test amounts to 3.41 with a p-value of 0.023. The null hypothesis hence needs to be rejected again. To sum it up, the results of the first model can not be interpreted causally, as the necessary assumptions for a difference-in-differences estimator are violated.

This is not the case for the second model, where there can be observed linear trends on first sight. Both groups experienced a decrease in the outcome variable before the reform. After the reform both the treatment and the control group increased their tax multipliers, as the reform led to an overall rise in expenditures on the municipal level. This rise is mainly driven by the new task distribution between the canton and the municipalities which includes a new framework for teacher wages. This led to a significant increase in educational spending on the municipal level (see Figure 9 in appendix). The parallel trends test confirms the visual supposition. The null hypothesis can not be rejected. The same applies to the Granger causality test which finds no evidence of a changed behaviour of the two groups prior the treatment. The second model therefore provides some empirical evidence in favour of a flypaper effect. Not only did none of the increase in transfer flow into a tax cut, but the treatment group even increased its taxes significantly compared to the control group. However, considering the opposing trends in expenditures displayed in Figure 5, the significant tax increase in the treatment group is not a real surprise. Figure 6 shows two diagnostic plots for parallel trends.



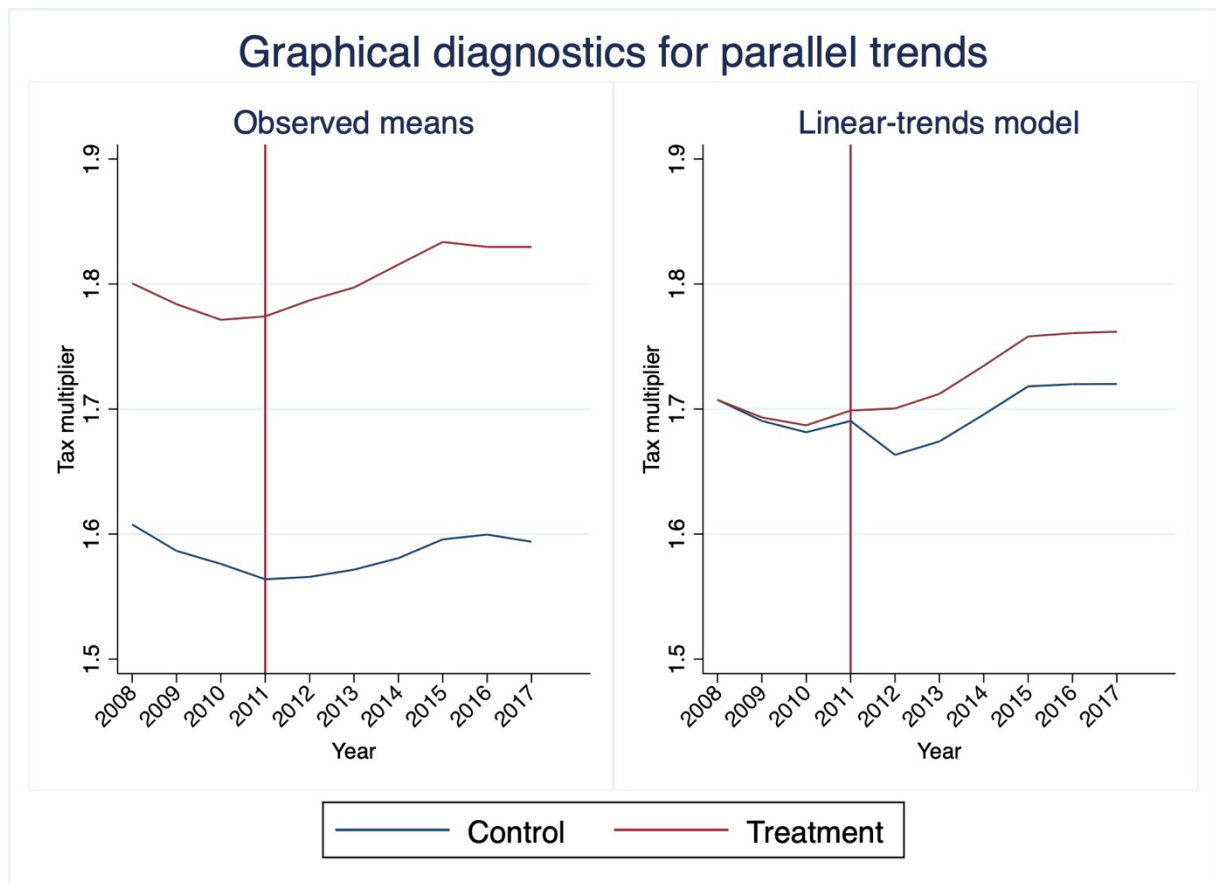


Figure 6: Graphical diagnostics for parallel trends of the second Dif-in-Dif model

Regarding the results of the third and the fourth model, there is no significant treatment effect to be assessed in the case of the loser communities. The estimated coefficient actually lies within a range that could correspond to Bradford and Oates (1971) theoretical predictions. Although the magnitude of the treatment is significantly higher for the loser municipalities (226 CHF), the coefficient of the third model is insignificant. The same applies to the estimated coefficient of the fourth model with the tax multiplier as outcome variable which is insignificant as well. The cut in net transfers from the first pillar of the equalisation system therefore provides no clear evidence that the flypaper effect works in both directions. In this context it is again important to note that an assessment of a flypaper effect in the opposite direction is probably much more difficult to assess. Assuming an income effect of 0.1 it is no surprise that most of the cut in transfers will be borne by the local budget.

Regarding the results of the third and the fourth model, there are no issues to be found regarding the parallel trends test and the granger causality. Both the third and the fourth model show trends in the outcome variable that are parallel. The diagnostic plots for the parallel trends of the third and the fourth model are to be found in the appendix. Table 9 summarizes the test results of the parallel trends test and the Granger causality test.

Table 10: Diagnostic tests for the difference-in-differences estimates

	(1) Expenditures Winner Mun.	(2) Tax Multiplier Winner Mun.	(3) Exp. Loser Mun.	(4) Tax Multiplier Loser Mun.
<b>Parallel Trends Test</b>				
F-Statistics	4.00 (0.0499**)	0.32 (0.571)	0.14 (0.713)	0.42 (0.520)
<b>Granger Causality</b>				
F-Statistic	3.41 (0.0230**)	0.34 (0.799)	1.43 (0.248)	0.29 (0.835)

P-values in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### 5.3 Sensitivity Checks

The fiscal equalisation system of the canton of Bern with its complex design and different programs obviously leaves room for many possible regression specifications to be run. On the one hand, one might for instance change the sample size. A common sensitivity check in the literature on the flypaper effect is to exclude bigger municipalities and cities from the specifications or exclude the smallest municipalities. Therefore, Table 11 depicts the regression output of four models using restricted samples. To avoid issues with collinearity the natural logarithm or the net transfers is being used as main independent variable while the median income is excluded from the specification. The second and the fourth model act again as comparison models that use the local tax multipliers as dependent variable. The sample of the first two models is restricted to municipalities with a resident population of less than 3000 people. The third and fourth model use a sample that excludes municipalities with a resident population of less than 500 people. The results provide again evidence in favour of a flypaper effect. However, the magnitude of the flypaper effect is considerably bigger compared to the results of Table 8 if only smaller municipalities are included in the sample. If the smallest municipalities are excluded from the estimates, the magnitude of the flypaper effect decreases. This provides evidence that smaller municipalities tend to exhibit a stronger flypaper effect compared to municipalities with a higher resident population.

Table 11: Regression output with changed sample size

	(1) Log-Exp. Pop < 3000	(2) Tax Multiplier Pop < 3000	(3) Log-Exp. Pop > 500	(4) Tax Multiplier Pop > 500
Log-Net transfer	0.0329*** (0.0108)	0.0527*** (0.0110)	0.0156** (0.00793)	0.0354*** (0.0120)
Controls	YES	YES	YES	YES
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
<i>N</i>	1970	1970	1654	1654
Adj. <i>R</i> <sup>2</sup>	0.803	0.863	0.864	0.874

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

A second sensitivity check that might give useful insights in the incentive structure of the fiscal equalisation system concerns the municipalities whose transfers are restricted due to article 35 of the cantonal law on fiscal equalisation and burden sharing. The exclusion of these municipalities presumably has a positive impact on the magnitude of the flypaper effect. According to article 35 the cantonal government is allowed to cut minimum equipment transfers as well as transfers for difficult geographical and topographical living circumstance, if a municipality is in a very good financial situation. Until the year 2011 the legal requirement for such a cut was even linked to a municipality's tax rate. Municipalities whose tax rates were below the cantonal average were not fully eligible for the minimum equipment transfers as well as the transfers for difficult geographical and topographical living circumstances. Such a requirement clearly gives incentives to raise tax rates as well as the total expenditures per capita in order to receive higher net transfers. Therefore, an exclusion of those municipalities from the sample presumably has a positive influence on the magnitude of the flypaper effect.

A last sensitivity check adds the transfers of the second pillar to the net transfers of the first pillar. This gives an aggregate net transfer variable which counts all transfers of the cantonal fiscal equalisation system together. The transfers of the second pillar have been included as separate controls in the baseline regression before due endogeneity concerns. Therefore, an aggregate transfer variable presumably shows greater coefficients than the net transfers variable only including the transfers from the first pillar.

Table 12 shows the regression output of the additional sensitivity checks. The results partially confirm the above explained hypotheses. As only a very small fraction of municipalities experienced cuts in transfers due to art. 35, their exclusion makes no real difference to estimated coefficients. They range in the same order as in Table 8. On the other hand, the coefficient of the third model using the aggregate net transfer variable as independent variable is significantly higher compared to the estimates of table 8. This provides evidence that the transfers of the second pillar are endogenous to some degree and therefore would lead to an overestimation of the flypaper effect. However, the coefficient of the fourth model using the local tax multiplier as dependent variable is slightly reduced. Eight observations have been dropped from the sample of the third and the fourth model as they exhibited negative aggregated net transfers due to the partial financing of the centre transfer by surrounding municipalities.

Table 12: Regression output without art. 35 municipalities and aggregate transfer variable

	(1) Expenditures Without Art. 35	(2) Tax Multiplier Without Art. 35	(3) Log-Exp. Whole Sample	(4) Tax Multiplier Whole Sample
Log-Net transfer	0.0221*** (0.00820)	0.0415*** (0.00957)		
Log-Net transfer			0.0350*** (0.0115)	0.0343*** (0.0114)
Controls	YES	YES	YES	YES
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
<i>N</i>	2210	2210	2322	2322
Adj. $R^2$	0.843	0.859	0.879	0.948

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

Concerning the difference-in-differences estimates it would be interesting to see how the estimated coefficients change if the control group consists out of all the grantor communities. As the grantor communities experienced an increase in their transfer payments to the fiscal equalisation system due to raised equalisation rate of 37%, this should increase the overall treatment effect. However, when performing the respective estimates one can clearly see that the grantor communities do not act as an appropriate control group. Apparently, the municipalities having a mean HRI above 100 points during the analysed time period made excessively high write-offs of roughly 1000 CHF in 2015 due to the upcoming reform in the harmonized accounting standards (see figure 11 in appendix). The estimated coefficients of the treatment variable would therefore be completely distorted and provide no meaningful insight.

## 6 Conclusion and Policy Recommendations

The aim of this paper was to contribute to the empirical literature on the flypaper effect with an analysis of the intercommunal fiscal equalisation system of the canton of Bern. The results of the baseline regressions show severe collinearity issues. The variance inflation factor for the median income is persistently above 20 points which indicates that the standard errors are strongly inflated. As a result, the coefficients of the median income are never significant and in the case of the linear specifications probably also strongly inflated, as the income effect exceeds usual expectations on its magnitude by far. The logarithmic specifications on the other hand provide evidence for a quite strong flypaper effect whose magnitude is comparable to previous studies. One additional CHF of transfers triggers additional expenditures by roughly 26 cents while one additional CHF of median income only triggers additional expenditures of 5-6 cents. Estimates that exclude the median income from the models show a coefficient of the logarithmic transfer variable that has the same size. Tax cuts on the other hand are not being triggered by equalisation transfers. The opposite is the case. These results however might be driven purely endogenous due to intercommunal tax competition. Contrary to the analysis of Cappelletti and Soguel (2013) there is no evidence for a systematic link between the flypaper effect and local bureaucratic complexity. Bureaucracy theory therefore does not act as a relevant determinant for the magnitude of the flypaper effect in this empirical setting.

Due to a reform of the fiscal equalisation system in the year 2012 there exists the unique possibility to analyse both positive as well as negative fiscal shocks to local public finances. These fiscal shocks have been exploited empirically using a difference-in-differences approach. The results of the difference-in-differences estimates are inconclusive. The first model could not be interpreted properly, as the parallel trends assumption was violated. On the other hand, the second model provides some evidence that the treatment group, even though having profited from the reform, increased its local tax multipliers significantly. However, considering the results of the first model, which show clear opposing trends in local expenditures between the treatment and the control group, the evidence of the second model is clearly insufficient to identify a flypaper effect. Regarding the relatively small magnitude of the treatment, there might also exist a lack of statistical power. The same applies to the third and the fourth model. Both models analysing the impact of a sudden decrease in transfers could not provide any evidence for a flypaper effect in the opposite direction as it has been observed in the related literature.

In summary, the analysis of this paper could not provide clear evidence in favour of a flypaper effect in the cantonal fiscal equalisation system of Bern. While the baseline regressions provide some evidence in favour of a flypaper effect, the difference-in-differences estimates are not

able to do so convincingly. Regarding the problem of collinearity, such problems should not arise in empirical settings where transfers do not depend on the median income that heavily. The best empirical settings therefore constitute equalisation schemes with discontinuities in the allocation formula, like the ones exploited by Dahlberg et al. (2008) and Baskaran (2012). Therefore, more experimental evidence is required to reach better conclusions on the existence of the flypaper effect.

Eventually, there comes up the question for possible policy recommendations. Even though the present empirical setting provides no clear evidence in favour of a flypaper effect, there are other convincing papers that are able to do so even when endogeneity is accounted for. The flypaper effect therefore seems to be a real phenomenon, which should be taken seriously. The first thing to do to prevent a potential flypaper effect from occurring is to ensure the democratic control of the median voter over the public budget. Only if there exists the possibility to take control over the public budgeting process, the median voter has also the capacity to prevent a possible divergence between the propensity to spend exogenous transfers publicly and his own interests. However, considering the case of Switzerland where local budgets are already being under the direct democratic control of the local population, it appears quite paradoxical to claim that transfers are not being used according to the interests of the median voter while it is the same median voter who decides over the public budget. This would imply that the median voter makes a behavioural fallacy.

Therefore, the second important recommendation is to ensure full information over the budgeting processes among the population. Only full transparency reduces the risk of a possible behavioural fallacy like fiscal illusion. Therefore, citizens also need to be better informed which goal fiscal equalisation transfers try to fulfil. Their primary purpose is to reduce inequalities between different jurisdictions and not to increase public spending of recipient governments while tax rates remain above average. If the local population is aware of this fact, fiscal equalisation transfers should not be treated any differently than an equivalent rise in local income. Democratic control and well-informed citizens thus are the best way to ensure optimal local budgetary outcomes that are in line with the interests of the median voter.

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## Appendix

Table 13: Regression Output of the second baseline regression without the median income

	(1) Expendi- tures	(2) Tax Multiplier	(3) Log-Exp.	(4) Tax Multiplier
Net transfer	0.198 (0.229)		0.000129*** (0.0000384)	
Log-Net transfer		0.0205** (0.00936)		0.0408*** (0.0104)
Net Transfer $\times B^+$	0.513 (0.349)	0.0176 (0.0174)	0.00000508 (0.0000397)	0.00121 (0.0151)
Net Transfer $\times B^-$	-0.245 (0.197)	-0.00350 (0.0190)	0.0000154 (0.0000476)	0.0187 (0.0249)
Controls	YES	YES	YES	YES
Municipality FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
$N$	2330	2330	2330	2330
Adj. $R^2$	0.842	0.846	0.872	0.876

Standard errors in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

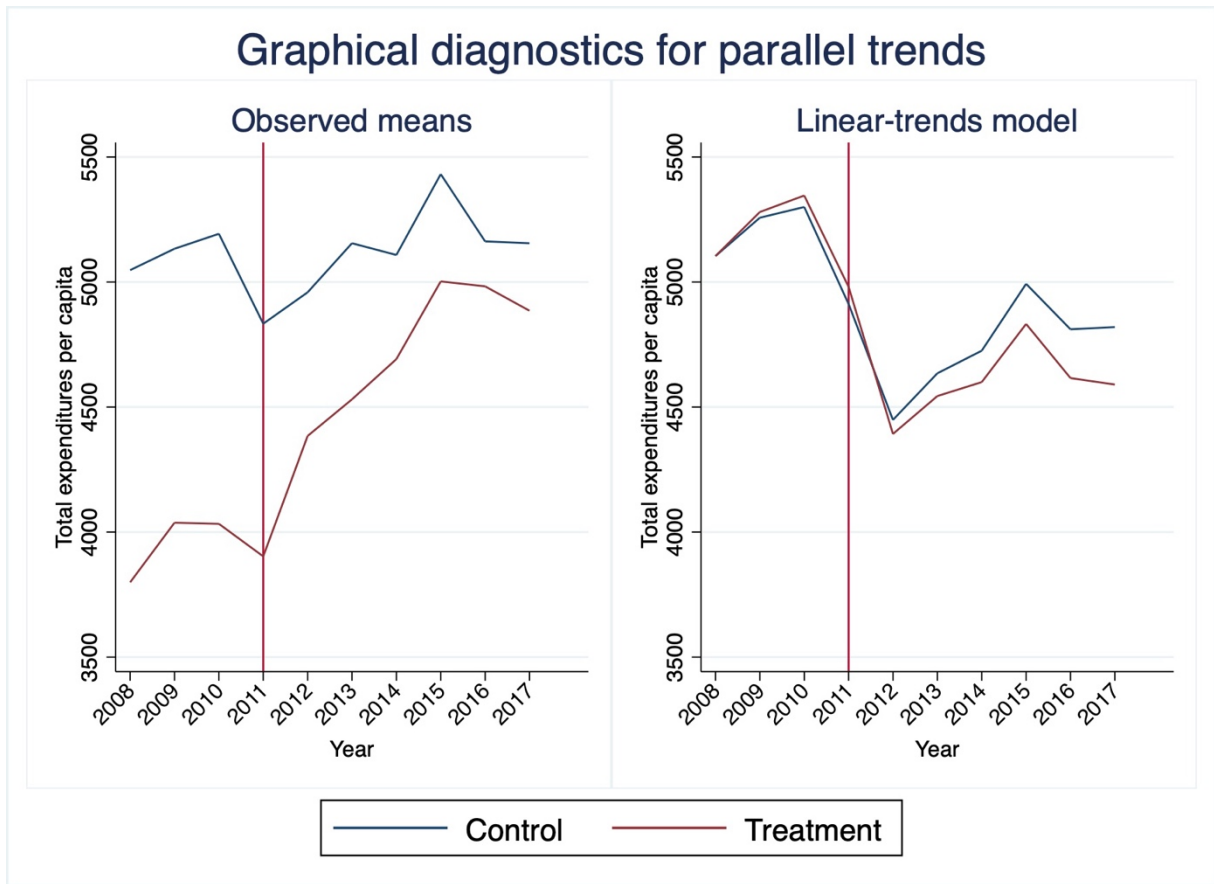


Figure 7: Graphical diagnostics for parallel trends of the third Dif-in-Dif model of Table 9

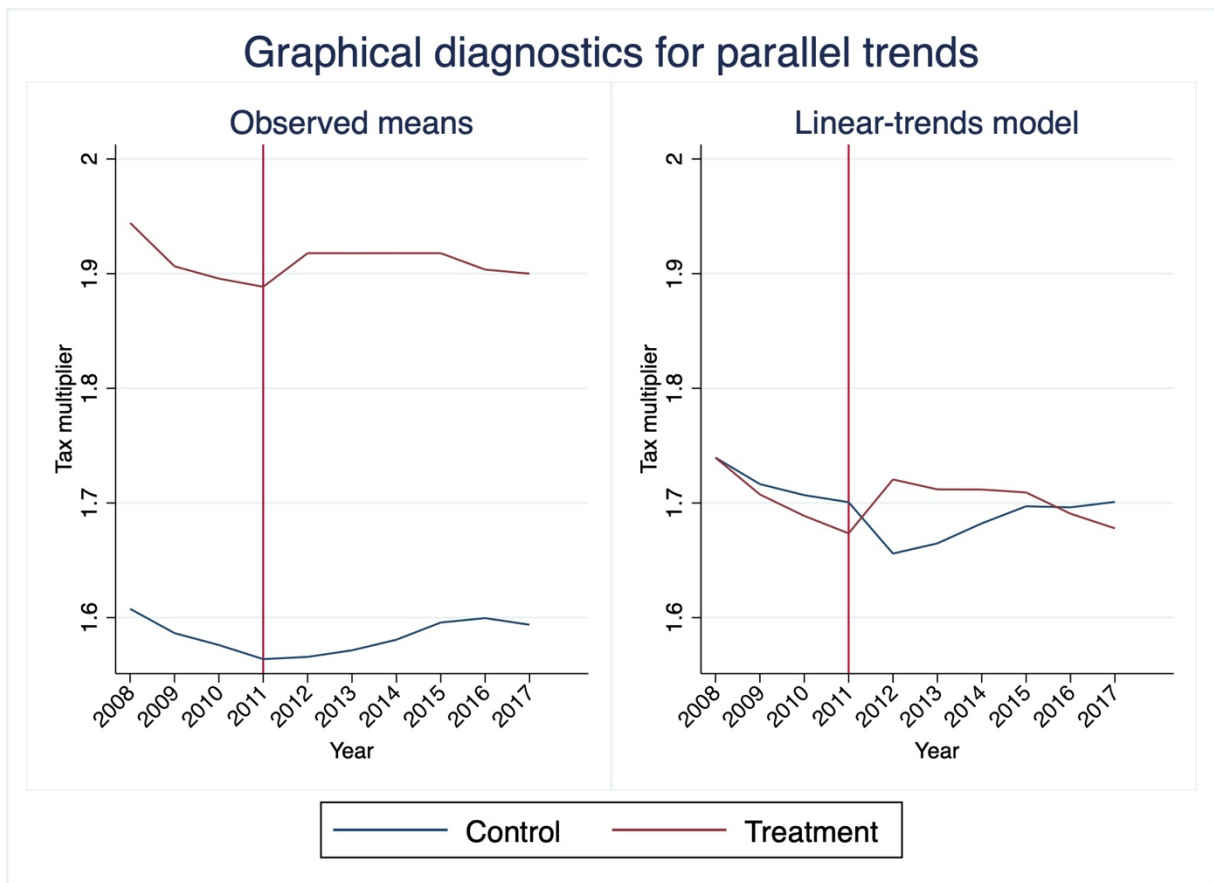


Figure 8: Graphical diagnostics for parallel trends of the fourth Dif-in-Dif model of Table 9

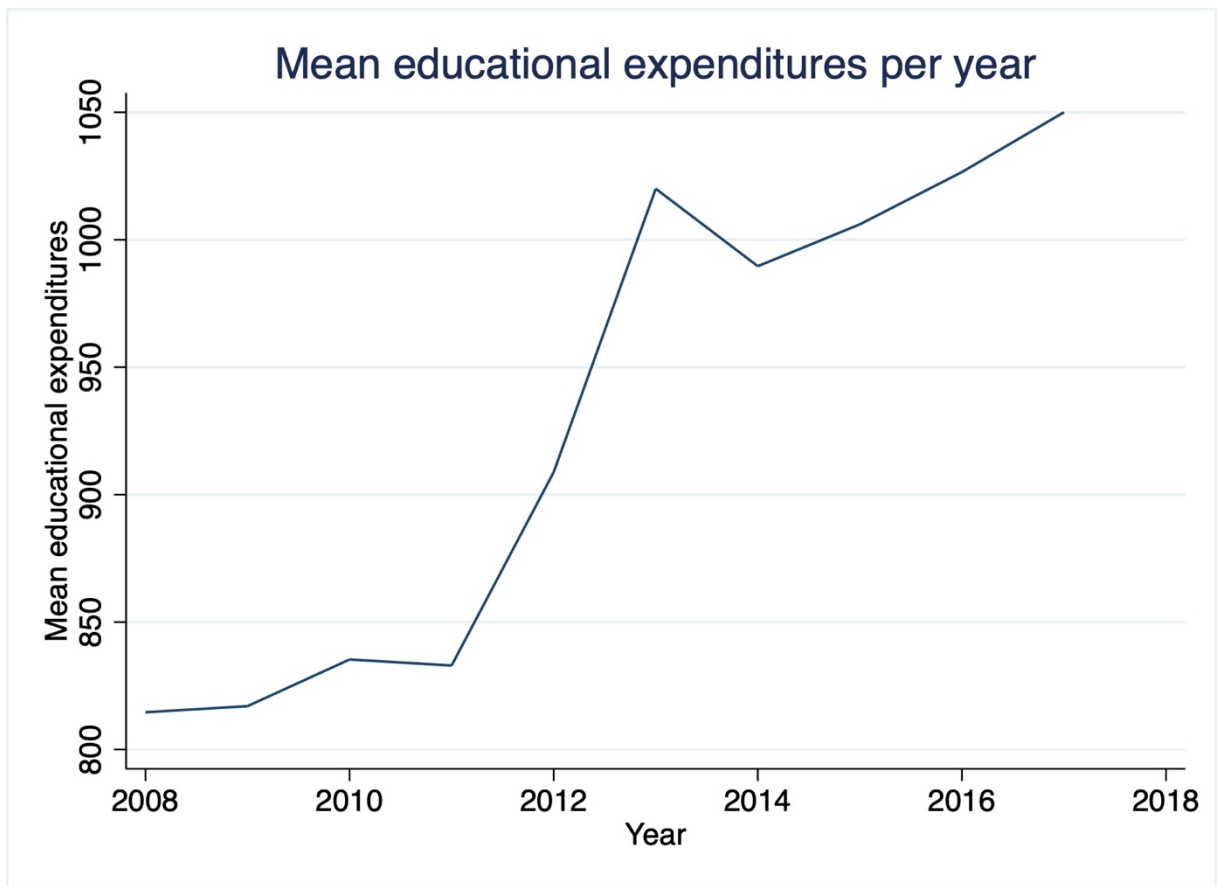


Figure 9: Plot of mean educational expenditures per year



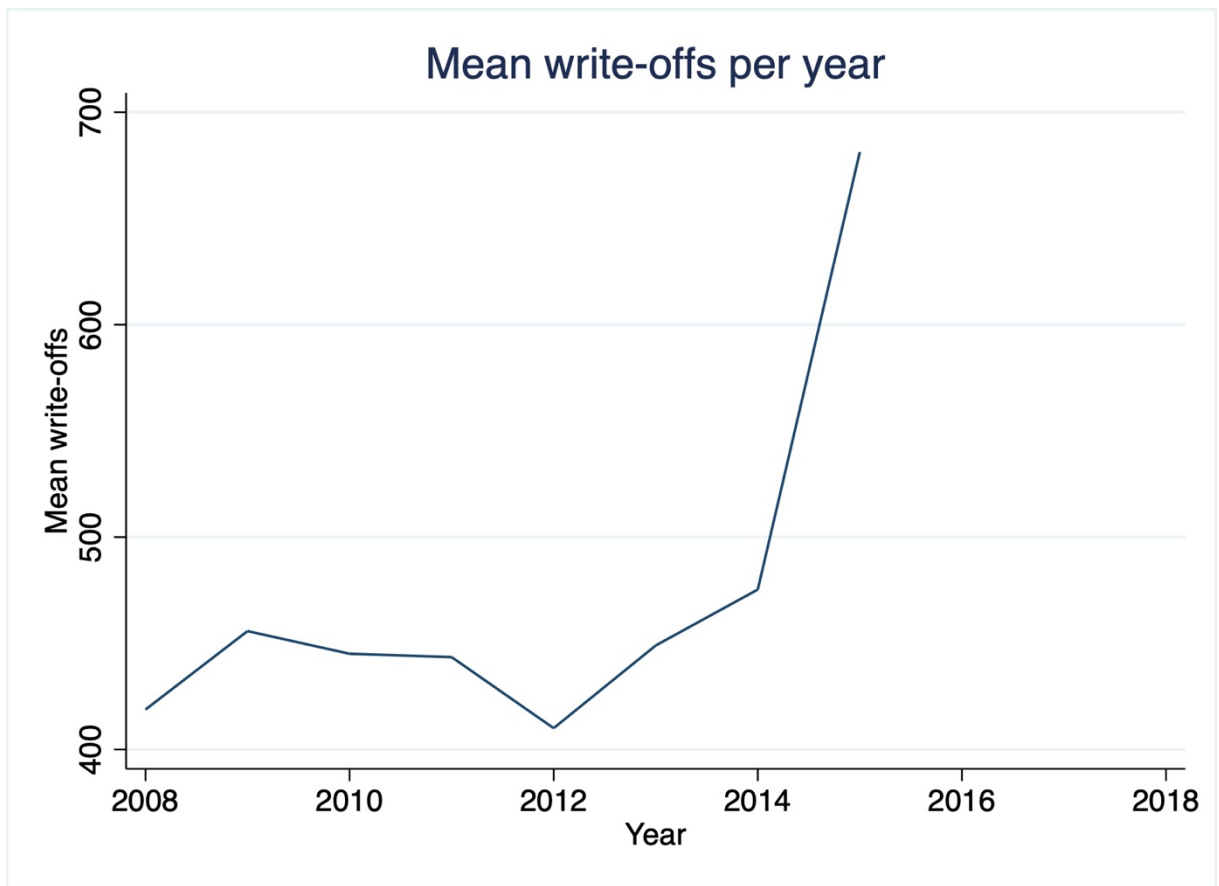


Figure 10: Plot of mean write-offs per year

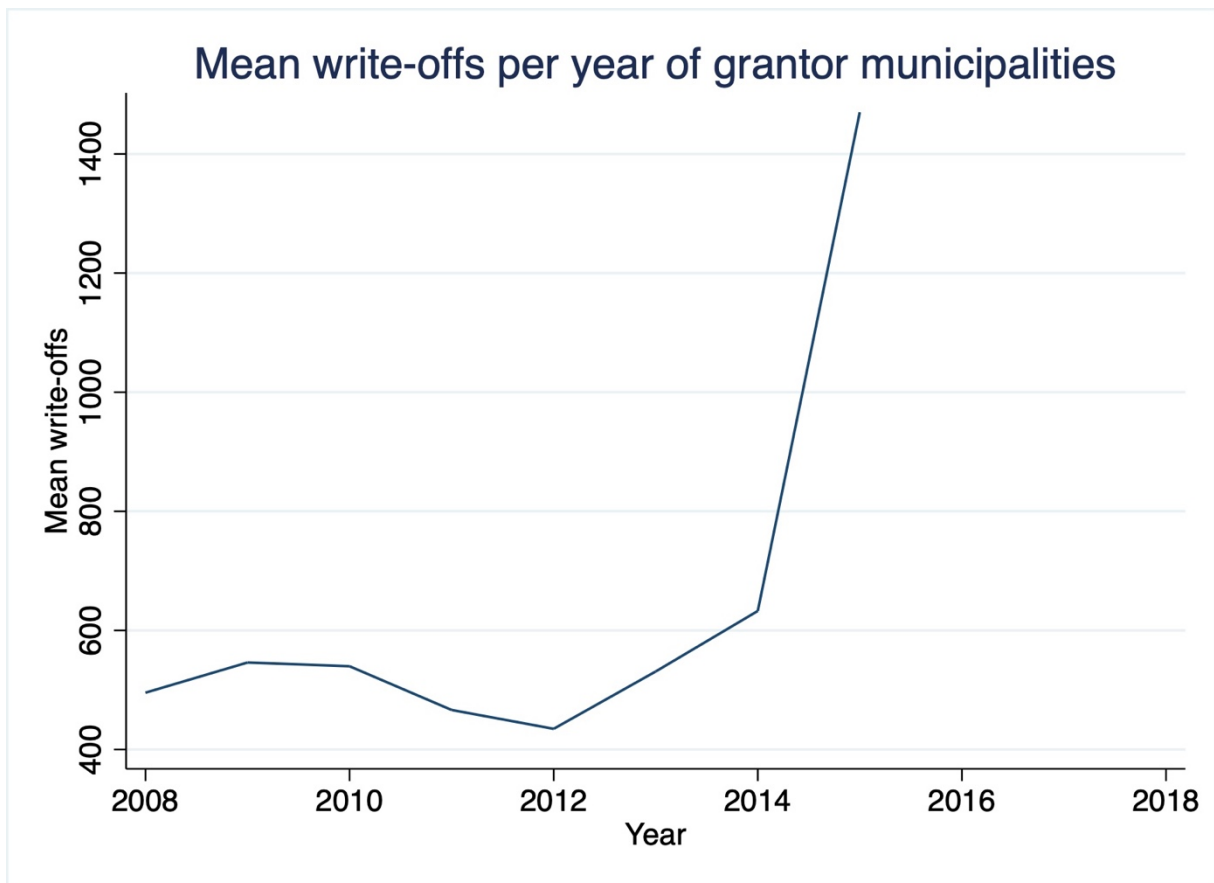



Figure 11: Plot of mean write-offs per year of grantor communities with mean HRI > 100

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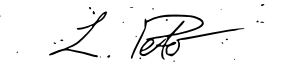
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