Identifying Local Strategic Interaction: Evidence from Flanders

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Abstract

In the early 2000s, the municipalities of Flanders collectively raised local tax rates by 10 to 20% over the course of just three years. Among the main reasons for the tax hikes, was a federal income tax reform that shrunk the local tax base. At the same time, a Flemish reform expanded the municipal fund, thereby increasing general grant revenue. In this paper, we analyze local government's reaction to these revenue shocks and try to discern whether the observed tax changes are solely attributable to the reforms or whether any strategic considerations came into play. In doing so, we contribute to the literature on vertical and horizontal fiscal externalities.

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1 Introduction

In its annual report on tax reforms, the OECD (2017) signaled an intensification of tax competition between governments, as it recorded an increase in corporate tax reforms and saw the average corporate tax rate continue to decline, after it had initially stabilized following the financial crisis. However, whether there is in fact tax competition and whether action needs to be taken to prevent it, is not clear from the evidence provided. Indeed, the OECD reports that while tax rates have fallen, revenues have remained relatively stable. One explanation is that countries have broadened their tax base by fighting international tax avoidance, as noted in the OECD report. Another reason could be an increase in profits since the crisis. These observations are emblematic of a broader issue which faces research on tax competition, namely the endogeneity of fiscal policy to unobserved or hard to capture processes which correlate over time and space. This is echoed by Chirinko & Wilson (2017), who find that the secular decline in U.S. capital tax rates reflects synchronous responses among states to common shocks rather than competitive pressure.

Nevertheless, theory does provide arguments why governments may interact strategically in setting fiscal policy. Most commonly, tax competition is associated with distortive taxes and mobile tax bases. In order to attract firms or people, governments may enter a "race to the bottom", leading to suboptimal levels of public service provisions. A second reason for interaction is capture by spillovers in public service provision or the inability of governments to exclude neighbours from the local public goods they provide. If some governments can benefit from neighbouring governments' spending, there is less need for them to spend and hence tax as much. Lastly, a lack of information to citizens about the cost of local public services may lead them to use tax rates in neighbouring communities as a yardstick to assess their own government's performance. If other governments change fiscal policy, politicians may be persuaded to follow suit so as to remain in office (see e.g. Besley & Case (1995)).

To test these hypotheses, the empirical literature has traditionally relied on tax reaction functions estimated via spatial econometrics, see Brueckner (2003) for an overview. The overall conclusion from these studies has been that tax rates are interdependent. Moreover, as Baskaran & Lopes da Fonseca (2014) write in a survey: "Until recently, the empirical results from the local level were fairly conclusive. The majority of the relevant studies find that tax rates are strategic complements: a decrease in the tax rate by other jurisdictions leads to a decrease in one's own." However, these findings of potentially harmful tax competition have been criticized for not being able to distinguish spatial correlation from actual strategic interaction in tax rates (Gibbons & Overman, 2012).

More generally, the identification of tax competition is difficult because it is impossible to know what the level of taxation would have been, had there been no external pressures. The unbiased identification of strategic interaction therefore requires a credible source of exogenous variation in neighbouring fiscal policy. Only a handful of studies have been able to capture such variation, relying mainly on natural experiments produced from changes in institutional

arrangements. Lyytikäinen (2012) for instance, exploits a change in statutory minimum rates which led to a mandatory rise in local tax rates for some, but not all Finnish municipalities. Isen (2014) instead examines reactions to close referenda outcomes on local fiscal policy decisions in the U.S. and Baskaran (2014) exploits an equalization reform in one German state to identify tax mimicking in a neighbouring state's municipalities. While these studies find no evidence for local strategic interaction, others have shown the opposite, exploiting Germany's reunification (Baskaran, 2018), Swiss cantonal tax rates as instruments (Parchet, 2019) and the persistent cross-border cultural differences in preferences Eugster & Parchet (2019). Moreover, in contrast to the traditional literature, (Parchet, 2019) even finds a negative correlation between tax rates rather than a positive one that would suggest a race to the bottom.

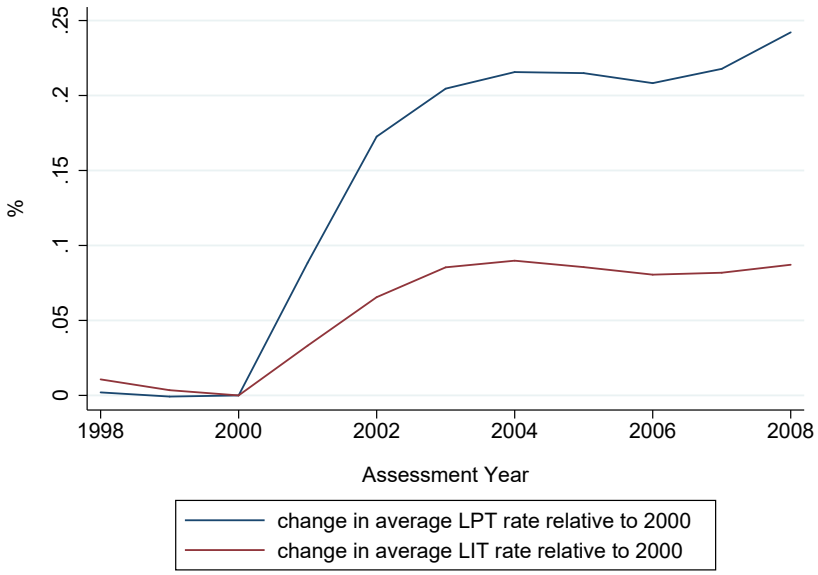
As such, recent findings on local interaction are more heterogeneous and do not come to an unambiguous conclusion. Therefore, more research is needed to test the hypotheses in the literature, identify under which circumstances governments engage in strategic tax setting behaviour and uncover the underlying mechanisms. In this paper, we contribute to this endeavour by exploiting two reforms in Belgium that heterogeneously affected municipal revenue and removed regulation regarding social and investment spending. The reforms did not force the municipalities to take a particular course of action, but the revenue shocks were large enough to demand a response. In fact, they resulted in unprecedented changes in local tax rates, see figure 1, which we will examine to uncover whether any strategic interaction played a part.

The first reform we consider relates to the grant-based financing of Flemish municipalities. In 2003, the Flemish government merged several existing funds into one and changed the way in which it was allocated. To subdue resistance from the municipalities, the government increased the total amount of funds, guaranteeing that no municipality would lose money. As a result, some municipalities saw their revenue increase by half, while others received the same amount of grants as they had before. This reform therefore relaxed the budget constraint for some municipalities while for others, the financial situation remained largely unchanged.

The second reform we consider and the most likely cause of the local tax hikes, is the federal reform of the income tax. This was a broad reform that introduced and extended several tax deductions, changed tax brackets as well as the top marginal tax rates. Municipalities were directly affected by this reform because they levy a surcharge on the revenue collected in their municipality. As the reform aimed to decrease the overall tax burden, many municipalities saw their tax base shrink artificially, eliciting a response. The extent to which municipalities were affected, depended on their composition but also on their historical dependence on the local income tax relative to the property tax.

While all municipalities were subject to these reforms, treatment intensities differ, partly due to variable characteristics related to the reform and partly due to more historic aspects, which we will try to exploit. To first analyse the impact of the reform on municipal fiscal policy, our identification strategy accounts for the heterogeneity in characteristics (and hence revenue shocks), both as a source of omitted variable bias and as determinants of treatment

Figure 1: Change in average tax rates relative to 2000



effect heterogeneity. In a second stage, we analyze strategic interaction by also modelling the neighbours' reactions, the heterogeneity in which we take as a given seeing as one cannot choose their neighbour.

2 Institutional context and Reforms

2.1 Institutional context

This study focuses on municipalities in the Flemish region of Belgium, which count 308 during the period of our analysis. In 2000, their total spending per capita averaged around 1000 euro (or 4% of GDP), to a great extent funded through two taxes, the local income tax (LIT) and the local property tax (LPT). During the same year, these taxes generated respectively 37% and 46% of total tax income, which in turn accounts for 46% of total ordinary revenue. Another large source of revenue is the Municipal Fund, which makes up 95% of all general grants, in total constituting almost 20% of total revenue. Remaining revenue is made up of contributions and targeted grants (17%), financial revenue (13.5%) and charges (4.5%). As the LPT and LIT are the most important taxes in terms of revenue but also the most commonly known, they are the focus of this paper and merit a lengthier discussion.

Important for our analysis, Belgian municipalities are free to set the tax rates of the LIT and LPT, but because they are surcharges, their tax base is determined by higher level government. The LPT is in fact levied as a factor of the regional property tax revenue collected in the municipality from both households and firms. The primary tax base is called the "Kadastraal Inkomen" (K.I. cadastral income) which reflects a fictitious rental value of the taxed property. Although the tax base is adjusted for inflation, it uses local rental values for 1975 as a frame of reference and therefore no longer reflects reality. This is to some extent noticeable in figure A.1

in appendix A, where tax rates are plotted for 2000 showing a stark contrast between the more rural west and the rest of Flanders. Between 1991 and 2018, the regional property tax rate was set at 2.5% so that apart from some reforms aiming to decrease the property tax burden on firms, the municipal or secondary tax base remained a fixed proportion of the cadastral income.

Since 1999, the Flemish Tax Service has been in charge of collection and transfer of LPT revenues. Municipalities have to determine the LPT rate by January 31st of the assessment year and communicate it to the administration by March. Property tax bills are then sent by October 31st and payable 2 months later at the latest. Due to late tax assessments in 1999 and 2000, it was decided to grant monthly advances in each second semester of the year from 2001 onwards.[1] Note that tax rate decisions, assessment, collection and transfer occur all in one year. An increase in the LPT rate can therefore have an almost immediate impact on municipal revenue which stands in contrast to income taxation, on top of it being a more stable source of revenue.

The LIT in turn, is a percentage of the federal personal income tax collected in a municipality by the General Administration of Tax Collection and Recovery. Figure A.2 in appendix A, maps local tax rates for 2000, showing clear patterns of spatial correlation. Because of some disputes regarding the legitimacy of LIT rates being determined rather late, a law came into force stipulating that from 2009 onwards LIT rates had to be decided by January 31st of the assessment year. Tax returns are then due in July and tax bills have to be sent a year later at the latest. In October of the assessment year collection starts and municipalities get an estimate of the revenues they will receive over the course of the next year. As for the LPT, income tax assessment was often delayed such that from 2001 onwards, municipalities have received advances on their LIT revenue. Yet in contrast to the LPT, these advances are not received during the assessment year but from February to April the year after, meaning there is a substantial lag between the time income is earned and tax revenue is received.

We next discuss the two reforms that we exploit as revenue shocks to identify strategic interaction. We will outline both the nature of the reforms and the timing of its conception and implementation, so as to form an idea of how and when the reforms could have affected local fiscal policy.

2.2 Municipal fund reform

As mentioned earlier, the Municipal Fund (MF) is the largest source of unconditional grant revenue. In 2003 the fund was reformed in two ways. First, the allocation key was changed following principles that had already been announced in the coalition agreement of 1999. This reform aimed to redistribute more based on fiscal capacity and open space and pay more attention to municipalities with "central" functions as well as the smaller and more rural municipalities, so

[1] These advances are paid each month in equal parts, summing up to 95% of an estimate municipalities have to communicate to the Flemish administration by May 15th of the assessment year, otherwise the administration determines the estimate itself. The difference between estimated and realized tax revenue is paid by June next year.

as to support cities with their wider range of tasks while also safeguarding the identity and administrative power of others.

Before the reform, MF grants were allocated according the key in table 1. From 2003 onwards, the key in table 2 was used. A first notable change is the explicit selection of certain municipalities in addition to Antwerp, Ghent and Bruges, the largest cities in Flanders. The choice for these municipalities was not well motivated except for a reference to the 1997 spatial plan of Flanders, which in turn refers to a study from the 70s, updated in 1998, that ranked municipalities according to the quantity and quality of their facilities and their overall sphere of influence.[2] This selection was nevertheless criticized by the consulted advisory bodies, which urged to use measurable, objective parameters rather than a group of specific municipalities to support city-like functions - notably, this had already been done using students and employment to capture the "central function" of a municipality. In case this were not feasible, they suggested to use a different typology designed by Dexia[3], which has since become the standard frame of reference for meaningful comparisons and analysis of municipal finance.[4]

A second change with respect to the old MF allocation mechanism, is the inclusion of factors related to social welfare. This has to do with the second way the reform affected municipal finance and which had not been part of the coalition agreement. To reduce administrative burden and increase fiscal autonomy, the Municipal Fund (€1.2 billion anno 2002) was merged with two other funds, the Investment Fund (IF, €125 million) and half of the Social Impulse Fund (SIF, €185 million). The other half of SIF grants was set aside to become the City Fund and equals the SIF share of the thirteen largest cities, the beneficiaries of the new fund. The older SIF and IF funds were allocated to help revitalize disadvantaged neighbourhoods and fight deprivation on the one hand and support real estate investment and infrastructure works on the other. Municipalities were entitled to so-called "drawing rights" from these funds. For SIF, this meant that in order to use grants revenue, a policy plan needed to be approved by the administration detailing goals, achievable results, necessary means and the amount of drawing rights to be used. For investments, municipalities had to apply with the province's governor. In case these drawing rights were not called upon, the SIF grants were transferable generally for up to two years, while the IF grants were perpetually transferable to the next year. Merging these funds and getting rid of application requirements therefore meant more freedom and less administrative burden. The allocation of these grants or rather the underlying drawing rights

[2]See Annaert et al. (1972) and Van Hecke (1998). The first ranking by Annaert et al. (1972) distinguished large, regional and small cities determined by consumption patterns that mapped a sphere of influence, this was based on a survey that asked inhabitants where their frequent shopping took place and their consumption of leisure activities, health care, education and other publicly provided services. Van Hecke (1998) updated this study in the 90's and further distinguished three types of small cities based largely on quantities related to local, public and private facilities e.g. the number of beds and people employed in a hospital, the number of schools and students, the number of bars, shops and movie theaters. The well-equipped small cities are called "provincial" cities in the remainder of this paper.

[3]Dexia was a bank bailed out by the Belgian and French state following the financial crisis. The Belgian part is currently called Belfius and grew from the "Gemeentekrediet van België", a bank with a long history of financing investments of local administrations.

[4]This typology, first published in 1997, is based on a factor and cluster analysis employing over 100 socio-economic and morphologic characteristics, see Dessoy (1998).

was based on the variables and weights reported in tables B.2 and B.3. Notably, the allocation of SIF grants is based partly on recent and partly on more historic statistics, that are updated only every 3 years, the last time being in 2000.

Table 1: Allocation key used between 1990–2002 .

Target	Share	Weight	Allocation rule
$>$ 150.000 inhabitants	42.9%	42.9%	Historical split
Bruges	0.2%	40%	by population (+30% at the coast)
50.000 $\leq$ inhabitants $\leq$ 150.000	15.55%	10%	by surface (+30% at the coast)
$<$ 50.000 inhabitants	41.35 %	5%	by population density (+30% at the coast)
		10%	by inhabitants employed (+30% at the coast)
		15%	by personal income tax capacity (-30% at the coast)
		15%	by property tax capacity (-30% at the coast)
		5%	by number of students (+30% at the coast)

While some of the grant determinants in tables B.2 and B.3 were included in the new allocation key, others were no longer taken into account. During the decision process, municipalities were kept out of the loop. To appease the local administrations, the Flemish government made the same promise as when the SIF was originally created and the MF was last reformed: no one will lose revenue.[5] To that end, more money was put in the Municipal Fund and those municipalities that lost revenue with the new allocation key, were paid the difference with the guaranteed amount, equal to the sum of MF, SIF and IF revenue in 2002. For the City Fund, there was also a guarantee, not equal to the SIF revenue but what had been guaranteed when SIF was first created. In contrast to the MF, City Fund grants were allocated based on population with an initial split 75% for Antwerp and Ghent and 25% to the 11 "regional" cities.[6] As was also noted by the Court of Audit (Rekenhof) in an evaluation of the City Fund, see Rekenhof (2009), this system of guarantees and by extension the selection of particular beneficiaries, creates a disconnect between the problems municipalities face and the grants they receive to combat these.

[5]The Municipal Fund was last reformed on November 7 1990, after it had been regionalized in 1999.

[6]The selection of these cities was also based on a ranking of municipalities, but not coincidentally these are Flanders' largest cities. The largest non-included municipality has 25% less inhabitants than the smallest included one. The 75-25 split is based on the 1998 allocation of funds based on the criteria reported in table B.2.

Table 2: Allocation key published in July 2002 and used onwards.

Focus	Share	Weight	Allocation rule
Pre-allocated shares (40.8%)			
Cities	30%		by population, to cities with at least 200.000 inhabitants (Antwerp and Ghent)
	1.6%		to cities between 100.000 and 200.000 inhabitants. (Bruges)
Regional cities	6.2%		by population: Turnhout, Roeselare, Genk, Oostende, Hasselt, Sint-Niklaas, Kortrijk, Mechelen, Aalst, Leuven.
Provincial cities	2%		by population: Aarschot, Deinze Dendermonde, Diest, Eeklo, Geel, Halle, Herentals, Ieper, Knokke-Heist, Lier, Lokeren, Mol, Oudenaarde, Ronse, Sint-Truiden, Tielt, Tienen, Tongeren, Vilvoorde, Waregem.
Coastal cities	1%		by population: De Panne, Koksijde, Nieuwpoort, Middelkerke, Oostende, Bredene, De Haan, Blankenberge, Zeebrugge, Knokke-Heist.
Allocation by variables (59.2%)			
Central function	8%	4%	by inhabitants employed
		4%	by students
Fiscal poverty	30.2%	19%	by personal income tax capacity
		11.2 %	by property tax capacity
Open space	6%	6%	on the basis of woods, parks and gardens, arable land, grasslands, uncultivated land, recreation areas and orchards
Social measures	15%	1%	by the number of widows, disabled, pensioners, and orphans
		4%	by the number of unemployed with low levels of schooling
		3%	by the number of births in disadvantaged families
		3%	by the number of people in social housing
		4%	by the number of subsistence wage beneficiaries

In table B.1 we present a timeline detailing when the various aspects of the reform were announced. Mention of the Municipal Fund reform is first made in the coalition agreement of June 1999. In July of 2001, the preliminary draft decree is presented in a press release,

revealing that the fund will be merged with the SIF and IF, in line with the guidelines of the coalition agreement but also integrating the funds' old criteria and guaranteeing that the levels of MF and SIF grants will be maintained. In November, an adjusted draft decree is presented which now also guarantees that grants obtained from the IF will be maintained. Critique by the advising bodies regarding the explicit selection of municipalities is disregarded, even more so, the preallocated share for provincial cities is doubled and the criterion of road length (as a proxy for infrastructure or maintenance cost) is dropped. While no numbers have been (officially) released, a member of parliament notes in January 2002 that figures are appearing in news papers causing a stir. The prime minster of interior affairs refuses to release any official estimates and would not confirm nor denounce the other estimates until all advisory bodies' comments are in. From April through June, the draft decree is discussed in parliament, accompanied with simulations and ultimately approved and ratified in July. By August, municipalities have received preliminary estimates of the grants they may expect to receive between 2003 and 2007. In response, a member of parliament notes that for his constituency the estimate is lower than was apparent from the simulations during parliamentary discussions and he is told it may still change as the underlying data is being updated.

In summary, this municipal finance reform introduced changes to the preallocation for regional cities and set aside funds for provincial cities as well. From the original municipal fund, surface was excluded as a grant determinant and substituted with open space while other social and investment spending criteria were dropped and weights were changed overall. The definite mix of determinants and their weights was not known until the Decree was approved in the summer 2002, but the coalition agreement revealed a realignment of policy towards cities and rural municipalities, which was also apparent from the preliminary draft decree of the summer of 2001.

Table 3: Summary Statistics Municipal Fund Grant Change

Grant change	min	median	max	mean	sd
in euro	0	75335	68743008	575116	4226929
in euro per capita	-2.7	7.1	146	13	20
in %	0	.053	.54	.08	.1

In 2003, the Municipal Fund contained €1.542 billion, 6% more than the total of the old fund, SIF and IF the year before. SIF guarantees for the 13 largest cities (the "regional" cities) went to the City Fund for a total of €90 million. As figure 2 and table 3 show, this increase was not evenly spread across municipalities. The average change relative to 2002 was 8% but almost 40% of municipalities saw no change in grant revenue. If not for the guarantee system, these municipalities would have lost revenue under the new allocation mechanism. In line with the rhetoric of the reform, figure 3 indeed shows a higher increase in revenue for cities, particularly the regional ones.

In terms of ex ante behaviour it is possible that these municipalities relaxed fiscal policy

Figure 2: Relative grant change

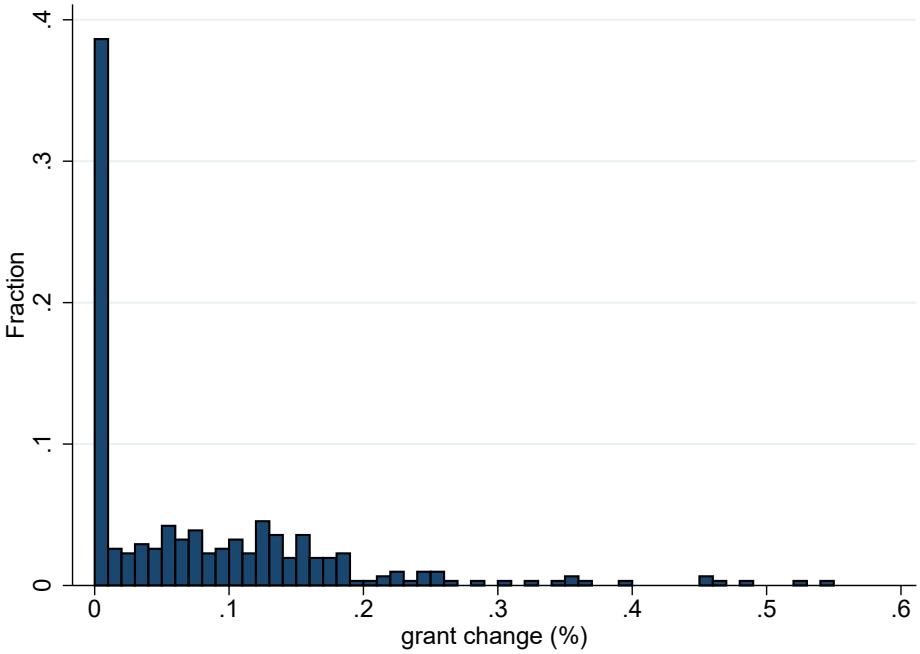
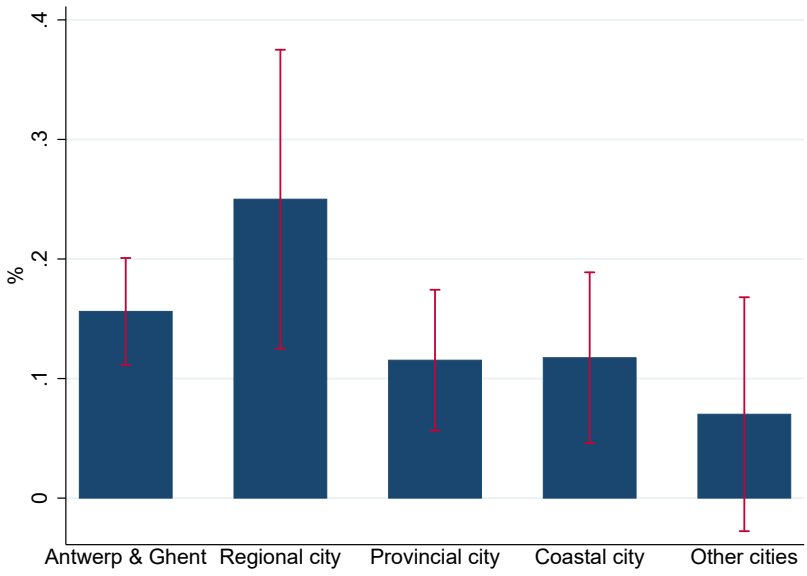
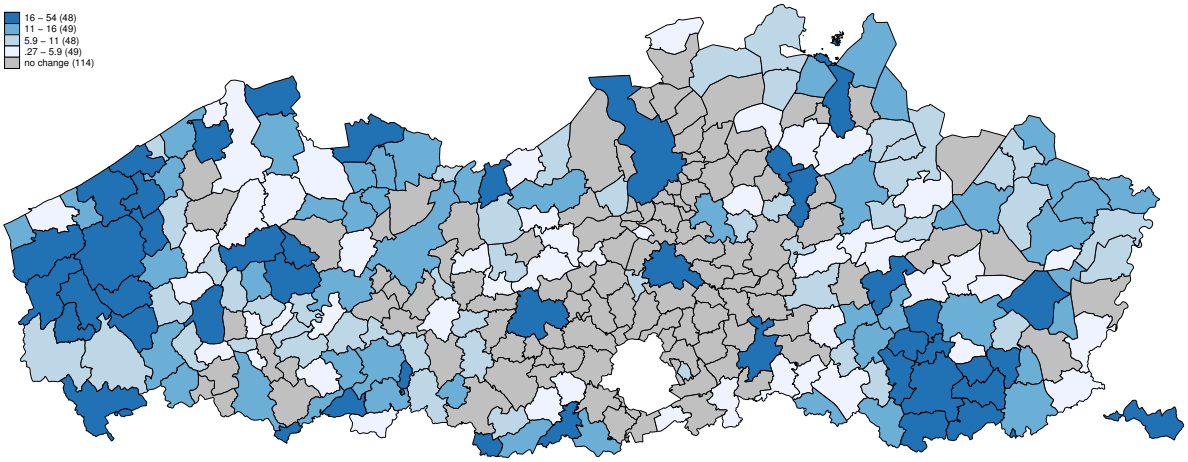


Figure 3: Relative grant change by city type



Note: This figure shows the percentage change in municipal fund grant revenue by city type with bars of one standard deviation.

Figure 4: Relative grant change quantile map



knowing they would receive more grants in the future, although the first simulations were only available in April of 2002. Municipalities could also have tried to inflate their shares in the funds, so as to have a high guarantee level in 2003. However, the SIF guarantee was not announced in the coalition agreement and was fixed in 2000 for the next three years. The IF guarantee was only announced in the adjusted draft decree in November of 2001, leaving only a year to adjust policy so as to attract inhabitants and students, build new houses or construct more roads. Furthermore, these last two grant determinants were explicitly dropped from the new MF criteria. Guarantees with respect to the old MF grant were announced in July 2001, also leaving one full budget year to adjust behavior.

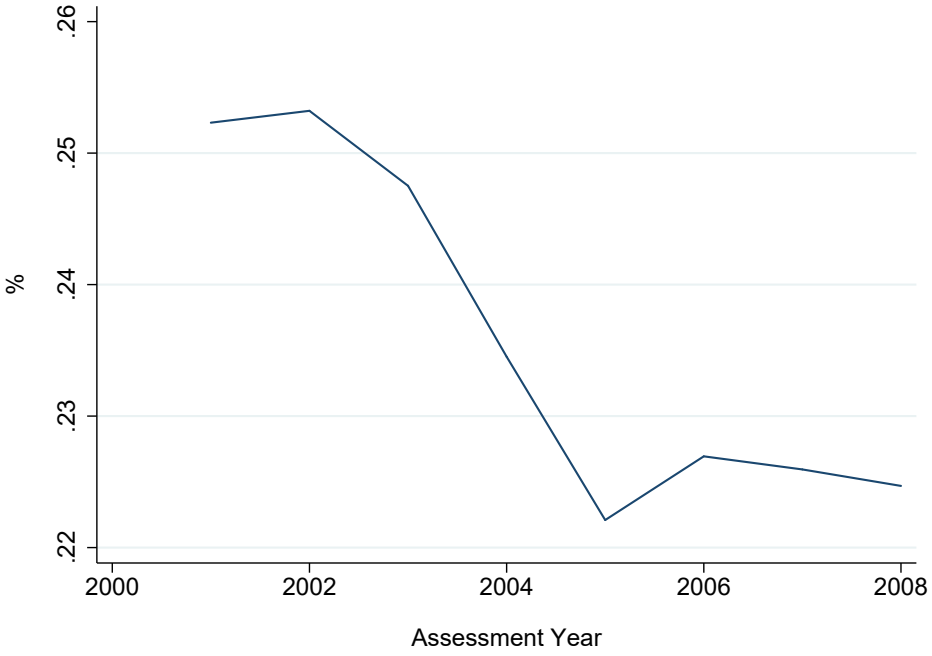
Ex post, we can imagine two possible reactions. First, municipalities may expand fiscal policy in response to the actual change in revenue or due to there being no more administrative hurdles. Secondly, as municipalities are more free to spend the grant revenue previously allocated to social and investment spending, the composition of expenditure may change. Both of these reactions may elicit or take into account neighbouring municipalities' reactions, which we will try to identify.

While for most, the municipal fund reform was a positive positive revenue shock, the same cannot be said about the federal income tax reform which we discuss next.

2.3 Personal income tax reform

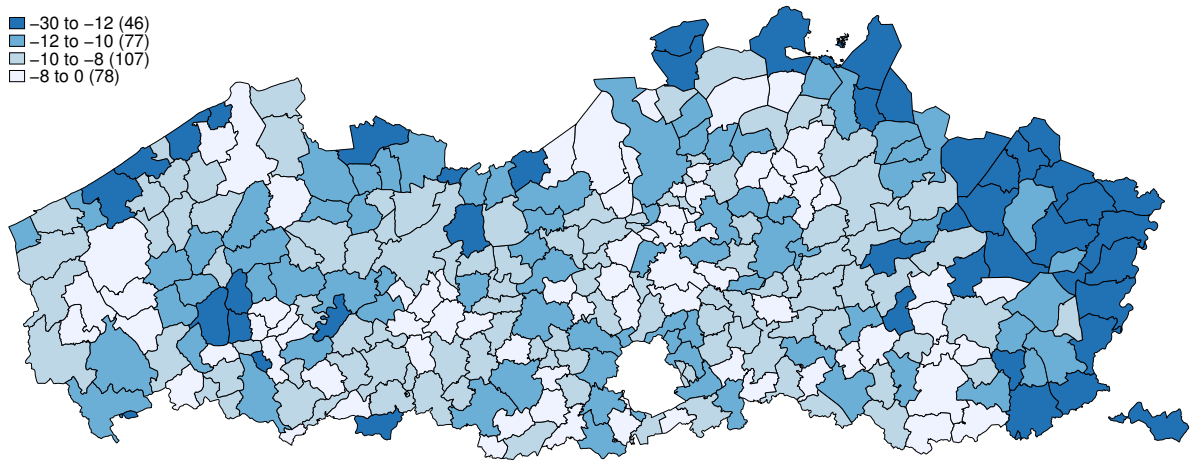
In 2001, a major reform took place in the federal income tax system. The budgetary cost was estimated to lie between €4 and 5 billion (see Cantillon et al. 2001; Saintrain 2001), largely confirmed in a counterfactual microsimulation exercise by Decoster et al. (2015). The reform was implemented progressively between 2002 and 2005, with the largest budgetary effects, around 40% of the total incidence, hypothesized to occur in the last year. The income tax system was reformed with four goals in mind, to reduce the burden on labour and to improve the way cohabitation (married or not), children and the environment were taken into account. The overall impact of this reform is clearly illustrated in figure 5 which plots the implicit, average federal income tax rate calculated as the federal income tax revenue over net taxable income or stated otherwise, the secondary tax base relative to the primary tax base.[7] Figure 6 maps the local effects between 2001 and 2006. An overview of the measures and the expected cost - according to the Federal government - is provided in table 4.

Figure 5: Average Federal income tax rate (2001–2008)



[7]Data is obtained from Statistics Belgium. The decline is in fact underestimated as net taxable income shrinks due to some aspects introduced by the reform.

Figure 6: Change in the local income tax base relative to net taxable income (%, 2001–2006)



While several studies have analyzed the budgetary and redistribution effects of these measures, not much attention was paid to the impact on municipal finance. Yet, because the local income tax is levied on federal income tax revenues, municipalities were very much affected. Moesen & Stevens (2003) estimated a decline in the municipal tax base accumulating up to €3.3 billion in 2006, while the Flemish Administration of Interior Affairs communicated an 11% decline in municipal revenues due to the reform.[8] Apart from some predictions for different growth scenarios (by the administration) or for different type of municipalities (by Moesen & Stevens 2003), no municipality-specific predictions were made. Yet, seeing as the reform encompassed various measures, municipalities were likely to be affected heterogeneously, depending on the socio-economic and demographic composition of their population as well as their dependency on the income tax as a source of revenue.

Table 4: Main reform measures and budgetary impact expected by the government (Saintrain, 2001)

Measure	Expected budgetary impact
Low income tax credit	€446 million
Adjustment middle tax brackets	€768 million
Deductible professional expenses	€322 million
Decrease of top marginal tax rates	€174 million
No differential treatment married vs unmarried couples	€1009 million
Separate taxation of non-labour income spouses	€50 million
Tax credit changes of social housing occupants	€397 million
Child friendly measures	€124 million

In terms of reaction we may expect municipalities to adjust their tax rates so as to maintain

[8] In circular BA-2003/07 dated July 18 2003, municipalities were notified that the federal tax reform would lead to a decrease in tax revenue of 10 to 11% by 2006. This was based on estimates by the Federal Budget Office and simulations done by the VVSG, a municipal network organisation (Vlaams Verbond voor Steden en Gemeenten, Flemish Alliance for Cities and Municipalities).

similar levels of revenue (regardless of motivation). Since tax base sharing can induce vertical fiscal externalities resulting in tax rates that are inefficiently high, the reduced tax burden on labour may lead municipalities to change tax rates by less than what would otherwise be necessary to offset the revenue loss. However, they may also go beyond the technical correction to take advantage of the reduced federal burden to raise even more revenue (depending on motivation). At the same time, politics may have played a role too. In that respect it is interesting to note that when municipalities were informed of the general impact on tax revenues of the reform, the circular of July 18 2003 explicitly mentioned that municipalities can decide for themselves whether to follow the federal government in reducing the tax burden on labour or to choose a different direction.[9]

In terms of timing of the reaction, we reiterate that there is a significant lag between the moment municipalities decide on the LIT rate and when the LIT revenue is received. Because the reform was gradually implemented, starting in 2002, it could have affected revenues only from 2003 onwards with the most tangible revenue shocks occurring much later. Nevertheless, tax rates have to be determined in advance so we may expect tax rates to be adjusted from 2002 onwards albeit based on imperfect information. To make up the budget for say 2003, municipalities would normally receive revenue estimates from the Federal Public Service (FPS) Finance in October 2002. In case they raise the tax rate in 2002 (on taxable income in 2001), municipalities can ask the FPS for a recalculation but this may take more time. To conclude, we provide an overview in table B.4 of when particularities regarding the reform were announced.

2.4 Tax reactions

While both reforms affected revenue in 2003 and after, we observe tax rates changes well in advance. As figure 7 shows, most municipalities changed tax rates in 2001 and 2002 and most municipalities changed the property tax rate rather than the income tax. Conditional on changing tax rates, we find the largest increases are with respect to the property tax, see figure 8. While the average property tax rate increases between 20 and 30% during the 2001–2003 period, the average income tax rise doesn't reach 15%. Note that the few municipalities that did change taxes outside this period, decreased them. That is not too surprising given the municipal elections of 2000 and 2006. Nevertheless, it may be interesting to determine to what extent these tax cuts were driven by (neighbouring) municipalities' policy changes.

[9] ("De gemeenten kunnen zelf beslissen of ze de federale overheid willen volgen in de vermindering van de fiscale druk op de arbeid of dat ze een andere richting kiezen")

Figure 7: Number of local tax rate changes (out of 308, 1999–2008)

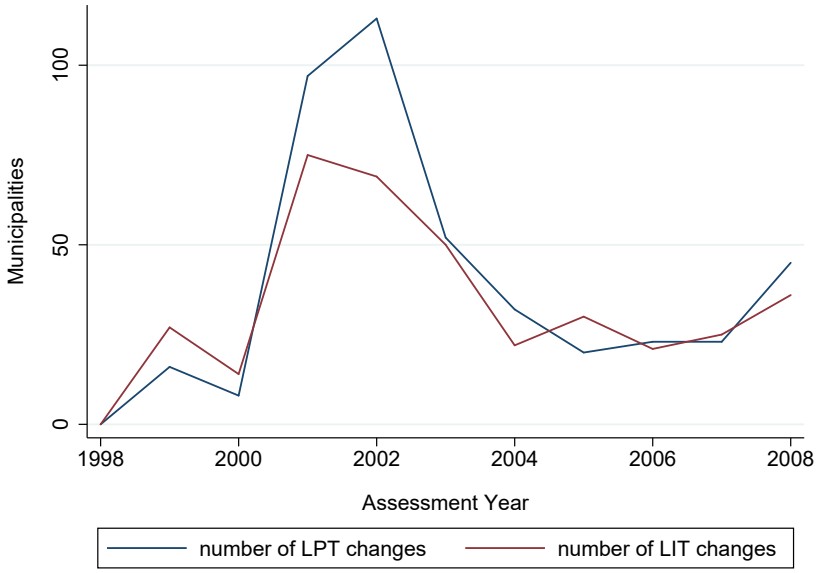
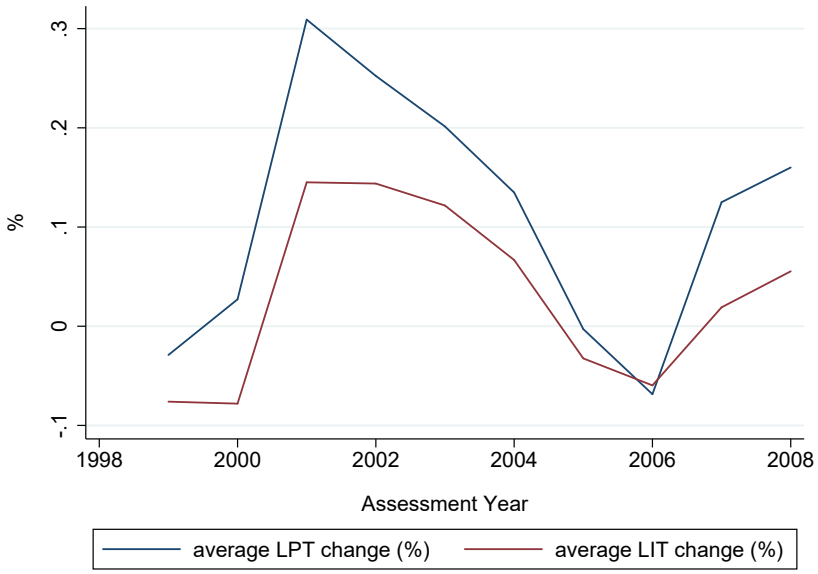


Figure 8: Average local tax rate changes, conditional on change (1999–2008)



Looking at the maps in figures 9 and 10, which show LIT and LPT rate changes between 2000 and 2004, no clear pattern emerges. Most municipalities that changed the LIT also changed the LPT (91.4%), while the majority of municipalities that did not change the LPT did not change the LIT either (72.6%). Seeing as (to our knowledge) there were no municipal-specific estimates of the impact of the tax reform on the local tax base and given the lagged receipt of income tax revenues, it is plausible that municipalities preferred to change the property tax rate, which has a more predictable and immediate impact on tax revenue.

Figure 9: LIT rate change (% change 2000–2004) map

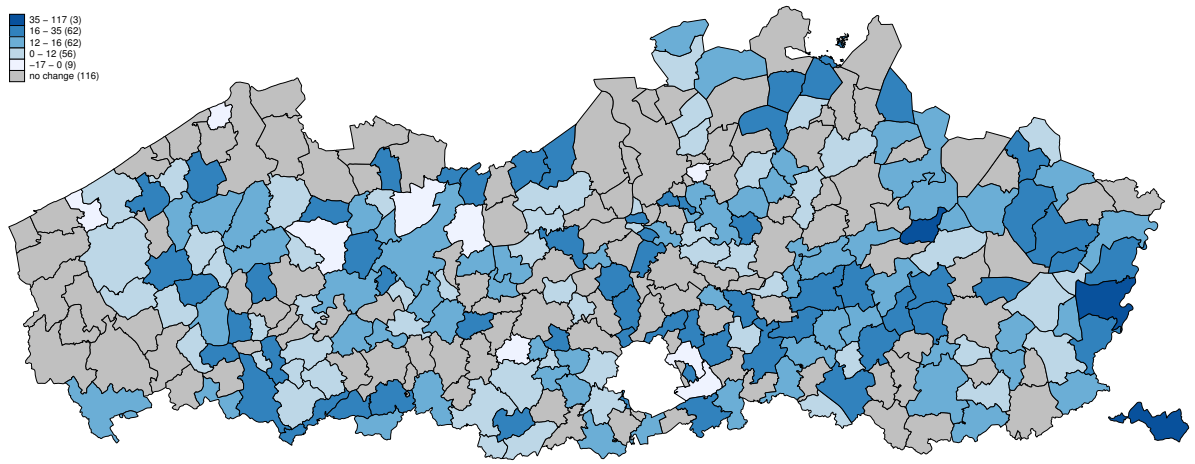
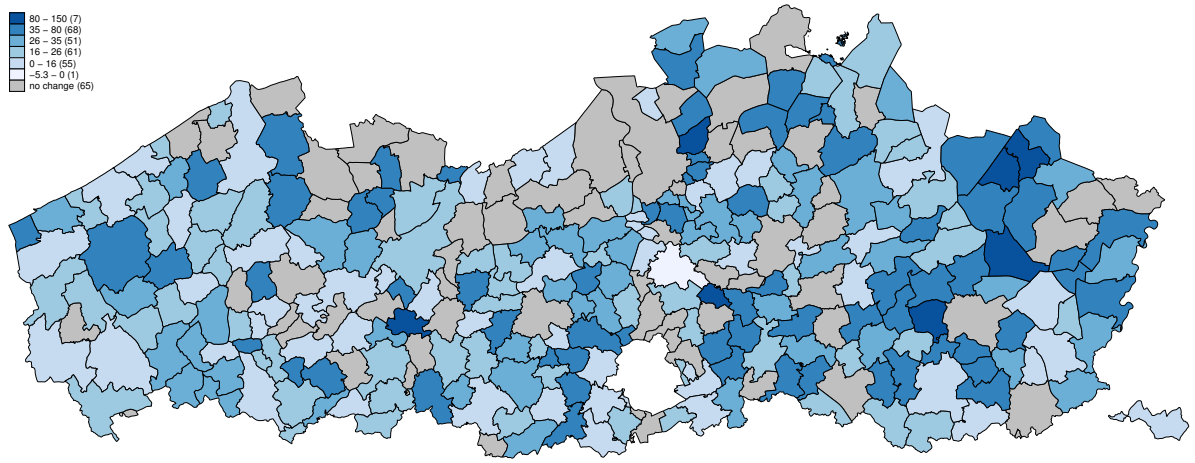


Figure 10: LPT rate change (% change 2000–2004) map



Given the nature of the reforms, we can pose several hypotheses regarding the local reaction in fiscal policy. With respect to the grant reform, we know that administrative hurdles were removed to make it easier to spend SIF and IF grant revenue. Municipalities no longer had to submit a policy proposal, which may have led to an increase in social and investment projects. On the other hand, instead of being allocated drawing rights for a particular purpose, municipalities now received grants they could spend freely, so we may see the money flow in a different direction. In either case, if such policies generate spillovers, we may expect local fiscal interaction to take place.

Regarding the federal income tax reform, we can similarly write that it may have reduced pressures on local social spending, as it introduced a low income tax credit, larger tax credits for social housing occupants and changes in the way children were accounted for in the tax system. More generally, the observed tax rate changes in the wake of the reform's announcement may not have fully compensated for the loss of revenues due to competitive pressures. Due to the difficulty in estimating these losses, municipalities may also have mimicked others.

3 Identification Strategy

Essentially, this study comprises two analyses. On the one hand, we are interested in examining the reaction of local government to policy changes affecting municipal finance (vertical externalities). On the other hand, we want to identify whether this reaction also involves horizontal strategic considerations (horizontal externalities). To do so, we exploit the aforementioned reforms as exogenous revenue shocks, natural experiments driving municipality-specific behaviour, while recognizing that municipalities were not randomly affected. We therefore take an observationalist approach to causal inference and propose the following two estimation strategies: a spatial difference-in-differences analysis with relevant controls and a tax reaction regression with synthetic or historic instrumental variables. We discuss these estimation approaches as we detail our identification strategy step by step.

3.1 Identification and estimation

In a first analysis, we assess the direct effect of the reforms on local fiscal policy. Note with respect to the municipal fund, that grant determinants and the changes therein normally explain the observed differences in grant revenue across municipalities. At the same time, these local characteristics are likely to drive fiscal policy decisions. Due to the reform however, an additional source of variation was introduced: changes in the weights placed on said characteristics. Similarly with respect to the local income tax base. While it is usually determined by local characteristics and the changes therein, the reform altered the relation these have with the tax base. In both cases, controlling for differences in characteristics over time and space, allows to capture the reform-induced revenue shocks and identify their impact on local policy.

Therefore, our identification strategy consists mainly of dealing with observed heterogeneity and rests on the exogenous nature of the reforms. With respect to the municipal fund reform, it was exogenous in the sense that municipalities were not part of the discussion, neither individually nor through their network organization (VVSG). Not even the High Council of Interior Affairs was able to adjust the government's plans. Most importantly, the reform was not directly related to local tax rates. Even though it clearly focused on municipal finance, the reform did not redistribute based on tax rates but tax capacity. While redistribution did occur based on a typology of municipalities, this only calls for a more careful consideration of heterogeneity. Furthermore, the reform did not directly affect municipal characteristics, except through the reactions in fiscal policy that we wish to examine. Similarly with regard to the tax reform, plenty of anecdotal evidence shows that the role and fate of the municipalities was ignored, quite possibly because the local income tax represents literally only a fraction of the federal tax burden.

The relationship of interest is specified as follows:

$$\Delta y_{it} = \Delta grant_{it} + \Delta LITbase_{it} + \Delta X_{it} + \Delta \epsilon_{it}, \tag{1}$$

where we account for time-invariant heterogeneity through differencing (Δ) and control for time-varying characteristics in X_{it}. y_{it} represents our outcome variable of interest (tax rates, spending, debt etc.) for municipality i in year t, while $\Delta grant_{it}$ and $\Delta LITbase_{it}$ are the local revenue shocks. Controlling for X_{it}, the variation we capture in $grant_{it}$ and $LITbase_{it}$ is due to a change in policy direction at higher levels of government independent of local characteristics. Indeed, note that $grant_{it}$ would be complete collinear with X_{it} if not for the change in weights placed thereon and the guarantee system.

Nevertheless, the revenue shock coefficients estimated this way represent a particular weighted average of treatment effects, as not just the magnitude of the shocks may differ by municipality but also the relative response (heterogeneity in the intercepts vs. heterogeneity in the slopes). We can therefore improve identification by controlling for the lag of X_{it} which should absorb these differences or more interestingly, by interacting the shocks with a meaningful typology of municipalities e.g. the one specifically developed by Dexia bank to evaluate local public finance.

As an alternative to using the observed grant and secondary tax base while controlling for characteristics, we could use expected values that are independent of changes in local characteristics. In fact, that is what the municipalities relied on when making their fiscal policy decisions, estimates of the grant and tax revenue based on observed (i.e. past) local characteristics and region or countrywide growth predictions. We return to this idea in our second estimation approach.

So far we haven't considered whether the reforms sparked any strategic behavior. If spatial interaction did occur, our estimates would be biased because it constitutes an explicit violation of the Stable Unit Treatment Value Assumption (SUTVA). Therefore, we have to model this interaction, which we do as follows:

$$\Delta y_{it} = \Delta grant_{it} + \Delta LITbase_{it} + W \times \Delta grant_{it} + W \times \Delta LITbase_{it} + \Delta X_{it} + W \times \Delta X_{it} + \Delta \epsilon_{it}, \quad (2)$$

where W is a spatial weights matrix and the interactions with all other variables represent spatial lags of those variables, i.e. a weighted average of neighbouring values.

To make any causal claims about the spatial lags, our identifying assumption here is that neighbouring revenue shocks only affect own policy changes through their policy changes. As such, we use neighbouring revenue shocks as the source for any neighbouring policy change that may trigger a reaction, whether it is a change in distortionary tax rates, a cut in local welfare support or a rise in infrastructure investment. This is a departure from most studies on local strategic interaction, which usually rely on tax reaction functions. Instead of specifying an explicit link between neighbouring municipalities' tax rates, we just try to capture any possible spillover from the reforms in order to assess whether there is in fact strategic interaction among local governments. This makes it difficult to interpret the nature of the strategic interaction, but the impact of the reforms on own policy may provide some guidance, in addition to the potential channels we discussed in the previous section.

Nevertheless, in a second estimation approach we do follow the more traditional strategy and try to distill the exogenous impact of the reform on revenue into an instrument for neighbouring policy. Lacking actual data on expected changes (for now), we proceed to make a synthetic instrument by separating the change in revenue that is due to changes in local characteristics from the change in revenue that is due to higher level government policy changes.

In doing so, we follow Gruber & Saez (2002) and more recently Criscuolo et al. (2019). First, we specify grant revenue and the secondary income tax base (Z) as a function of their respective determinants. We then obtain the relative weights of these revenue determinants, $\hat{\delta}_1$ and $\hat{\delta}_2$ by estimating the regression function equivalents before and after the reform, see equations 3a and 3b.

$$Z_{it-1} = \delta_1 X_{it-1} \tag{3a}$$

$$Z_{it} = \delta_2 X_{it} \tag{3b}$$

Finally, the changes in revenue due to changes in policy weights, not X, equals $(\hat{\delta}_2 - \hat{\delta}_1) \times X_{it-1}$, which we subsequently use as instruments for the spatial lag of Δy_{it} in equation 4. Alternatively, for the MF revenue shock, we could make instruments from those variables that used to determine grants in previous versions of the fund but not any more. While their effect lingers on through successive guarantees made by higher governments, they are not correlated with current changes that may influence policy. For the income tax revenue shock, we could use the historic revenue dependence on the LIT relative to the LPT as an instrument. Local tax rates are not often adjusted and usually not to such an extent as we observed during the reform period. While they are correlated with the tax bases, they are in part determined by past events much like these reforms, so that we can exploit path dependency. Note that in 4, we now make a distinction between y_1 and y_2 to reflect that municipalities don't have just one policy instrument at their disposal. Not controlling for the others will violate the exclusion restriction that neighbouring revenue shocks only affect own policy through that one policy instrument.

$$\Delta y_{1,it} = \Delta grant_{it} + \Delta LITbase_{it} + W \times \Delta y_{1it} + \Delta X_{it} + \Delta y_{2,it} + W \times \Delta y_{2,it} + \Delta \epsilon_{it}, \tag{4}$$

As a caveat we note that in our setting, neighbouring municipalities that have different revenue shocks may be very different in terms of characteristics. While we can control for these differences, one municipality may be so different from the other that it is not really used as a yardstick for voters to measure the performance of their local council. If this is the case, our approach does not allow to identify this particular type of strategic interaction although it may still provoke other type of reactions. We argue that this also holds for other studies that compare for example municipalities across regional borders or that exploit policy changes that explicitly favour or punish particular municipalities.

Up to now, we haven't considered the likely possibility that municipalities anticipated the reforms. As we established in the previous section, both reforms were announced in coalition agreements of 1999, then plans for the income tax reform took shape in 2000, while those for the fund followed in 2001, ultimately becoming official in 2001 and 2002 respectively and kicking in another year later. Although the reforms would affect municipal budgets only in 2003 and official estimates of the impact appeared only in the spring of 2002, we already observe tax changes in 2001.

To acknowledge then the possibility of anticipatory responses, based not on simulations of the effects but perhaps on focal points of the communicated plans and the extent to which these reflect local characteristics, we propose to model anticipation in addition to the interactions.[10] More in particular we can estimate the following quasi-myopic model:

$$\begin{aligned}\Delta y_{it} &= \Delta grant_{it} + \Delta LITbase_{it} + W \times \Delta y_{it} + \Delta X_{it} \\ &+ \sum_{j=2001}^{t+j=2005} E_t[\Delta grant_{it+j} + \Delta LITbase_{it+j} + W \times \Delta y_{it}] + \epsilon_{it},\end{aligned} \tag{5}$$

where we have restricted forward looking behaviour to the term of office (2000-2005). Because we don't observe expectations, we have to substitute them with their realised versions. The leads in equation 5 are therefore endogenous and we need to instrument them. With respect to the LIT base and spatial lag of y, we can apply the synthetic instrument strategy outlined above for 2001–2005 as the reform was gradually phased in and hence policy weights changed each year. For the municipal fund we can do the same but note that the weights changed only once, such that conditional on changes in X, the only remaining variation is in the 2002-2003 transition. Lastly, to avoid modeling anticipatory behaviour at all, we can simply take long differences between 2000 and 2005 and apply the original strategy.

4 Data

To conduct our analysis we rely on multiple data sources, above all municipal accounts and official documents from higher level governments. An overview of current data and respective sources is provided in table 5.

4.1 Outcome variables

Our main variables of interest are the local tax rates. With respect to the property tax, we use data from annual reports of the Flemish Tax Service, cross-checked with data from Statistics Flanders. For the income tax, we also use data from Statistics Flanders, cross-checked with the law text that specified tax rates for 2001-2008 following some disputes about the late timing of

[10] Additionally, to capture lags in reaction, we could include time lags of neighbouring policy instruments as in Chirinko & Wilson (2017), which are exogenous as they are pre-determined.

tax changes.[11]

Additional variables of interest pertain to the total amount and composition of spending as well as residual outcomes such as budget deficits or debt. For this we rely on municipal account data, which we discuss further below.

4.2 Revenue shock variables and determinants (controls)

Our main independent variables capture the revenue shocks induced by the reform. These are the municipal fund grants, including the SIF and IF before 2003, and the secondary income tax base, i.e. the federal revenues collected in a municipality. In addition to these variables, we need to control for grant determinants, the primary tax base (personal income) and other reform related characteristics (e.g. the number of children per household, couples in legal cohabitation, social housing occupants).

Data on the grants was obtained for 2002 onwards from the Administration of Interior Affairs, including grant determinants since 2003. Determinants of the MF, SIF and IF before 2003 were not available from the Administration but will be obtained from archived documents except for the SIF as these were destroyed. Nevertheless, SIF determinants were updated only every three years, the last time in 2000 based on data collected between 1997 and 1999, which in turn determined the SIF guarantee for 2003. As such, changes in these factors no longer affected the amount of grants municipalities would obtain under the new MF, with the exception of those that were included in the new allocation key. Therefore, and to account for heterogeneity, we will collect these social measures, see table 2, from separate sources.

Grant revenue before 2002 can be obtained from municipal accounts. Although these accounts can be publicly consulted through a platform of the Administration of Interior Affairs, they go back only to 2003 and were converted to an accounting framework officially in use since 2014. To obtain a consistent series of grant revenue, expenditure and other fiscal policy variables we had to consult different sources.

Accounts are split between ordinary and extra-ordinary (non-recurring, investment) revenue and ordinary expenditure. At this moment we have data from the Administration containing a general, "economic" breakdown of ordinary and extra-ordinary expenditure between 1998 and 2014, a detailed, functional breakdown of ordinary expenditure between 1992 and 2002 and a detailed overview of ordinary revenue since 2000.[12] As such, we lack an overview of extra-ordinary revenue, which includes the IF, and a functional breakdown of extra-ordinary expenditure. The latter was obtained from Dexia, the credit provider, from 1996 onwards. Regarding IF revenue, note first that both SIF and IF grant revenues differ from the drawing rights municipalities were allocated. For SIF, these were obtained from the Belgian Official Gazette, while for the IF they can be obtained from the Administration's archives.

[11] The data verification with other sources revealed that the tax rates provided by Statistics Flanders were incorrect for the year 2003.

[12] The economic breakdown refers to a breakdown of revenue and expenditure according to economic groups, for revenue these are charges (for services), taxes and transfers (not directly related to services) and financial revenues, while for expenditure these are costs of staff, operational costs, transfers and debt.

Table 5: Overview of available data and sources

Variable	Period	Source
Local property tax (LPT) rate	1992–2018	Statistics Flanders & Flemish Tax Service
Local income tax (LIT) rate	1992–2018	Statistics Flanders & Law of July 24 2008
Functional breakdown ordinary expenditure	2003–2016	Administration of Interior Affairs (BBC accounting)
Functional breakdown ordinary expenditure	1992–2002	Administration of Interior Affairs (NGB accounting)
Functional breakdown investment expenditure	1996–2013	Dexia (NGB accounting)
Local income tax (LPT) base	2001–2015	Belgium Statistics
Net taxable income	1976–2015	Belgium Statistics
Local property tax (LPT) base	1982–2017	Belgium Statistics
Property tax base index	1991–2017	Flemish Tax Service
Breakdown ordinary revenue	2000–2010	Administration of Interior Affairs (NGB accounting)
Municipal Fund (MF) & City Fund grants	2003–2017	Administration of Interior Affairs
Municipal Fund (MF) grants	?–2002	Administration of Interior Affairs (& archive)
Social Impulse Fund (SIF) drawing right	1997–2002	Belgian Official Gazette
Social Impulse Fund (SIF) grant	2000–2002	Administration of Interior Affairs
Investment Fund (IF) drawing right	?–2002	Archive Administration of Interior Affairs
Investment Fund (IF) grant	NA	NA
Local election votes and seats	1976–2006	FPS Interior & Prof. K. Deschouwer

With respect to the primary and secondary income tax base, we rely on data provided by Statistics Belgium (STATBEL). Net taxable income is available by municipality since 1976, while from 2001 onwards STATBEL also provides federal and municipal revenue collected and the number of declarations by bands of €10000. Ideally we would also have such data for the year 2000. Other useful data from STATBEL include e.g. the property tax base (taxable K.I.), number of dwellings, age of the population ... while more niche data on households may be obtained from the 2000 census.

Lastly, data on local election results and council seats were obtained from the Federal Public Service Interior.

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A Additional figures

Figure A.1: Local property tax rates in 2000, as a factor of Flemish property tax revenue

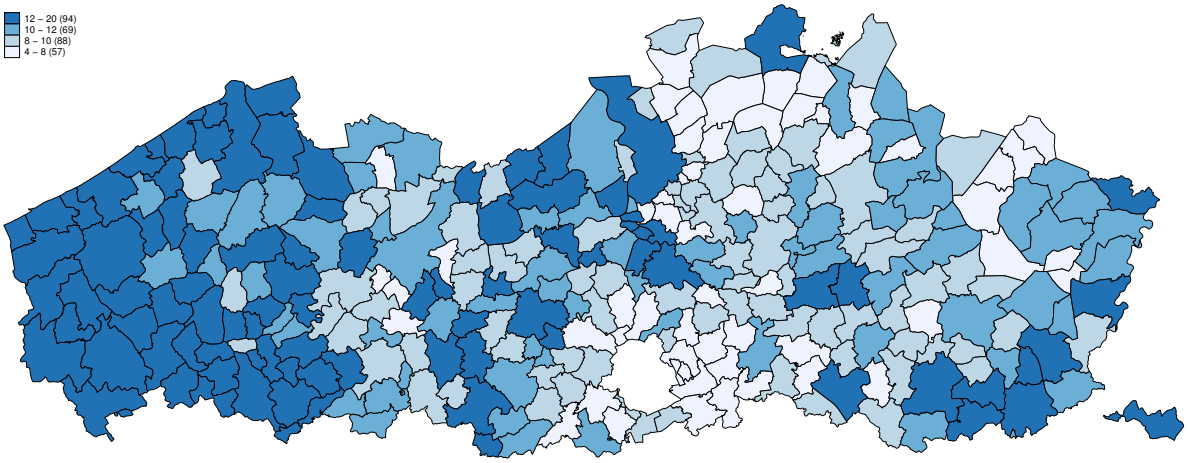
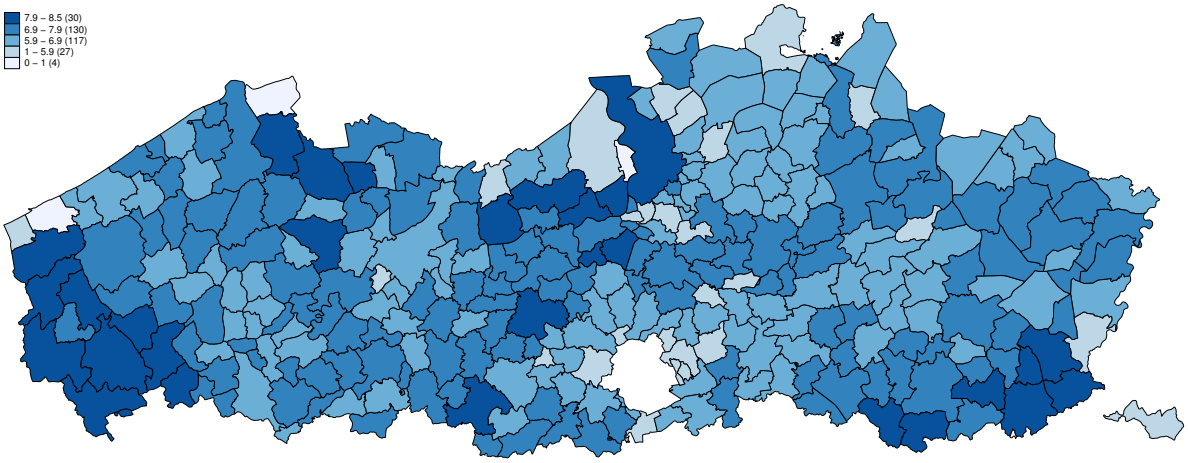


Figure A.2: Local income tax rates in 2000, as a % of federal income tax revenue



B Additional tables

Table B.1: Timing of the Municipal Fund Reform

Time	Source	Communication
June 1999	Coalition agreement	aim to revise the allocation criteria for the municipal and investment fund
July 2001	Press release	the government has approved the preliminary draft decree of the municipal fund reform which envisions a merger of MF, SIF and IF mentioning that fiscal capacity will be the most important parameter, while other criteria are in line with the coalition agreement and take into account the central function, the degree of urbanization, administrative power of smaller and rural municipalities and open space. In addition, the new criteria take into account the integration of the IF and SIF by considering also road length and the number of students as well as the number of widows, orphans, disabled and pensioners, subsistence wage beneficiaries, low-skilled unemployed, births in disadvantaged families and social housing flats.
November 2001	Press release	the government has approved an adjusted draft decree taking into account comments from the High Council for Interior Affairs (Hoge Raad voor Binnenlands Bestuur) and the Social and Economic Council of Flanders (Sociaal-Economische Raad van Vlaanderen). Main change relates to an expansion of the grant guarantee which now also covers investment fund drawing rights. Criteria related to the IF are dropped and the weight of the pre-allocation to provincial cities goes from 1% to 2% . Still has to be sent to the Council of State (Raad van State).
January 2002	Q&A parliament	Question directed at the Minister of Interior Affairs asking for official calculations as numbers have been floating in the press. Minister answers that while he has asked for multiple simulations, neither him, his cabinet or the administration has leaked any data as he does not want to jeopardize the discussion in parliament that still has to follow. When the Council of State has commented on the draft, he will submit it and defend it in parliament. Until then he will not release any numbers of declare whether the ones being spread are correct.
April 2002	Draft decree	Submission of draft decree to parliament
July 2002	Decree	Approval of the draft in parliament and ratification by the government
August 2002	Q&A parliament	Question directed at the Minister of Interior Affairs regarding Municipal Fund grant estimates. Mentions approval of decree before summer recess and having received a letter containing estimates for grant revenue which are lower than amounts simulated for discussion in parliament. Minister replies that the numbers then as those sent now are presumed, using the most recent data, new estimates may be sent at the end of the year but won't in any case be exact until the end of 2003.

Table B.2: Allocation Social Impulse Fund

weight	rule description
20%	number of subsistence wage beneficiaries in the past three years
15%	number of foreigners with permanent residence, from countries with a GDP per capita below 3720 euro (1996) or from Italy, Spain, Portugal and Greece
10%	number of children living with a single parent
10%	number of births in disadvantaged families
10%	number of social housing flats
10%	number of housing units without comfort according to the National Institute of Statistics
7.5%	number of unemployment benefit recipients, younger than 25
7.5%	number of unemployment benefit recipients, unemployed for more than a year
5%	number of widows, orphans, disabled and pensioners with less income than the lowest employee pension
5%	number of youths receiving assistance

Table B.3: Allocation Investment Fund

weight	variable	rule description
45%	inhabitants	average between the most recent and the highest number of inhabitants in the past ten years, +10% if population density¿2.5*average
15%	surface	surface of the municipality
15%	road length	length of municipal roads for heavy traffic + 0.8*other paved roads +0.6*provincial and municipal roads
15%	dwellings	most recent number of housing units + 0.2*number constructed until 1945
5%	central function	share in the Municipal Fund if the MF grant was ¿2.5 million euros
5%	students	average between the most recent and highest number of students in the past five years in primary education + 1.6* secundary and higher education + 0.25*adult education and part-time art school

Table B.4: Timing of the personal income tax reform

Time	Source	Communication
July 1999	Coalition agreement	The personal income tax reform is announced.
August 2000	Policy note	Finance Minister presents plan to reduce tax burden on labour and neutralize difference in tax treatment of married and unmarried couples.
October 2000	Policy note	Two more goals are announced: to better take into account children in the tax system and reorient it in a more environment friendly direction.
November 2000	Budget 2001	Overview of expected budgetary cost of the reform.
January 2001	Saintrain (2001)	Study released by the Federal Planning Bureau on the reform's macro-economic and budgetary effects.
April 2001	Cantillon et al. (2001)	Study released by the Centre for Social Policy on the reform's redistribution effects.
August 2001	Law	Law stipulates how the reform will be implemented.
July 2002	Circular letter	Administration of Interior Affairs sends municipalities a letter with predictions of the impact on tax revenues for different growth scenarios through 2002–2006.
May 2003	Moesen & Stevens (2003)	Study by Moesen & Stevens on the predicted impact of the reform on the municipal tax base for various types of municipalities.