Minimum Tax Rates and Tax Competition: Evidence from Property Tax Limits in Finland *

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Abstract

This paper analyzes how minimum local property tax rates affect local tax policy choice. In Finland, central government has raised the limits on property tax rates several times in the past 30 years. I construct a measure of forced tax rate increases caused by these reforms and examine how municipalities respond to forced increases in nearby municipalities. Event Study regression results for the property tax on business properties indicate that neighbors' forced tax rate increases lead to higher tax rates, after a reform of the tax base equalization system which increased incentives to compete for the tax base. Before the equalization reform, the tax rates on business properties were unaffected by neighbors' forced tax rate increases. I find some indications that forced increases in the residential property tax rate lead to lower tax rates in neighboring municipalities four years later. Analysis of government bills and committee reports shows that the introduction of minimum tax rates was partly motivated by concerns regarding horizontal tax competition. Vertical tax competition between central and local governments on income and corporate taxes seems to have played a role too. Forced property tax rate increases have a clear and lasting effect on tax revenue in affected municipalities, implying that the tax capacity of central government as regards other tax bases likely increased as intended.

Key words: Fiscal interaction, tax competition, property tax, minimum tax rates
JEL codes: H70, H71, H77

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1 Introduction

The coordination of tax policy and the use of tax rate limits imposed by higher-level governments on lower-level governments has received significant attention in recent years. This trend is exemplified by the EU's recent introduction of a minimum corporate tax rate, which is intended to combat harmful tax competition. National governments have even greater power to constrain the tax policies of lower-level sub-national governments. In addition to restricting the range of tax instruments available to local governments, central governments often impose limits on tax rates as well. Understanding how these limits on taxation powers affect local policy choice is important for policy design.

The focus of this study is on property taxes on business and residential real estate, which are an important source of revenue for local governments in many countries. This study sheds light on the effects of minimum property tax rate increases, and provides insights into how tax competition shapes local tax policies. I use panel data from Finland and a quasi-experimental research design to study horizontal fiscal interaction triggered by changes in minimum property tax rates. Additionally, the study considers vertical tax competition between central and local governments as a cause of minimum tax rates set by central government.

In Finland, municipalities choose property tax rates for different types of real property within tax rate bounds set by central government. The government has raised the minimum and maximum tax rates several times over the past 30 years, and the current lower limits are above the initial upper limits. This study analyzes the effects of these changes on the directly affected municipalities and on nearby municipalities. First, I describe the developments in the tax rate distribution over time as the bounds for the tax rates change. Second, I construct a measure of forced tax rate increases resulting from the minimum tax rate hikes, and use it as a treatment variable in an Event Study type regression framework to investigate how the affected municipalities and their neighboring municipalities responded to the forced tax rate increases.

The results indicate that when municipalities are forced to increase their property tax rates on business properties, the tax rates of their neighbors do not not change when a strong tax base equalization system is in place. However, I find some indication of a positive effect of forced increases on the tax rates of nearby municipalities after a reform of the tax base equalization system, which strengthened the incentives to compete for the tax base. On the other hand, forced increases in the residential property tax rate appear to lead to lower tax rates in nearby municipalities four years after the reforms.

Property tax limits in Finland have been analyzed previously by Lyytikäinen (2012), who used increases in the lower bounds of property tax rates in the year 2000 as a quasi-experimental setting to study strategic tax competition among local governments. No evidence of tax rate interaction was found. I revisit the 2000 reform, but extend the analysis to previously overlooked outcomes (tax base and tax revenue) and later increases in the property tax limits in 2010, 2015 and 2017. Moreover, this paper uses a transparent Event Study approach and estimates reduced form effects of minimum rate increases, rather than a spatial instrumental variables strategy as used by Lyytikäinen (2012) to estimate tax policy reaction functions. Since the year 2000, there have been two important changes in the institutional setting that may affect competition in property taxes. Firstly, the property tax

base was removed from the tax base equalization scheme in 2012. Secondly, the number of municipalities has decreased by roughly 30% through municipality mergers. These changes have altered the context of local tax policy decisions, and the results suggest that they may have affected strategic interaction among municipalities.

The discussion on the Finnish institutional setting documents justifications for increases in property tax limits found in government law proposals. In contrast with the current discussion on international tax coordination, concern over inefficiently low tax rates through race to the bottom tax competition does not seem to be the main justification for increases in minimum property tax rates. Horizontal tax competition among local governments was not discussed in the proposals, but it was mentioned in a committee report preparing the introduction of the Finnish property tax system in 1993. The law proposals suggest that the increases in minimum tax rates were to some extent motivated by vertical tax competition between central and local governments on labor income and corporate taxes, although the tax capacity of central government is not explicitly mentioned. When analyzing the direct effects of forced tax rate increases empirically, I find that forced increases have a clear and lasting effect on property tax revenue in the affected municipalities, which implies that the potential revenue of central government from other tax bases likely increases as intended.

This paper forms part of a growing branch of quasi-experimental empirical work on strategic tax competition among local governments. A number of earlier studies have estimated tax rate reaction functions of spatially close jurisdictions using spatial econometrics tools, generally finding that a tax increase in one jurisdiction leads to increases in nearby jurisdictions (see Brueckner 2003 for a review). The critique of standard spatial econometric approaches by Gibbons and Overman (2012) has been influential in the emergence of quasi-experimental tax competition literature utilizing plausibly exogenous variation in tax rates due to policy reforms by upper-level governments or close elections, or close to jurisdiction borders. Examples of studies using quasi-experimental approaches include Lyytikäinen (2012), Baskaran (2014), Isen (2014), Agrawal (2015), Agrawal (2016), Parchet (2019), Eugster and Parchet (2019) and Mast (2020). The results of these studies have challenged earlier findings of overwhelmingly positively sloped reaction functions, and lead to a more nuanced view of tax rate interdependence. As predicted by theoretical models, reaction functions can also be flat or negative.

Theoretical and empirical literature on local policy choice in the presence of fiscal externalities is reviewed extensively by Agrawal et al. (2022). They emphasize that the slope of reaction functions found in empirical studies is not informative of the welfare effects of tax competition, or of the existence of a race to the bottom, which both depend on the fiscal externalities associated with tax competition. Minimum tax rates have been analysed theoretically by Keen and Konrad (2013). In a setting with two jurisdictions and mobile tax base, they find that a minimum tax rate set between unconstrained equilibrium rates increases tax rates in both jurisdictions. The only empirical studies I am aware of are Lyytikäinen (2012) and Buettner and Poehnlein (2021), who analyse local business tax limits in Germany. Köthenbürger (2002) analyzes theoretically the effects of equalization schemes on the distortion of tax competition, that arises because each jurisdiction ignores the external impact of its tax policy on the tax base of other jurisdictions. Tax base equalization internalizes this fiscal externality by compensating jurisdictions for the loss of their tax base due to a

tax increase.[1] Egger et al. (2010) find empirical evidence that fiscal equalization alleviates business tax competition among German municipalities. Regarding the impact of mergers on tax rate interaction, Hoyt (1991) find that equilibrium tax rates (and welfare) increase as the number of competing jurisdictions decreases.

The paper is organized as follows. Section 2 discusses the role of property taxes in the Finnish local public finance system. Section 3 discusses the likely relevance of potential sources of horizontal fiscal interaction in the Finnish setting. Section 4 describes the data and provides a descriptive analysis of the evolution of property tax bounds and the distribution of property tax rates. Section 5 lays out the estimation strategy and Section 6 presents the empirical results. Section 7 concludes.

2 Institutional setting

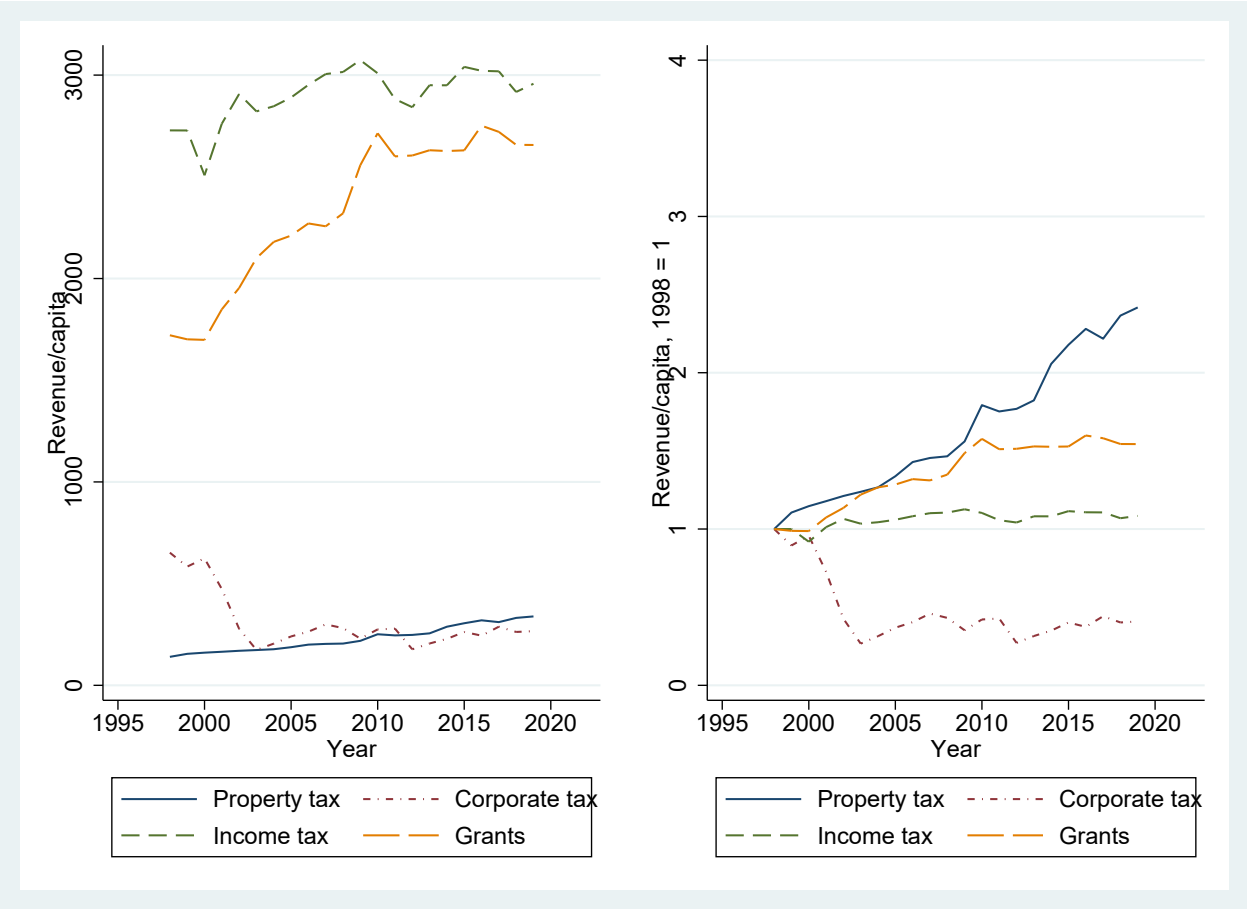
2.1 Local public finance system

During the study period ending in 2022, local governments (municipalities) in Finland were responsible for several key public services, including elementary schools, health care, day care for children, and elderly care.[2] Local public expenditure is roughly 20% of GDP, funded through grants from central government and own tax revenue, consisting of local income tax, municipalities' share of corporate tax, and property taxes. Figure 1 presents the development of average real tax revenue per capita from different sources, as well as central government grants, from 1998 to 2019. The graph on the left shows that local income tax is the main source of own revenue, and, together with central government grants, covers the bulk of local public expenditure. Property taxes are relatively unimportant in terms of revenue, but the graph on the right shows that their share of revenue has increased over time. During this period property tax revenue per capita has increased by 142% in real terms while income tax revenue has grown by less than 10%.

[1] Bucovetsky and Smart (2006) find that optimal equalization is weaker when the size of the capital stock is affected by taxes and Kotsogiannis (2010) finds that the presence of vertical tax competition further reduces optimal equalization. Matsumoto (2022) studies equalization in the presence of multiple tax instruments (capital and labor taxes).

[2] This changed in 2023 when social and health services were taken over by new middle-tier governments called 'wellbeing services counties'.

Figure 1: Average tax revenue and grants per capita in real terms 1998-2019.



Notes: The Figure shows the average tax revenue and grants per capita in Finnish municipalities in 1998-2019 in real terms (in 2019 euros). The left graph presents the level of revenue. The right graph presents the development relative to 1998.

The next Section describes the Finnish property tax system in more detail. The main alternative to property taxes as a source of own revenue is local income tax. This is a residence based flat rate tax on earned income (labor income) but a deduction set by central government means that it is applied to labor income above a threshold (currently roughly 16,000 EUR/year). There are no restrictions on the local income tax rate which currently varies between 17% and 23.5%. Central government taxes earned income with a progressive schedule. Capital income is taxed separately from labor income by central government at a mildly progressive tax rate. Additionally, municipalities receive a portion of national corporate tax revenue. Central government has adjusted this share up and down several times. In recent years, municipalities' share has been around one third of corporate tax revenue.

2.2 The property tax system

Local property taxes were introduced in Finland in 1993 to replace a disintegrated system of various national and local taxes and fees on real property.[3] The property tax rate can vary by type of property. The two main components of the property tax system are the general property tax (GPT) and the residential property tax (RPT), which apply to different types of real estate and have different allowed ranges.[4] The Finnish Tax Authority is responsible for the assessment of property values, and the same method is applied throughout the country.

The general property tax is applied to land and non-residential buildings. The taxable value of land is based on the estimated market value of a similar undeveloped site, regardless of whether the site is actually developed.[5] Hence, the taxable value of land is independent of the development decisions of the land owner and the general property tax is a neutral land tax, to the extent that it is applied to land (Lyytikäinen, 2009). However, the general property tax is also levied on commercial and industrial buildings, valued at the estimated construction cost less depreciation. The part of the general property tax that falls on buildings makes investment less profitable and may cause capital to relocate, implying a lower tax base in the long run. Hence, municipalities may use the general property tax as a means to attract business capital.

Residential buildings are taxed at a separate tax rate, which has a lower allowed range than the GPT. The assessed value of residential buildings is based on estimated construction costs less depreciation, similar to business buildings. A higher residential building tax rate, other things constant, makes housing investment in a municipality less profitable and may lead to a lower tax base over time. Therefore, the residential property tax could be used as an instrument in the competition for housing capital. Section 3 also discusses other potential sources of fiscal interaction.

2.3 Stated aim of minimum tax rates

As both the GPT and RPT have the potential to give rise to horizontal tax competition, one possible reason for changes in minimum allowed tax rates is the prevention of harmful tax competition. In addition, increases in the lower bounds of property tax rates could be driven by vertical tax competition between central and local governments. Both levels of government tax labor income, and the revenue from corporate tax is divided between them. Therefore, central government could use increases in minimum property tax rates to force municipalities to collect additional revenue from other tax bases than labor income, and to alleviate the pressure to increase municipalities' share of corporate tax revenue, thereby improving the revenue capacity of central government.

This section discusses briefly the stated justifications for the minimum tax rates based on government proposals for the introduction of property taxes in 1993 and subsequent changes

[3]The property tax system replaced a tax on imputed rental income and wealth tax (both had low revenue due to deductions and concessions that narrowed the tax base) and some local fees and charges.

[4]In addition, the municipalities have the option to apply higher (than GPT) tax rates on vacation homes, power stations and undeveloped lots, and they can exempt non-profit organizations.

[5]The target taxable value of land is 73.5% of the market value, but in practice the assessed values of land follow market values sluggishly and assessed values have lagged behind target.

in the minimum tax rates in 2000, 2010, 2015 and 2017. The purpose is to find out if horizontal or vertical tax competition was explicitly mentioned in the proposals as a rationale for minimum tax rates, or whether there are implicit indications of tax competition being one reason behind minimum tax rate increases.

Introduction of the property tax in 1993

The government proposal for the law on local property taxes in 1992 did not discuss horizontal or vertical tax competition. However, the increased international mobility of other tax bases (business profits, labor income and consumption) in the context of deepening international economic integration[6] was seen as an important rationale for the introduction of the property tax.

The government proposal did not consider a system without tax rate limits as an alternative, likely because a committee preparing the reform had proposed uniform national property tax rates, following the Swedish example. [7] The committee proposal for a uniform tax rate did mention that the possibility of competition among municipalities could have detrimental effects for local governments overall. Also, the committee considered that differential tax rates could in certain cases affect the location of new construction. Thus, concerns regarding the mobility of the tax base and horizontal tax competition seem to be one reason behind the committee's proposal for uniform tax rates. Hence, it seems that horizontal tax competition did play a role in the introduction of the property tax system and likely affected the initial property tax limits, although tax competition was not discussed in the government's proposal.

Minimum tax rate increases in 2000

The government proposal for increases in minimum property tax rates in 2000 did not refer to horizontal tax competition, suggesting it was not seen as an important reason for the reform. The explicit aim of the reform was to prevent increases in local income tax rates. This can be interpreted as evidence of vertical tax competition, although the taxation capacity of central government was not explicitly mentioned in the bill. An alternative interpretation is that the government was concerned about negative labor supply responses to income taxation.

Minimum tax rate increases in 2010

The reform of 2010 was at least partly motivated by the weakening outlook for municipalities' finances due to the financial crisis. The government wanted to increase the weight of the property tax in municipal finances, because the property tax was seen as providing a stable source of revenue free of cyclical shocks as compared to the corporate tax in particular. The reasoning that the property tax is better suited for municipalities than the corporate

[6]Finland became a member of the EU in 1995.

[7]The property tax committee also proposed that 5% of the revenue should go to central government, but the government decided that all of the revenue would go to the municipalities.

tax seems to suggest that vertical tax competition played a role in the reform. Previously municipalities' share of the corporate tax had often been adjusted upward to support municipalities when they faced negative shocks. As in the reform of 2000, the increase in tax rate limits was also seen as a tool to reduce pressure on taxing labor income, which can be seen as another indication of vertical tax competition between central and local governments. The government saw the property tax base as 'immobile', suggesting that the possibility of construction investment responding to property taxes was not considered. Hence, horizontal fiscal interaction did not seem to be an important justification for the reform.

Minimum tax rate increases in 2015 and 2017

The stated aims of the reforms of 2015 and 2017 were very similar to earlier reforms. The proposals paint a picture where the property tax base is seen as immobile, and therefore provides a good and stable source of revenue for municipalities. Increases in property taxes are also thought to prevent hikes in local labor income taxes.

Maximum tax rates

The rationale for maximum tax rates appears to be the prevention of large regional differences in property taxes. It seems likely that an upper bound was introduced in 1993 also to improve the political feasibility of the reform by alleviating concerns regarding excessive or even confiscatory tax hikes.

2.4 Fiscal equalization

The local government grant system includes a tax base equalization component which transfers resources from rich to poorer municipalities. The system suppressed incentives to compete on the property tax base until 2012, when property taxes were removed from the equalization system. This implied that the mobility of the property tax base across municipalities has become a more relevant concern for municipalities.

The equalization system is based on imputed revenues per capita that are calculated by applying the average municipal income tax rates and property tax rates to the actual tax base of the municipality and adding corporate tax revenue. Municipalities above an equalization limit (roughly 90% of average imputed per capita revenue in 2000) give up about 60% of their imputed revenue exceeding the limit and this revenue is used to raise the imputed revenues of poorer municipalities to the equalization limit.[8] The system weakens incentives to attract tax base, but municipalities above the limit still benefit from a higher tax base as they can keep 40% of the increase in imputed revenues due an increase in the tax base. For a municipality below the limit, an increase in the tax base may have little direct effect on revenues, but it may benefit from higher business capital indirectly through, for example, better employment opportunities.

Public discussion on municipal finances around the equalization reform suggested that

[8]In 2015, there was a grant reform which altered the limits and the functional form of the equalization system.

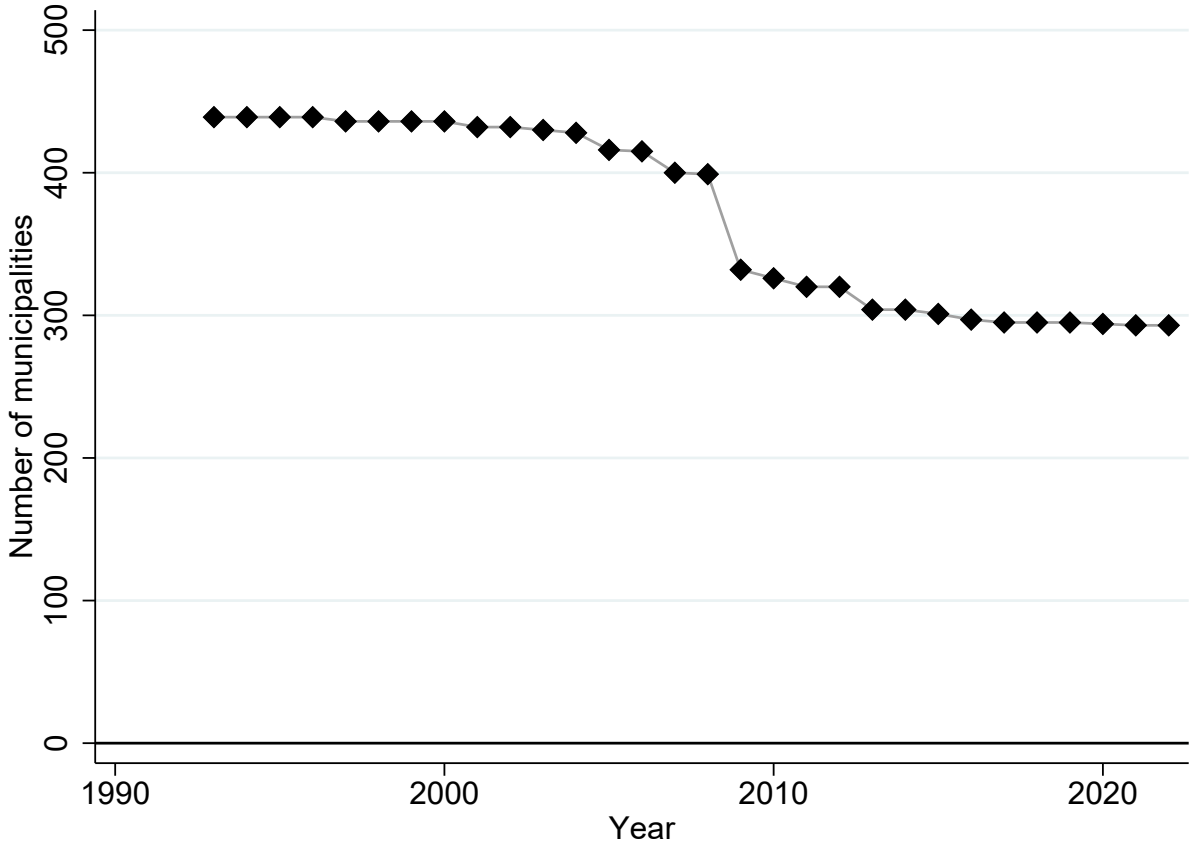
there is a widespread misunderstanding that the equalization system applies to actual tax revenue rather than imputed revenue. Hence, some municipalities may erroneously make tax policy choices assuming that a change in revenue due to a tax rate change affects their equalization transfer. Baskaran (2014) argues that there is a similar pervasive wrong belief among German municipalities that choosing a tax rate multiplier smaller than a certain reference value of the equalization system will directly result in lower transfers, although the transfer is based on the tax base. It is not clear how common these kinds of misperceptions are among municipal decision makers but these considerations suggest that local tax policy may not always be based on very sophisticated reasoning and full understanding of the incentive structure.

2.5 Municipality mergers

Figure 2 shows that the number of municipalities has decreased through municipality mergers throughout the study period. In 2009, there was a large merger wave due to a central government policy program that offered incentives for mergers (see e.g. Saarimaa and Tukiainen, 2015). The motivation for the program was to improve the efficiency of public service provision through economies of scale. The number of municipalities decreased by roughly 30% during the period which may have affected the extent to which municipalities make tax choices strategically.

In the empirical analysis I omit municipalities that disappeared during the event window around each reform due to mergers. Larger merger partners that retain their initial municipality ID are included in the analysis.

Figure 2: Number of municipalities 1993-2022.



3 Sources of tax rate interaction

Three main sources of local government fiscal interaction identified in the literature are 1) expenditure spillovers 2) competition on mobile tax base 3) yardstick competition of local politicians. This section discusses the relevance of these mechanisms for the Finnish setting, largely following Lyytikäinen (2012), but adds new perspectives, such as the role of tax salience and the implications of changes in the institutional context (equalization reform and municipality mergers).

Expenditure spillovers arise if residents of a jurisdiction can benefit or are harmed by services provided by other jurisdictions (e.g. Case et al., 1993). Expenditure spillovers are possible in the Finnish setting, but, arguably, they are unlikely to be an important source of fiscal interaction since the bulk of services provided by the municipalities are publicly provided private goods. Competition for tax base and politically motivated yardstick competition are more potential sources of spatial interdependence in tax rates in Finland.

In the competitive versions of tax competition models there are many relatively small jurisdictions that take the net return of capital as given, and hence strategic behavior is absent (Zodrow and Mieszkowski, 1986). If jurisdictions are sufficiently large to affect the net rate of return, tax rates are set strategically taking into account tax rates in other juris-

dictions (Wildasin, 1988). For the purposes of empirical work on local taxes it is important to note that strategic tax competition among jurisdictions in the same region requires that capital is not fully mobile but to some extent fixed to the region. Brueckner and Saavedra (2001) combine heterogeneous preferences of mobile households and a locally fixed tax base and show that, in a model with two jurisdictions competing for a fixed amount of capital, the relationship between capital tax rates in the jurisdictions may be positive or negative (or flat). Municipalities that are atomistic with respect to capital markets could also react to neighboring tax changes if they are linked in local labor markets and have market power in the labor market resulting in strategic interactions (Agrawal et al., 2019).

The property taxes studied in this paper fall partly on business and housing capital. This implies that a higher property tax rate lowers the profitability of investment in the municipality and may cause capital to locate in other municipalities, which makes competition on tax rates in an attempt to attract capital possible.[9] As discussed above, the sign of tax rate interaction due to the tax base competition mechanism is ambiguous a priori. Lyytikäinen (2009) finds evidence that property tax incentives affect housing starts, suggesting that tax base mobility is a relevant concern for local politicians.[10] Changes in the Finnish institutional setting imply that fiscal competition may have changed over time. The removal of property taxes from the tax base equalization scheme in 2012 increased incentives to compete on the tax base (see Section 2.4). Also the reduction in the number of municipalities through mergers (see Section 2.5) in the study period may have strengthened fiscal interaction. When there are fewer municipalities in the region, strategic interaction is more probable.

So-called yardstick competition or tax mimicking arises if the true costs of providing public services are known only by the local government and not observed by voters whilst tax rates are common knowledge (Besley and Case, 1995). In this setting, voters may utilize the fact that the costs of providing services in their jurisdiction are likely to be correlated with other jurisdictions in the area to assess the performance of their government. Relatively high taxes may indicate that the government is inefficient or rent-seeking and should be voted out of office. As a result, governments are forced to imitate their neighbors in order to stay in office.

Yardstick competition may be relevant to the Finnish case since Finnish municipalities are governed by elected councils. Information on tax rates is easily available, but comparing the efficiency of service provision across municipalities is difficult. Municipalities provide a wide range of services and there are no commonly used performance rating systems. Hence, voters may use tax rates as a benchmark when evaluating the performance of their council relative to other councils in the area. One can of course question the relevance of forced tax increases due to the actions of central government for yardstick competition among local politicians. On the other hand, voters may be unaware of the exact causes of the tax increases they observe. Moreover, property taxes are a highly salient form of tax for property owners and often rank as the most hated tax in surveys, which could make property taxes more

[9]Municipalities have a zoning monopoly, which they can use to influence land use to attract certain types of households or businesses.

[10]The evidence of the negative effect of property taxes on housing starts is based on an analysis of the surcharge on undeveloped lots, which created a large incentive to develop. The point estimates of the effect of the residential property tax are also negative but imprecise.

important for yardstick competition than income taxes. [11]

As the observed patterns of tax rate interaction in Finnish data are likely to be a combination of tax base competition (sign ambiguous), yardstick competition (positive) and possibly expenditure spillovers (ambiguous), the expected effect of a tax rate change of one municipality on nearby municipalities is ambiguous. It should also be noted that the empirical strategy based on variation generated by forced increases is not necessarily informative of responses to voluntary increases.

4 Data and descriptive analysis

I use panel data on property tax rates in Finnish municipalities[12] from 1993 to 2022, and other municipality charateristics for varying shorter periods. The Event Study analysis on the impacts of forced tax rate increases uses data from 1996 to 2020. Summary statistics for key variables in this data set are reported in Table 1. During this period GPT rates range from 0.2% to 1.9% and RPT rates vary between 0.1% and 0.9%. There is huge variation in the GPT base and revenue, while the RPT base and revenue vary less. This is likely due to regional differences in land values which influence the tax base of the GPT, but differences in the stock of business buildings may play a role too. The same kind of residential buildings have the same taxable value everywhere, and therefore the tax base of the RPT varies less. There is large variation in the size of municipalities. The population ranges from a few hundred to over 650,000 in the city of Helsinki.

Table 1: Summary statistics for 1996 - 2020.

	Mean	Std. dev.	Min	Max
GPT rate %	0.731	0.242	0.2	1.9
RPT rate %	0.338	0.122	0.1	0.9
GPT base, EUR/capita	9049	6171	1574	100700
RPT base, EUR/capita	15247	3641	8102	28192
GPT revenue, EUR/capita	72.6	66.3	3.8	921.3
RPT revenue, EUR/capita	54.8	31.1	9.2	220.9
Population	14268	39618	233	653835

Notes: The table shows summary statistics for the main variables used in the empirical analysis. Sample size is 8,904.

Figures 3 and 4 present the evolution of the statutory bounds for the general property tax rate and the residential property tax rate, together with the distribution of tax rates and

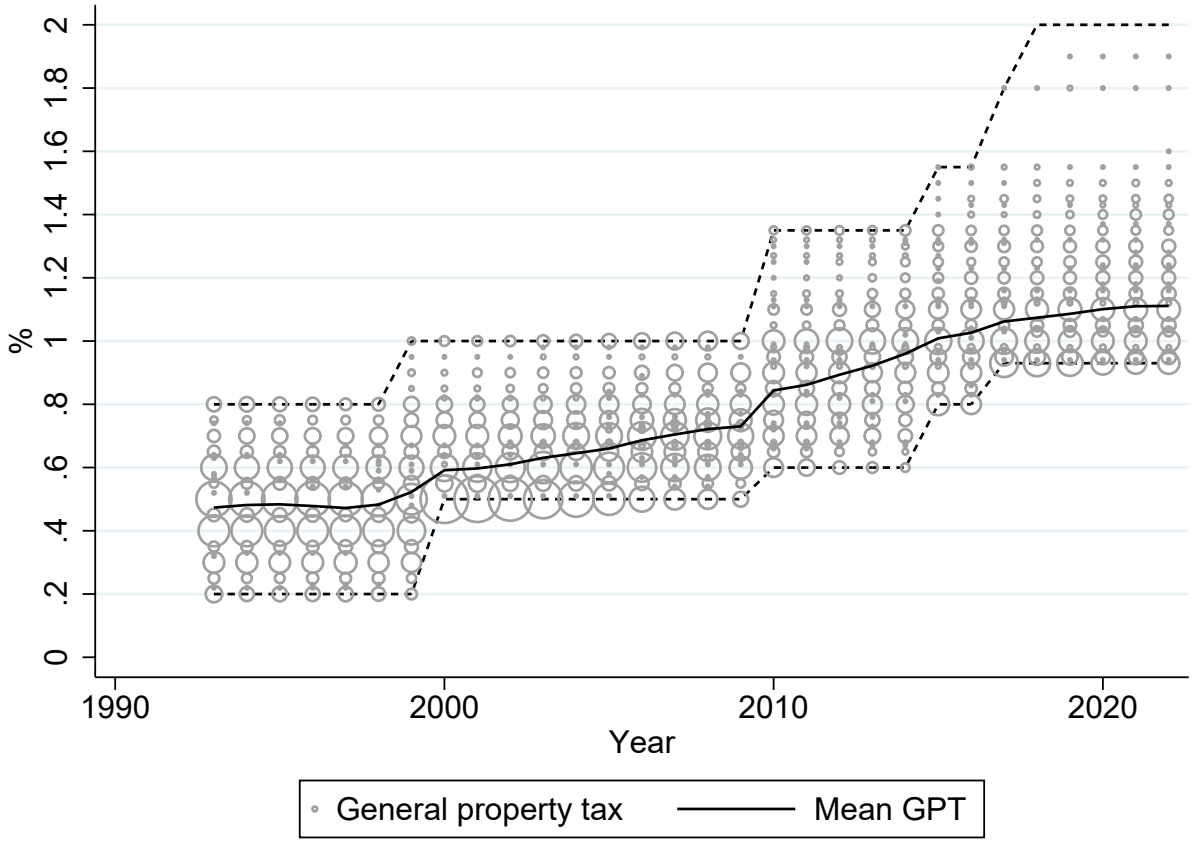
[11] Income taxation is highly automated in Finland through a witholding system and pre-filled tax returns. Property tax bills are sent by mail to the property owners each year and paying the tax requires more effort and attention than with income tax. Cabral and Hoxby (2012) provide evidence that a more salient form of the property tax system is associated with stronger opposition towards property taxes.

[12] Municipalities in the partly autonomous region of the Åland Islands are dropped due to missing data and differences in the institutional setting.

the mean tax rate in 1993-2022. The size of the circles indicates the number of municipalities in the cell.

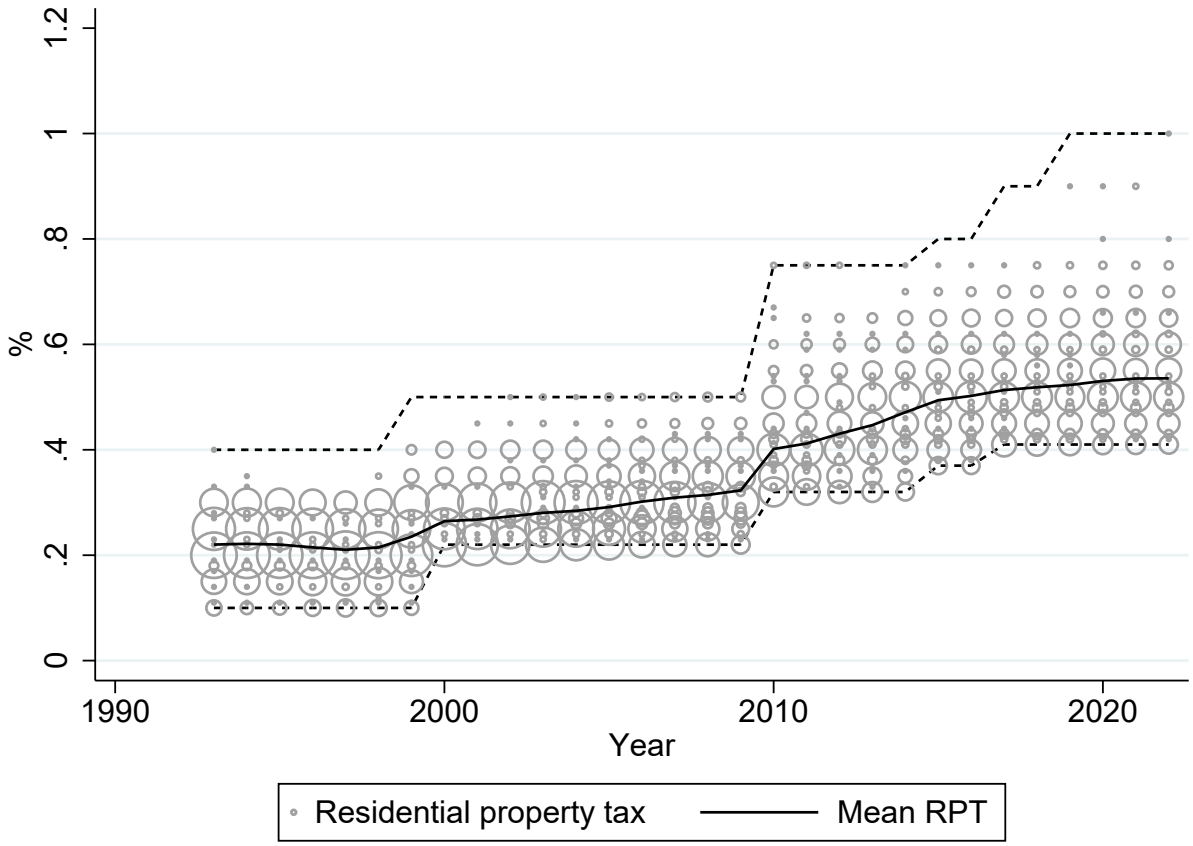
Figure 3 shows that the reforms raised the allowed ranges for the GPT and RPT substantially, and the current lower limits are above the initial upper limits. Before the reform of 2000, the mean GPT was flat at about 0.5%. The increase in the lower bound in 2000 was binding for a large share of municipalities. After the reform of 2000, the number of municipalities at the lower bound decreased gradually and the mean GPT increased through voluntary tax hikes. There was a clear upward shift in the mean GPT in 2010 when the bounds were raised again, and the upward trend continued after the reform. The upward trend continued through the reforms of 2015 and 2017 until 2020, after which it flattened. The bounds for the RPT (Figure 4) were lower than for the GPT throughout the period and there are only a few observations at the upper limit of the RPT.

Figure 3: General property tax rates in 1993 - 2022.



Notes: The Figure shows the statutory bounds for the general property tax rate, the distribution of tax rates and the mean tax rate in 1993-2022. The size of the circle indicates the number of municipalities in the cell.

Figure 4: Residential property tax rates in 1993 - 2022.



Notes: The Figure shows the statutory bounds for the residential property tax rate, the distribution of tax rates and mean tax rate in 1993-2022. The size of the circle indicates the number of municipalities in the cell.

Table 2 reports how binding the reforms were. In the empirical analysis of the effects of minimum tax rates, I use a measure of forced tax rate increases, which is the change in the tax rate required to meet the new minimum after the reform. The table presents the mean forced tax increase and the share of municipalities experiencing a forced increase after each reform. I present these statistics for own forced increases and neighbors' average forced increases separately. The reforms differ significantly in the amount of municipalities affected. The increase in the lower bound of the RPT in 2010 affected the majority of municipalities while the GPT reform in the same year was binding for only 8.3% of municipalities. The mean forced tax rate increase was highest in the GPT reform of 2000 (0.05 pp) and lowest in the GPT reform of 2010 (0.007 pp).

Table 2: Summary statistics for the reforms.

Minimum GPT rate	2000 reform 0.2% –>0.5%		2010 reform 0.5% –>0.6%		2015_17 reform 0.6% –>0.8% –>0.93%	
	Own	Neighbors' mean	Own	Neighbors' mean	Own	Neighbors' mean
Mean forced GPT increase	0.052	0.051	0.007	0.008	0.038	0.038
Share treated	0.374	0.759	0.083	0.344	0.329	0.820
Minimum RPT rate	0.1 –>0.22		0.22% –>0.32%		0.32% –>0.37% –>0.41%	
	Own	Neighbors' mean	Own	Neighbors' mean	Own	Neighbors' mean
Mean forced RPT increase	0.018	0.017	0.023	0.023	0.009	0.008
Share treated	0.461	0.833	0.549	0.917	0.200	0.563
N in reform year	436		326		295	

Notes: The table shows mean forced tax rate increases due to the reforms and the share of municipalities with non-zero forced increases.

For the interpretation of the findings on the effects of the reforms in Section 6, it is of interest to analyze whether the same municipalities were affected by multiple reforms. If the set of municipalities forced to increase property taxes differs vastly across the reforms, differences in the estimated effects of the reforms may be affected by heterogeneous responses by different municipalities, in addition to changes in the institutional setting. Table 3 uses data from 2017 and shows the share of municipalities experiencing different combinations of forced increases due to the reforms. 48% of municipalities had no forced GPT increases, and there is substantial overlap in the groups affected by different GPT reforms. For example, we see that out of the 33% with forced GPT increases in 2015-17 (See Table 2), only 13.6% were affected solely by this reform. The remaining roughly 20% also experienced forced increases in 2000 or 2010 or both. The share of muncipalities without forced RPT increases is lower (28.5%), and again, there is substantial overlap in forced increases across the reforms. However, the turnover in the group facing forced increases is quite substantial too, indicating that differences in the effects of different reforms may be partly driven by differences in the composition of the treated municipalities.

Table 3: Occurrence and overlap of forced increases in different reforms.

	General property tax	Residential property tax
No forced increases	0.481	0.285
Forced increases	0.519	0.715
– of which:		
Only 2000 reform	0.159	0.108
Only 2010 reform	0.014	0.193
Only 2015_17 reform	0.136	0.034
2000 and 2010 reforms	0.017	0.214
2000 and 2015_17 reforms	0.132	0.010
2010 and 2015_17 reforms	0.010	0.034
2000, 2010 and 2015_17 reforms	0.051	0.122

Notes: The table shows the share of municipalities that experienced forced increases from different combinations of reforms. The data is from 2017 and includes only municipalities that existed during all three reforms.

Figures 5 and 6 illustrate the spatial distribution of property tax rates in 1997 before the first reform of the tax rate limits, and in 2017 after the last reform studied here. There is clearly positive spatial correlation in both years for the general property tax rates (left) and the residential property tax rates (right). All maps have clusters of high and low tax rate municipalities. This spatial correlation could arise due to interdependence in the tax rate setting, but spatial correlation in other determinants of tax rates is an alternative explanation. Variation due to increases in the minimum tax rates helps to disentangle between these explanations.

Figure 5: Property tax rates in 1997.

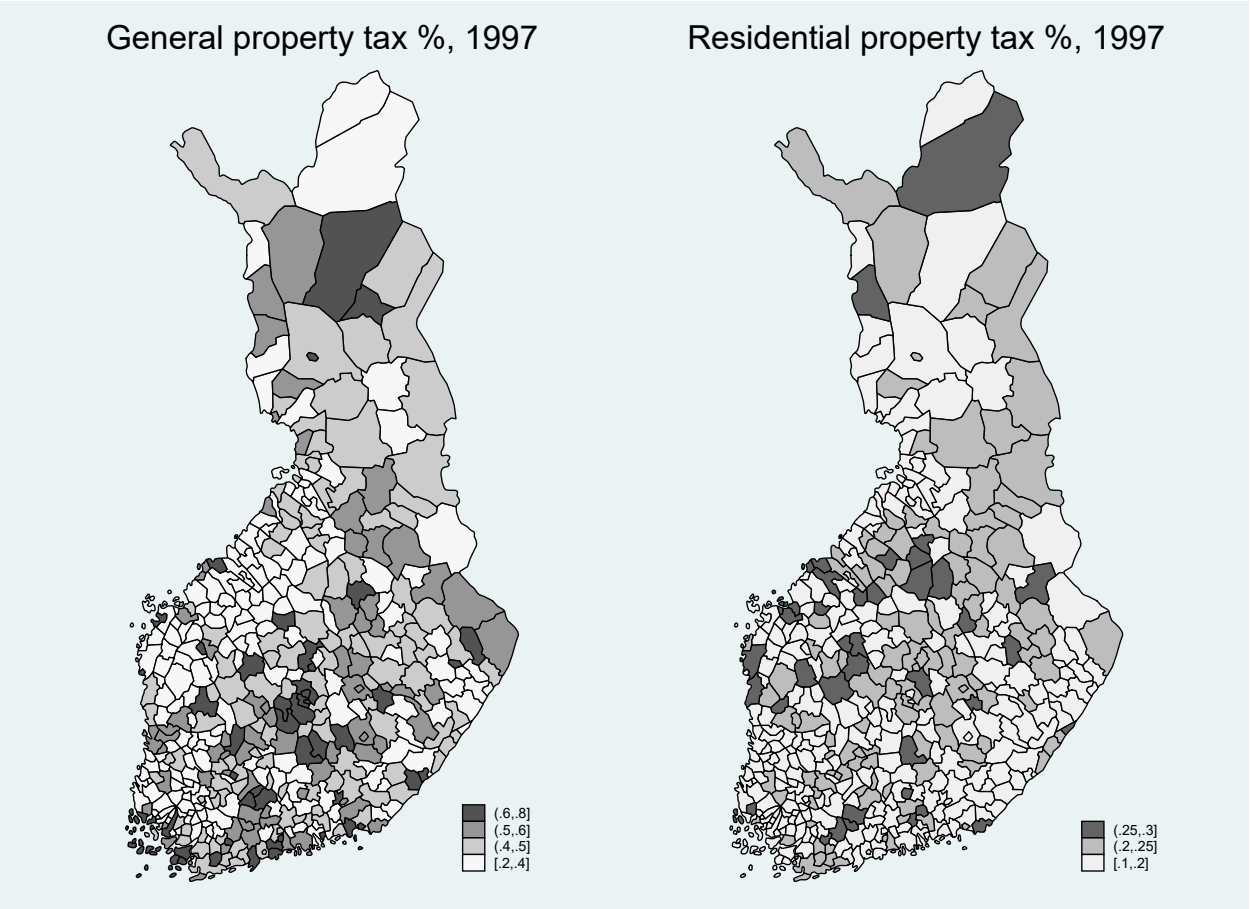
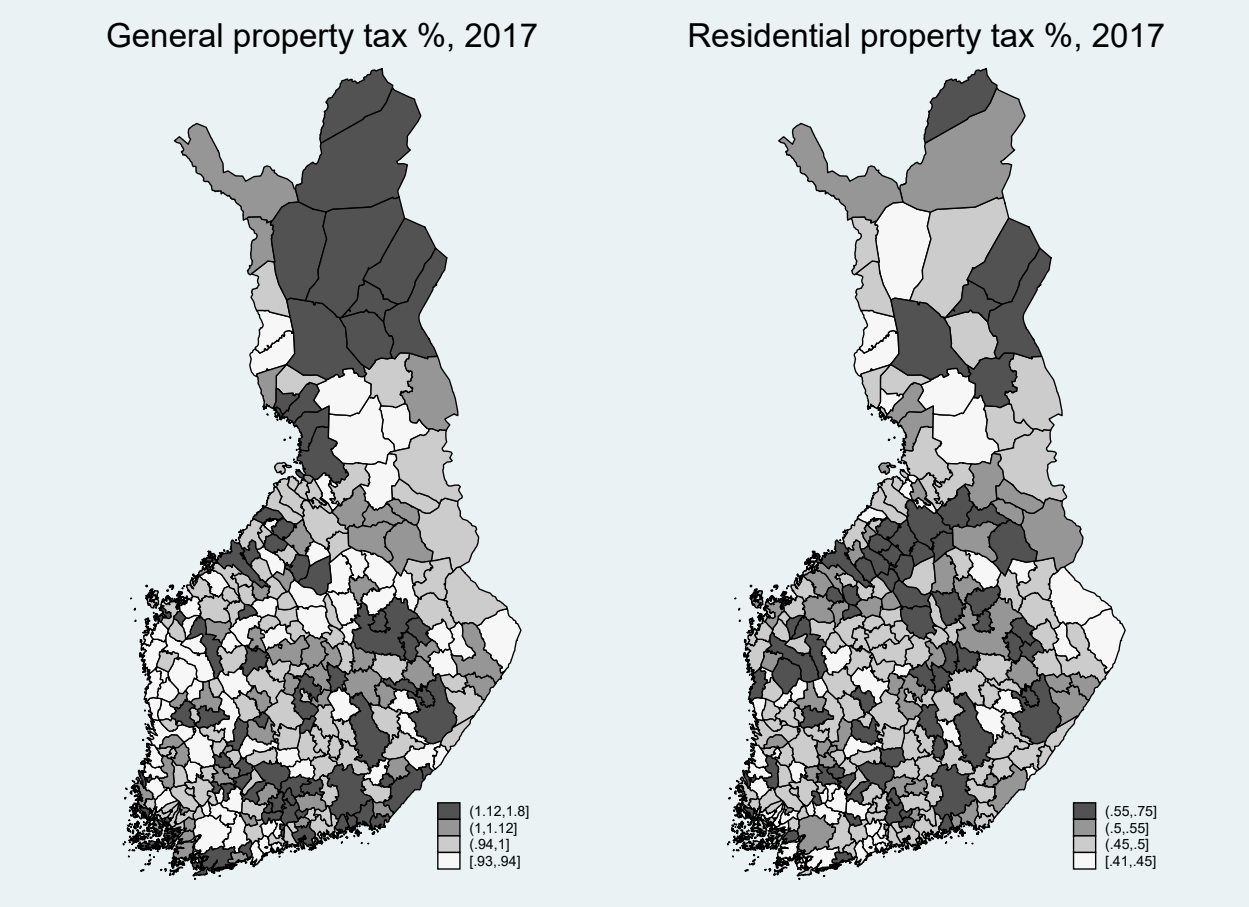


Figure 6: Property tax rates in 2017.



5 Empirical strategy

Increases in the minimum property tax rate force municipalities where the limit is binding to increase their tax rates. The purpose of the empirical analysis is to test how these tax policy shocks affect their neighbors' tax rate choices, as well as their own tax rate, revenue and tax base.

Drawing on Lyytikäinen (2012), I construct a measure of 'forced increases' in the property tax rates due to the reforms. The forced increase (Z_{it}) is the difference between the new lower bound $\underline{T}_t$ for the property tax rate T in year t and the tax rate in year $t-1$ for municipalities with a tax rate below the new lower bound. For municipalities above $\underline{T}_t$ in $t-1$, the forced increase is zero. The forced increase is written as:

$$Z_{it} = D(\underline{T}_t > T_{it-1})(\underline{T}_t - T_{it-1}). \tag{1}$$

For example, a municipality with a general property tax rate of 0.2% in 1999 was forced to increase its GPT by at least 0.3 percentage points in 2000 when the lower bound for GPT was raised to 0.5%, and thus $Z_{i2000} = 0.3$ for this municipality. Forced increases do not necessarily translate one-to-one into changes in actual tax rates because the municipality

might also have increased its tax rate in the absence of the reform, or the municipality can increase its tax rate by more than the minimum required amount.

Because the reforms of 2015 and 2017 were close to each other and rather small in magnitude, I combine these reforms by summing up the forced increases in these years into one ($Z_{i2015\_17} = Z_{i2015} + Z_{i2017}$). The reforms of 2000 and 2010 are analyzed separately.

I use the forced increase as the treatment variable in Event Study type two-way fixed effects regressions. The forced increase for each municipality is held constant within the event window around the reform. Our interest lies in the interaction of the forced increase with the year dummies. The model for the impact of own forced increases on outcome Y is:

$$Y_{it} = \beta_t Z_i + \kappa_i + \lambda_t + u_{it}. \tag{2}$$

The parameter of interest is β_t, which measures the impact of a one percentage point forced tax rate increase relative to the base year (one year before the reform). Municipality fixed effects κ_i and year fixed effects λ_t control for time-invariant municipality characteristics and common time effects, and u_{it} is the error term. Standard errors are clustered at the municipality level.

When analyzing spatial interaction in tax rate setting, the treatment variable is the weighted average of forced increases in nearby municipalities. I use a simple nearest neighbors weighing matrix where all municipalities that share a border with municipality i get equal weights $1/N_i$ (where N_i is the number of i's neighbors) and other municipalities get zero weight.[13] The spatial interaction model is written as:

$$Y_{it} = \beta_t \sum_{j \neq i} (w_{ij} * Z_j) + \kappa_i + \lambda_t + u_{it}, \tag{3}$$

where w_{ij} denotes spatial weights. Again, the year before the reform is the base year, and controls include municipality fixed effects and year fixed effects. This model differs from Lyytikäinen (2012), who used neighbors' forced increases as an instrument for actual tax rate changes (1-4 year differences) to estimate tax competition reaction functions. Here the purpose is to estimate a reduced form model examining the effects of forced tax increases without making assumptions about whether the estimates are informative of responses to tax changes due to other factors.

I estimate a separate model for each reform and use data for four years before and four years after the reform years 2000 and 2010. For the 2015_17 reform the event window is 2011-2020.

6 Results

6.1 Own forced tax rate increases

Before analyzing the spatial strategic interactions caused by the reforms, I will examine how own forced tax increases affect the actual tax rates, tax base, and tax revenues of

[13] Lyytikäinen (2012) tests for the robustness of his results to population weights or the inclusion of neighbors' neighbors. The findings regarding tax rate interaction are not sensitive to alternative weighing schemes.

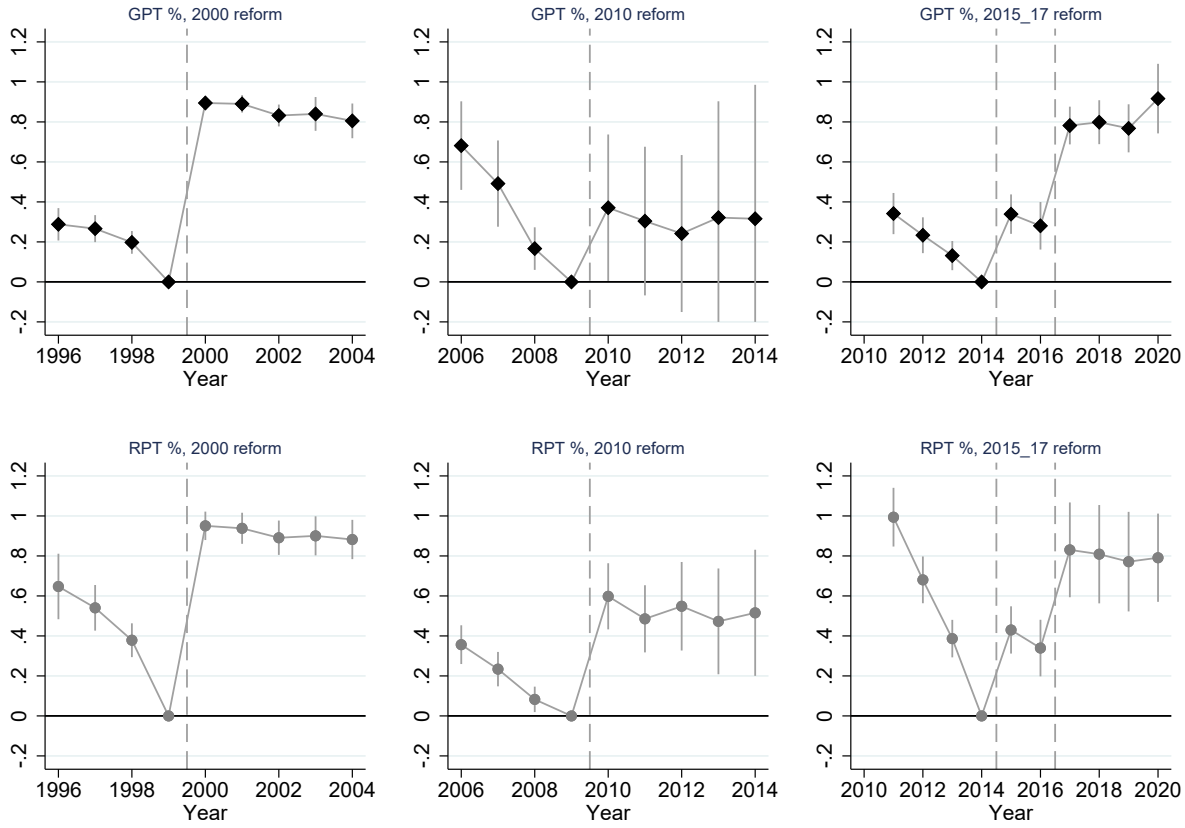
municipalities. Alas, there is not enough statistical power to study the effects on several other interesting outcomes, such as local spending or the local income tax rate, because property taxes are still a relatively unimportant source of revenue, although their importance has increased as shown in Section 2. I will present the results in the form of graphs that plot the Event Study coefficients for each outcome variable for all three reforms.

Figure 7 shows the effect of own forced GPT (top) and RPT (bottom) increases on actual tax rates, for the 2000 reform (left), the 2010 reform (center), and the 2015-17 reform (right). A coefficient of 1 would mean that a forced increase leads to an equally large increase in actual tax rate.

Starting from the GPT reform of 2000, the estimates for the impact of a forced GPT increase are between 0.8 and 0.9 after the reform. Before the reform there is a slight downward trend indicating that GPT lagged behind other municipalities in municipalities that had large forced increases in 2000. This downward pre-trend is not surprising as municipalities with low tax rates in 1999 can not have raised tax rates in recent years. The negative pre-trend is even stronger in the GPT reform of 2010, and the impact of the forced increases on actual tax rates is less pronounced than 10 years earlier. The confidence bands are large because the reform was small in magnitude. Forced GPT increases due to the 2015 and 2017 reforms were related with a relative decline in GPT before the reform and large increases after the reform.

Turning to the residential property tax, the figure shows that own forced RPT increases led to clear increases in actual tax rates, especially after the 2000 reform. After the reform of 2010, the effect is less pronounced than the other reforms, and there is a strong negative pre-trend in the RPT reform of 2015-17.

Figure 7: Own forced increases and own actual tax rate.



Notes: The Figure plots the coefficients of the interaction of forced tax rate increases and year dummies for the general property tax (upper panels) and the residential property tax (lower panels) for the reforms of 2000 (left), 2010 (center) and 2015-17 (right). The spikes indicate 95% confidence intervals (clustering at municipality level). The controls include municipality fixed effects and year fixed effects. The sample excludes municipalities for which the upper limit to the tax rate was binding one year before the reform and municipalities that dropped from the sample due to mergers during the period.

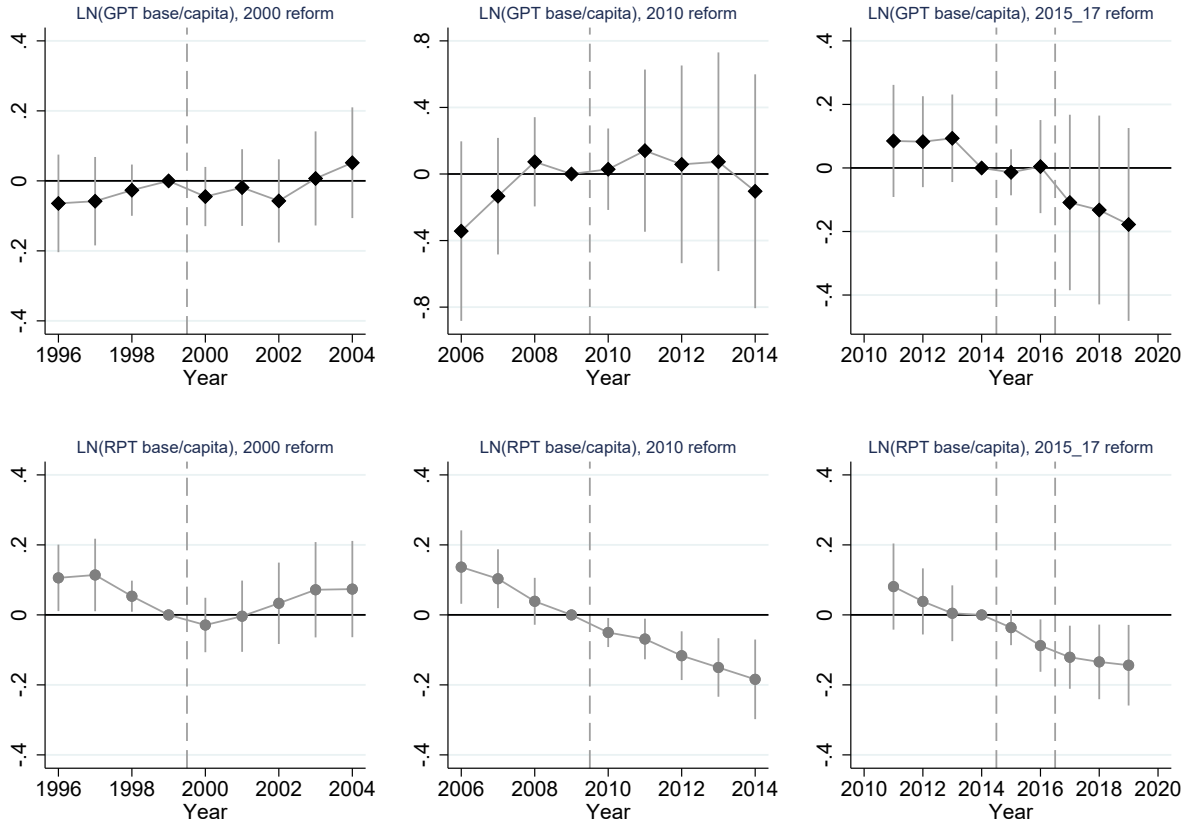
Figure 8 examines the impact of forced increases on the tax base. The dependent variable is the log of tax base per capita, and hence the estimates are semi-elasticities of the tax base per capita with respect to the tax rate. There is no clear evidence of deterioration of the tax base due to a forced GPT increases in the upper panels, but the standard errors are quite large especially after the 2010 and 2015-17 reforms and economically significant effects can not be ruled out.

The lower panels of Figure 8 present the tax base effects of forced RPT increases. The estimates are not consistent with a decrease in the tax base. There is a downward trend in the tax base associated with forced increases before all the reforms, which continues after the reforms of 2010 and 2015-17, but is reversed after the reform of 2000.

Overall, there is no clear evidence of detrimental effects on tax the base leading to a loss of revenue four years after the reforms. This is perhaps not surprising as the stock of housing

and business buildings can adjust only gradually through new construction and demolition. The limited time horizon and non-negligible statistical uncertainty mean that I can not rule out economically significant tax base effects in the longer run.

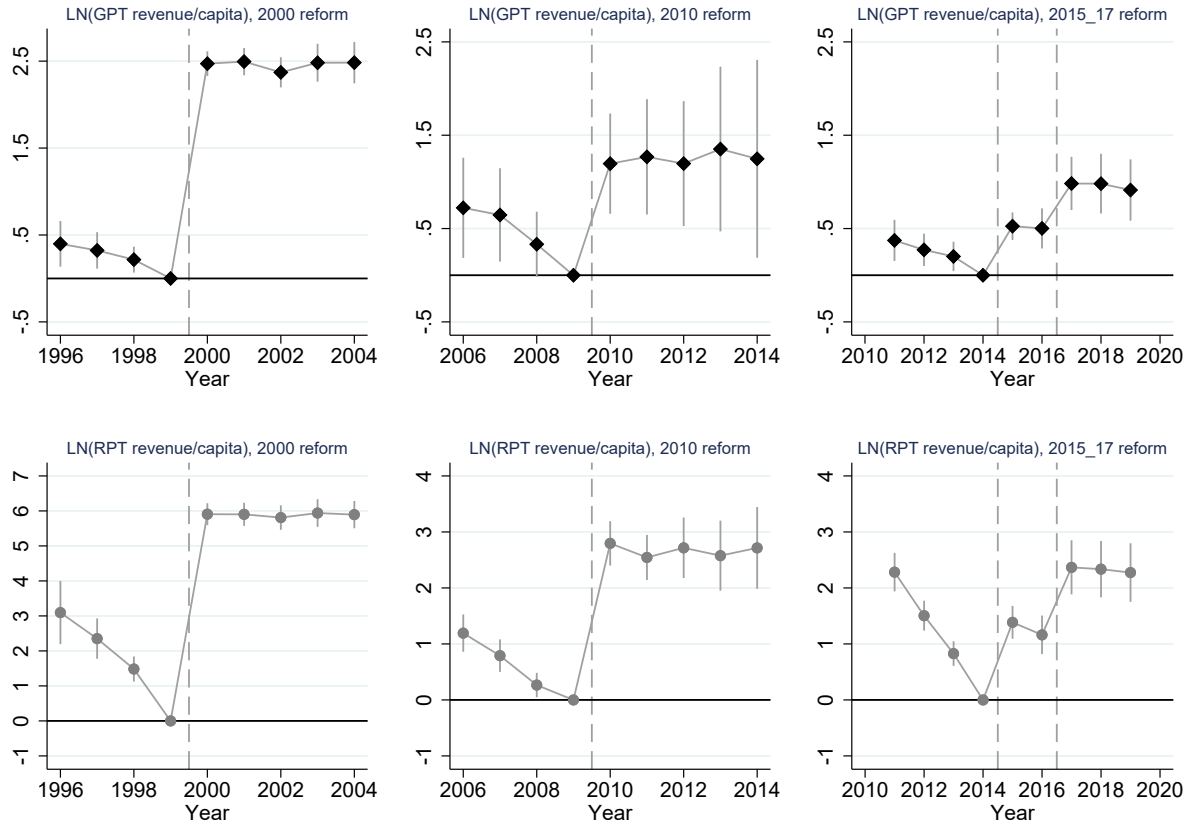
Figure 8: Own forced increases and tax base.



Notes: The Figure plots the coefficients of the interaction of forced tax rate increases and year dummies for the general property tax (upper panels) and the residential property tax (lower panels) for the reforms of 2000 (left), 2010 (center) and 2015-17 (right). The spikes indicate 95% confidence intervals (clustering at municipality level). The controls include municipality fixed effects and year fixed effects. The sample excludes municipalities for which the upper limit to the tax rate was binding one year before the reform and municipalities that dropped from the sample due to mergers during the period.

The results for tax revenue are presented in Figure 9. The combined effect of tax rate increases and tax base effects is that forced GPT increases lead to clear and lasting increases in revenue after all three reforms. Similar to the GPT, the results for tax revenue from the RPT in the lower panels show clear and persistent increases in revenue due to forced tax increases.

Figure 9: Own forced increases and tax revenue.



Notes: The Figure plots the coefficients of the interaction of forced tax rate increase and year dummies for the general property tax (upper panels) and the residential property tax (lower panels) for the reforms of 2000 (left), 2010 (center) and 2015-17 (right). The spikes indicate 95% confidence intervals (clustering at municipality level). The controls include municipality fixed effects and year fixed effects. The sample excludes municipalities for which the upper limit to the tax rate was binding one year before the reform and municipalities that dropped from the sample due to mergers during the period.

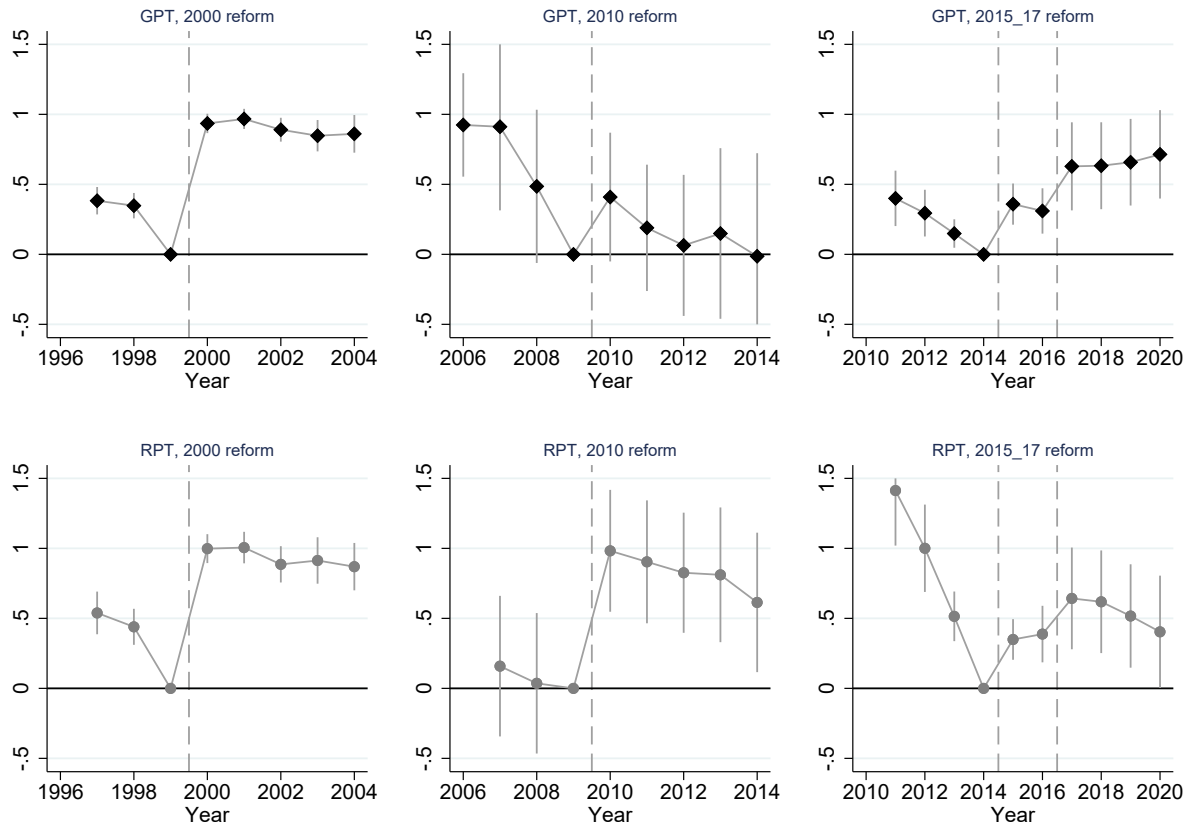
6.2 Fiscal interaction

Next I analyze spatial interaction in tax rates triggered by the minimum tax rate increases. To assess whether forced increases caused significant variation in actual spatially weighted average tax rates, I first estimate a model where the spatially weighted actual tax rate is the outcome variable. Figure 10 shows the results for both the GPT and the RPT and for all the reforms.

Starting from the GPT, neighbors' forced tax increases in the 2000 (top-left) and 2015-17 (top-right) reforms lead to clear and persistent shocks in their tax rates. The 2010 reform (top-center), which increased the minimum GPT rate by a mere 0.1 pp, did not cause as clear shocks in neighbors' actual GPT rates as the other reforms and the standard errors are large. The lower panel of Figure 10 presents the findings for the RPT. Forced RPT increases

lead to clearly visible shocks to neighbors' actual tax rates after all the reforms. Before the 2015-17 reform there is a strong negative pre-trend.

Figure 10: Neighbors' forced increases and neighbors' actual tax rates.



Notes: The Figure plots the coefficients of the interaction of neighbors' average forced tax rate increases and year dummies for the general property tax (upper panels) and the residential property tax (lower panels) for the reforms of 2000 (left), 2010 (center) and 2015-17 (right). The spikes indicate 95% confidence intervals (clustering at municipality level). The controls include municipality fixed effects and year fixed effects. The sample excludes municipalities with own forced increases in the reform year, municipalities for which the upper limit to the tax rate was binding one year before the reform, and municipalities that dropped from the sample due to mergers during the period.

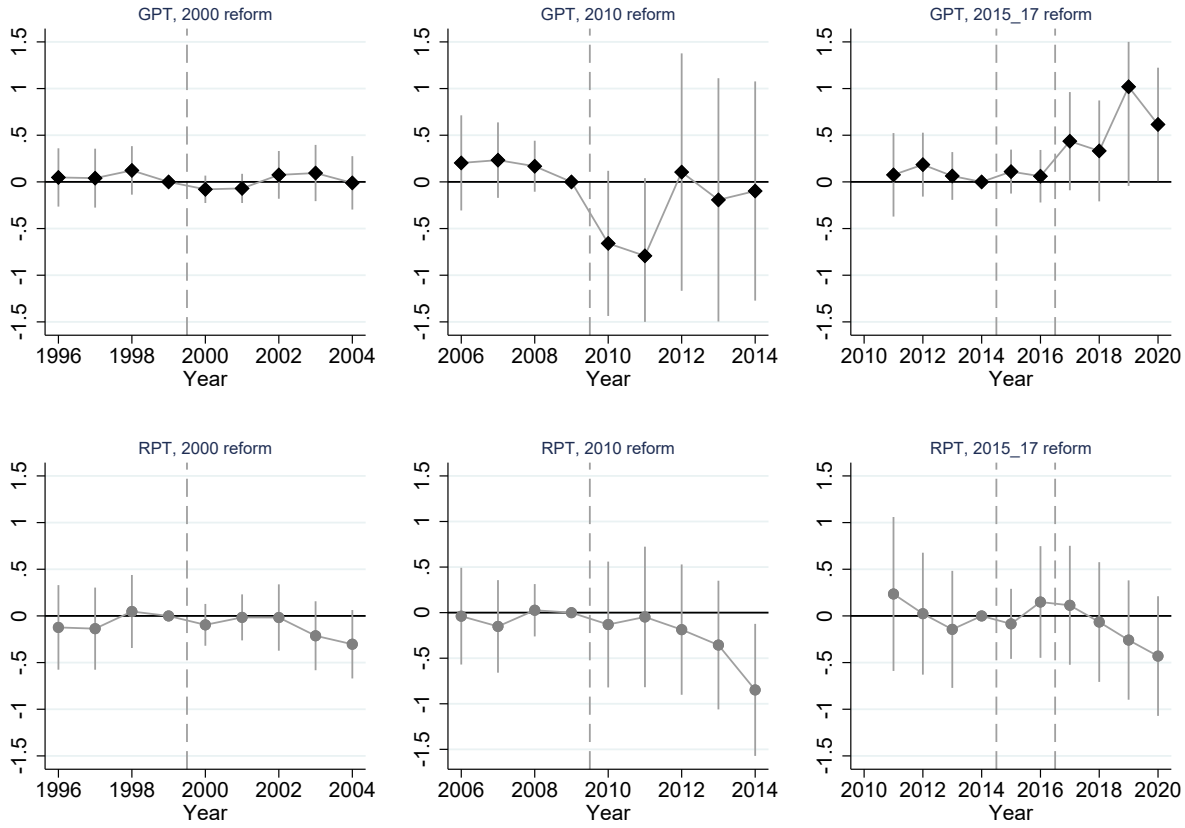
Figure 11 presents the findings on how the choice of property tax rates is affected by neighbors' forced tax increases. The first important observation from the figure is that trends in property tax rates prior to the reforms are flat in all six panels, which increases confidence in the results being informative of the causal impacts of neighbors' forced tax increases. The results for the GPT reform 2000 indicate that GPT rates were unaffected by forced increases in nearby municipalities. This is in line with the findings of Lyytikäinen (2012) for the same reform. The results for the relatively small GPT reform in 2010 are too imprecise to be informative, because the reform did not generate sufficient variation in

neighbors' tax rates (Figure 10). Forced GPT increases due to the reform of 2015-17 seem to lead to tax increases in neighboring municipalities. A possible reason for the difference between the findings for the 2000 reform and the 2015-17 reform is the equalization reform, which removed property taxes from the tax base equalization scheme. The decrease in the number of municipalities may also have increased strategic interaction. It should, however, be noted that the estimates have large standard errors and we cannot rule out economically insignificant or zero effects with a large degree of confidence. Moreover, Table 3 showed that the group of municipalities affected by the 2000 and 2015-17 reforms differed substantially. This means that heterogeneous responses by different municipalities can be an alternative explanation for the different point estimates for these reforms.

Turning to the analyses of RPT in the lower panels, the estimates show a similar pattern after all three reforms. Neighbors' forced tax rate changes seem to lead to a gradual decline in RPT rates 3-4 years after the reform, and there is a significant negative coefficient four years after the reform of 2010. This consistent pattern points towards neighboring municipalities' RPT rates being strategic substitutes.[14] A potential mechanism could be that municipalities expect their neighbors' forced RPT increases to lead to an increase in their tax base and they can therefore lower their RPT without losing revenue. The point estimate is more negative in the two latter reforms. A possible explanation could be intensified strategic interaction when the number of municipalities shrinks over time due to mergers. Also, the equalization reform could amplify expected tax base effects and strategic interaction. The confidence bands in the latter two reforms are, however, quite broad implying that differences to the 2000 reform may be a coincidence. Again, heterogeneous responses by different municipalities affected by different reforms may be an alternative explanation.

[14]The results for the RPT reform of 2000 are consistent with Lyytikäinen (2012), where the estimate for the slope of the reaction function 4 years after the reform was -0.16 but insignificant.

Figure 11: Tax rate interaction.



Notes: The Figure plots the coefficients of the interaction of neighbors' average forced tax rate increases and year dummies for the general property tax (upper panels) and the residential property tax (lower panels) for the reforms of 2000 (left), 2010 (center) and 2015-17 (right). The spikes indicate 95% confidence intervals (clustering at municipality level). The controls include municipality fixed effects and year fixed effects. The sample excludes municipalities with own forced increases in the reform year, municipalities for which the upper limit to the tax rate was binding one year before the reform, and municipalities that dropped from the sample due to mergers during the period.

Vertical fiscal externalities

The reforms analyzed above did not generate enough variation to estimate the impact of forced property tax increases on local income tax rates with reasonable statistical precision. Therefore, wether and to what extent the reforms caused vertical fiscal spillovers to the tax capacity of central government remains an open question. It should also be noted that Event Study analysis of the impact of minimum property tax increases on local income taxes would neglect any equilibrium effects on municipalities that were not directly affected by the reforms.

One can, however, calculate a rough upper bound estimate for the potential impact of the reforms on local and national income taxes by making the extreme assumption that in

the absence of the reforms, all municipalities would still apply the tax rates of 1998 prior to the first increase in tax limits since the introduction of the property tax. This scenario assumes that the overall rise in property tax rates is fully attributable to changes in tax rate bounds. Further, I assume that all of the increase in property tax revenue was used to lower local income taxes, and municipal expenditure was unaffected. Finally, I assume away any responses to tax rates that would affect tax bases. This is a highly unrealistic thought experiment, but it is useful for determining a rough upper limit for the impact of changes in property tax limits on income taxes.

When actual property tax revenues in 2019 are compared with hypothetical revenues obtained by applying 1998 property tax rates to the tax bases in 2019, it is found that actual GPT revenue in 2019 is 75% higher than the hypothetical revenue, and actual RPT revenue is 144% higher than hypothetical revenue. Total property tax revenue in 2019 was 95% higher than hypothetical revenue in the absence of tax hikes. In monetary terms, the contribution of tax rate increases between 1998 and 2019 to property tax revenue in 2019 was 870 million euros. In the same year, municipal income tax revenue was 18.9 billion euros and the income tax revenue of central government from the same tax base was 5.5 billion euros. Thus, in the absence of property tax revenue attributed to tax rate increases, local income tax would have to be 4.6% higher to cover municipal expenditure in 2019. Central government would have to cut its labor income tax revenue by 15.9% to keep the overall labor income tax burden constant. This simple calculation suggests that economically relevant vertical spillovers are possible, even though we lack the statistical power to estimate the magnitude.

7 Conclusions

The Finnish government has increased minimum property tax rates several times during the past 30 years, and the current lower limits are above the initial upper limits. This paper analyses empirically the effects of these changes in minimum property tax rates using panel data and an Event Study research design.

I find that neighbors' forced increases in general property tax rates did not trigger responses after the reform of 2000. This is consistent with the findings of Lyytikäinen (2012) for the same reform using a somewhat different estimation strategy. The reforms of 2015 and 2017 indicate that forced increases lead to GPT increases in nearby municipalities. This would be consistent with intensified competition for business real estate after the removal of property taxes from the tax base equalization scheme in 2012. As regards the spatial interaction of residential property tax rates, I find some indication that neighbors' forced increases in RPT rates lead to lower tax rate choices by their neighbors four years after each of the reforms studied, even though the estimate is statistically significant only after the 2010 reform. These findings contribute to the growing quasi-experimental tax competition literature.

It should be borne in mind that the empirical results in this paper concern strategic responses to neighbors' tax rates. Although the evidence on interaction among neighboring municipalities is limited, tax competition may still exist. In the standard model, jurisdictions that are negligible in size in the capital market compete, but the reaction functions are flat. The equilibrium may still be inefficient because fiscal externalities exist.

The empirical results for municipalities' own forced tax rate increases reveal that forced increases have a clear and lasting effect on own property tax revenue in the affected municipalities, as the tax rates rise and the tax base is largely unaffected in the short run. This suggests that the tax capacity of central government as regards other tax bases likely increased. Interestingly, analysis of government bills on tax rate bounds suggests that the increases in minimum tax rates were at least partly motivated by vertical tax competition between central and local governments on income and corporate taxes. The impact of forced property tax increases on local income taxes cannot be estimated due to lack of statistical power, but a simple back of the envelope calculation assuming all property tax increases can be attributed to changes in tax rate bounds suggests that, the impact on local income tax rates and revenue capacity of the central government can be economically significant.

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