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Revenue vs Expenditure Based Fiscal Consolidation: The Pass-Trough from Federal Cuts to Local Taxes*

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Abstract

A growing literature emphasizes that the output effect of fiscal consolidation hinges on its composition, as the choice of increasing revenues vs cutting expenditure is not neutral. Existing studies, however, underscore the role of local governments in a federal setting. Indeed, transfer cuts at the central level might translate into higher local taxes, changing the effective composition of the fiscal adjustment. We evaluate this transmission mechanism in Italy, where municipalities below the threshold of 5,000 inhabitants were exempted from (large) transfer cuts in 2012. This allows us to implement a difference-in-discontinuities design in order to estimate the causal impact of transfer cuts on the composition of fiscal adjustment, also because tight fiscal rules impose a balanced budget on Italian municipalities. We disclose a pass-through mechanism by which local governments react to the contraction of intergovernmental grants by mainly increasing taxes rather than reducing spending. From a political economy perspective, this revenue based fiscal consolidation is driven by local governments with low electoral competition and low party fragmentation.

Keywords: fiscal consolidation, intergovernmental grants, difference-in-discontinuities.
JEL classification codes: H2, H77, H87, D7.

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1 Introduction

Recent works in both macroeconomics and political economics show that the output effect of fiscal consolidation depends on its composition, as the choice of increasing revenues vs cutting expenditure is not neutral from both an economic and a political perspective (see Berndt et al. 2012, Alesina and Ardagna 2013, Alesina et al. 2017, Alesina et al. 2019).[1] In particular, the evidence summarized by Alesina et al. (2019) shows that expenditure based fiscal consolidations, on average, have a smaller contractionary effect than tax based fiscal consolidations. Yet, existing studies underscore the role of local governments in a federal setting. As transfer cuts at the central level might translate into higher local taxes, changing the effective composition of the national fiscal adjustment, any macro evaluation of fiscal consolidations should take this transmission mechanism into account. We isolate this mechanism in Italy, where we can causally evaluate the fiscal policy reaction of local governments to a large fiscal consolidation effort imposed at the central level. By doing so, we also join a growing literature that uses variation across cities or regions to identify the impact of economic shocks of interest to macroeconomists, as causal inference is usually difficult with the use of cross-country variation alone.[2]

Italy is the ideal testing ground for the causal evaluation of policy responses to the need of fiscal consolidation. As many other Western economies, Italy went through a sharp fiscal consolidation in the aftermath of the Great Recession, resulting in a public deficit reduction from 5.3% of the GDP in 2009 to 2.1% in 2018. In the period 2010-2015, approximately one third of this fiscal consolidation occurred through a permanent cut in federal transfers to municipal governments, which were reduced by 8.6 billions of euros (out of a 25.1-billion deficit reduction in nominal terms). As the current public spending of Italian municipalities amounted to 39.6 billions in 2010 (excluding expenditure for local public transport and waste management), this transfer reduction had a sizable impact on the local governments' fiscal position, and forced them to either increase local taxes or reduce spending, also because a tight balanced-budget constraint is in place and no deficit is allowed at the local level. This environment—which is common to many other countries with a certain degree of decentralization—allows us to investigate the transmission mechanism from a reduction in federal transfers to the composition of fiscal adjustment at lower layers of government. Moreover, as municipalities below the threshold of 5,000 inhabitants were

[1] Other relevant studies in the fiscal adjustment literature include Woodford (2011), Favero and Giavazzi (2012), Auerbach and Gorodnichenko (2103), Ardagna and Caselli (2014).

[2] Prominent examples include Corbi et al. (2019), Surico and Trezzi (2019), Martin and Philippon (2017), Mian and Sufi (2014), Nakamura and Steinsson (2014), Chodorow-Reich (2019), Autor et al. (2013). See Guren et al. (2020) for further discussion of this literature.

exempted from most of the transfer cuts, we can implement a difference-in-discontinuities design to causally evaluate the quantity and quality of the fiscal adjustment effort.

In particular, local governments in municipalities below the threshold of 5,000 inhabitants were exempted from (large) transfer cuts in 2012. This allows us to implement a difference-in-discontinuities design (see Grembi et al. 2016, Eggers et al. 2018) in order to estimate the causal impact of transfer cuts on the composition of fiscal adjustment, by controlling at the same time for confounding policies at 5,000 and for time shocks in 2012. In fact, the 5,000 threshold is also used in Italy to define the strictness of fiscal rules and the wage paid to local mayors (which has been shown to affect both their quality and performance), but neither of these two policies changed in 2012.[3] Of course, the year 2012 also affected the Italian economy and public finance because of other factors, but all of them were common to municipalities just below and just above 5,000 inhabitants. Therefore, as we formally show in our econometric framework, the combination of the time variation before/after 2012 and the discontinuous variation at 5,000 allows us to identify a causal effect.[4]

Our empirical findings disclose a pass-through mechanism by which local governments react to the contraction of intergovernmental grants by mainly increasing taxes rather than reducing spending. In particular, real estate taxation at the local level is suddenly increased in municipalities that have enough fiscal space to do that. From a political economy perspective, we find that this revenue based fiscal consolidation is mainly driven by municipalities with low electoral competition and no party fragmentation in the government coalition. As tax hikes are faster to adopt and bring revenues more rapidly than expenditure cuts, the government may be prone to adopt them to realize the fiscal adjustment, unless it faces (external or internal) political competition by politicians that have an incentive to emphasize the tax increase in the public discussion and campaign against the government.

Our study contributes to different strands of the literature in both macroeconomics and political economics. The analysis of fiscal adjustments has mainly been conducted at the national level, mostly in the attempt to quantify the output effects of revenue based as opposed to expenditure based fiscal consolidation plans (see Giavazzi and Pagano 1990, Alesina et al. 1998, Forni et al. 2010, Alesina and Ardagna 2013, Erceg and Lindè 2013, Yang et al. 2015, Alesina et al. 2018). At the sub-national level, aside the vast literature

[3]Grembi et al. (2016) exploits the discontinuity at 5,000 to evaluate the effectiveness of fiscal rules; Coviello et al. (2018) to estimate the impact of fiscal rules on firms' dynamics at the local level; Gagliarducci and Nannicini (2013) to estimate the effect of the mayors' wage on both political selection and performance, finding that better paid mayors are more educated and perform better once in office.

[4]The fact that other studies use the threshold of 5,000 inhabitants in Italy to estimate different causal effects does not affect the validity of our design-based evaluation, because none of the other policy discontinuities changed in 2012, as discussed in the section on the institutional background. And this is why our difference-in-discontinuities design identifies the effect of transfer cuts on fiscal adjustment only.

on political budget cycles (see Brender 2003, Brender and Drazen 2005, Drazen and Eslava 2010), the link between changes in transfers from upper-tier governments and the fiscal policy reaction by lower-tier governments has not been widely explored.[5]

The literature on sub-national fiscal policy can broadly be divided into two categories: the first looks at the determinants of the distribution of transfers from the central government to local governments; the second investigates their effects on fiscal policy decisions at the local level. In the first strand, attention has mainly been devoted to verify how much the territorial distribution of transfers is affected by political considerations.[6] The second strand is the closest to our contribution. Central governments can affect local fiscal policy behavior in two ways: by changing the amount of grants or by imposing non-monetary restrictions such as tax and expenditure limitations. In this respect, Skidmore (1999) looks at local tax limitations imposed in US states between 1976 and 1990, and finds that they produced a reduction in constrained revenue sources but a parallel increase in unconstrained ones. In other words, they favored a reshuffling of the local budget on the revenue side, leaving pretty much unaltered the spending level. The most direct way to affect local governments' fiscal behavior is undoubtedly by changing the level of transfers. In this regard, the literature has mainly focused on the so-called "fly paper effect," namely the overreaction of local expenditure to changes in transfers from upper-tier governments, as opposed to the reaction of local spending to changes in local income (see Hamilton 1983, Hines and Thaler 1995, Bailey and Connolly 1998, Inman 2008, among others). Some empirical evidence of flypaper effects has been found in the US (Case et al. 1993, Knight 2002, and more recently Leduc and Wilson 2017), UK (Gemmel et al. 2002), Norway (Tovmo and Falch 2002), and Sweden (Dahlberg et al. 2008), although these studies neither provide causal estimates nor find evidence of asymmetric behavior, that is a less than proportional reduction of local public spending when central grants are reduced (which is specifically the scope of our paper). As for the Italian case, Levaggi and Zanola (2003) and Legrenzi (2009) both find descriptive evidence of downward inflexibility of, respectively, regional and municipal public spending in the event of transfer reduction. Gennari and Messina (2014) do not find any robust result in terms of fiscal replacement, that is, municipalities reacting to smaller transfers by increasing

[5]Other attempts at disaggregating fiscal adjustments can be found in Mertens and Ravn (2013), Romer and Romer (2016), and Perotti (2014). These papers, however, are limited to the U.S. and often only consider either the tax or the spending side of fiscal corrections.

[6]Brollo and Nannicini (2012) implements a close-race regression discontinuity design in Brazil and find that municipalities in which the mayor is affiliated with the party of the Brazilian president receive larger discretionary transfers for infrastructures. Herwatz and Theilen (2014) focus on Germany and find some role for political affiliation of the state governor in determining the distribution of transfers. Bracco et al. (2015) find a similar result for Italy, where municipalities ruled by a mayor affiliated to one of the parties in power at the central level receive a larger amount of grants than non-aligned mayors. Vega and Vega (2013) focus on Portugal and find that the distribution of transfers is affected by the political cycle.

their own tax revenues. Our paper stems from these mixed results and implements a quasi-experimental design to estimate the causal effect of transfer cuts on both local taxes and spending, as well as heterogeneous responses by the underlying political environment.[7]

The rest of the paper is organized as follows. Section 2 sketches a simple theoretical framework that we use to interpret the empirical results. Section 3 describes the institutional setting and the data sources. Section 4 presents the econometric framework. Section 5 discusses the main findings and robustness checks. Section 6 concludes.

2 Theoretical preliminaries

The purpose of this section is to set the stage for the empirical analysis by providing a simple theoretical framework, in order to depict the relevant relations taking place in an economy where the central government reduces grants in favor of local governments. The private component of aggregate demand is approximated by a representative agent deriving utility from private consumption and both central and local public spending (as in Barro 1990, Turnovsky and Fisher 1995, Gong and Zuo 2002). We adopt a standard two-tier system—as in Gong and Zou (2002)—with a central and a local government.

Based on the scope of our analysis, we assume that while the central government is fully benevolent, the local government has an utility-enhancing component based on the amount of local public spending. The former levies a uniform income tax at a flat rate of τ^Y, whereas the latter a property or capital tax τ^K.[8] Central and local government spending are denoted, respectively, by G and g. Furthermore, central government transfers in favor of the local government are indicated by Γ. Both government tiers are subject to a balanced budget constraints.

Agents play a Stackelberg game with the following timing: the central government chooses its policy tools (G, τ^Y, Γ), the local government does the same (g,τ^K), and then the representative agent chooses its optimal consumption and saving plan.[9]

The representative agent's discounted utility (twice differentiable and under Inada conditions) is given by:

$$U_t = \sum_{t=0}^{\infty} \beta^t u(C_t, G_t, g_t) \tag{1}$$

[7] Our paper also indirectly contributes to the literature on the effects of balanced budget rules, see—among others—Grembi et al. (2016), Azzimonti et al. (2016), Asatryan et al. (2018), Eliason and Lutz (2018).

[8] As in Gong and Zou (2002) and Mieszkowski (1972) in our framework capital includes real estate property.

[9] Formally, the representative agent maximizes its utility by taking as given governments' fiscal choices; then the local government maximizes its own welfare function by incorporating the agent's optimal condition; and finally the central government maximizes welfare by taking into account the other two players' FOCs.

with $0 < \beta < 1$ being the exogenous discount factor and C_t private consumption. The local government's welfare function has an additive component $W(g)$, with $W'(g) > 0$, capturing the political economy effect of a larger budget. In other words, local governments also gain utility from local public spending, because of either politicians' rent-seeking or some clientelistic exchange with interest groups at the local level.

The representative agent chooses consumption C_t and capital K_{t+1} in order to maximize (1) under the following budget constraint:

$$K_{t+1} = (1 - \tau_t^Y)Y_t(K_t) - C_t + (1 - \tau_t^K)K_t \tag{2}$$

where K is the capital stock and $Y(K)$ is the production function. The optimal condition is given by:

$$U'(C_t) = \beta U'(C_{t+1}) \left[(1 - \tau_{t+1}^Y) \frac{\Delta Y_{t+1}}{\Delta K_{t+1}} + (1 - \tau_{t+1}^K) \right] \tag{3}$$

where $U'(C) > 0$ is the marginal utility of private consumption. Equation (3) states that at the optimum the opportunity cost of accumulating one unit of new capital—the foregone consumption, left-hand side of (3)—is equal to the discounted net marginal benefit of future consumption that the accumulation of capital today will produce—right-hand side of (3). In turn, the latter quantity is the sum of the net-of-taxation unit of capital and the net-of-taxation output produced by that unit.

The local government chooses local public spending g_t and local tax instrument τ_{t+1}^K in order to maximize welfare function (1) augmented by the political component $W(g)$, subject to representative agent's FOC—equation (3)—and its own balanced budget constraint:

$$g_t = \Gamma_t + \tau_t^K K_t \tag{4}$$

Local government's optimal condition reads:

$$U'(C_{t+1})\lambda_{2,t} = [U'(g_{t+1}) + W'(g_{t+1})]K_{t+1} \tag{5}$$

where $\lambda_{2,t}$ is the utility price of an additional unit of private consumption—i.e., the Lagrange multiplier associated to the representative agent's FOC—and $U'(g_{t+1})$ is the marginal utility of local government spending. Equation (5) emphasizes the trade-off facing the local government: if it increases the local tax instrument τ^K, the benefit is given by the future marginal utility of local public spending, but the cost is the foregone future marginal utility of consumption (since taxation decreases capital, which decreases income, which decreases consumption) weighted by the Lagrange multiplier.

Finally, the central government chooses central public spending G_t and the central tax instrument τ^Y_{t+1} in order to maximize welfare function (1), subject to other players' FOCs—equations (3) and (5)—and its own balanced-budget constraint:

$$G_t = \Gamma_t + \tau^Y_t Y_t \tag{6}$$

Central government's optimal condition reads:

$$\lambda_{2,t} U'(C_{t+1}) \frac{\Delta Y_{t+1}}{\Delta K_{t+1}} = U'(G_{t+1}) \tag{7}$$

where we assume that the utility price of an additional unit of private consumption in the central government maximization problem is the same as the one in the local government. $U'(G_{t+1})$ is the marginal utility of central government spending. Equation (7) dictates that at the optimum the marginal cost of increasing federal tax—left-hand side of equation (7)—must be equal to the marginal benefit of the corresponding increase in public spending or transfer to the local government—right-hand side of equation (7).

The equilibrium is pictured by a vector of endogenous variables [K_{t+1}, C_t, G_t, g_t, τ^K_{t+1}, τ^Y_{t+1}, Γ_t] satisfying the system composed by equations (2) through (7). Solving the system in steady state and assuming that $U(G) = \log(G)$ and $U(g) = \log(g)$ and $W(g) = log(g)$, we get to the following:

$$C = \frac{1-\tau^Y}{\tau^Y}(G+g) - K\left(\frac{\tau^K}{\tau^Y}\right) \tag{8}$$

$$\frac{1}{\beta} = \tau^Y - \frac{\tau^K}{\tau^Y} \tag{9}$$

$$g = -\frac{\lambda_5}{\lambda_2}\tau^K Y K + \frac{\lambda_5}{\lambda_2}\frac{\tau^K}{\tau^Y}\frac{K}{2}\Gamma \tag{10}$$

where the absence of a time subscript denotes the value of a variable in a non-stochastic steady-state. Our simple theoretical framework was designed to understand what happens when the central government reduces transfers to the local government. From equation (10) we can derive the two steady-state relations that serve our purpose:

$$\frac{\Delta g}{\Delta \Gamma} = \frac{\lambda_5}{\lambda_2}\frac{\tau^K}{\tau^Y}\frac{K}{2} > 0 \tag{11}$$

$$\frac{\Delta \tau^K}{\Delta \Gamma} = -\frac{2g\tau^Y K}{(K\Gamma - \tau^Y K Y)^2} < 0 \tag{12}$$

What happens when the central government cuts transfers? We can isolate three empirical predictions.

i The local government—see equation (11)—reduces local public spending. The size of this reduction is bigger the higher the steady-state local tax rate (because the fiscal effort is already strong) and the lower the income tax rate.

ii The local government—see equation (12)—increases the local tax rate. The size of this increase is bigger the higher the steady-state level of local public spending (this is probably due to the function form chosen for $U'(g)$) and the income tax rate (this is consistent with the previous result). The derivative of (12) with respect to the steady-state capital stock reads:

$$\frac{\Delta\left(\frac{\Delta\tau^K}{\Delta\Gamma}\right)}{\Delta K} = \frac{g\tau^Y(\Gamma-\tau^Y)(K-2)}{\Delta[K(\Gamma-\tau^Y Y]^3} \tag{13}$$

The sign of equation (13) is the same as $(K-2)$. Therefore, if the endowment of capital is high, the increase in the local capital tax rate (following a reduction in federal transfers) is higher, in order to exploit the wider tax base.

iii The increase in the local tax rate following a grant reduction is higher the higher the utility $W(g) = log(g)$ accruing from the political game at the local level:

$$\frac{\Delta\left(\frac{\Delta\tau^K}{\Delta\Gamma}\right)}{\Delta g} = \frac{-2\tau^Y K}{(K\Gamma-\tau^Y KY)^2} \tag{14}$$

as $W'(g) = \frac{1}{g}$, it is clear that the higher the marginal utility stemming from the use of local public spending, the higher the size of the pass-through from federal cuts to local taxes.

3 Institutional background and data

3.1 Italian sub-national governments

In this section, we provide background information on the Italian system of sub-national governments. This will allow us to show why Italy is a perfect testing ground to estimate the impact of federal cuts on the composition of the fiscal adjustment realized by lower layers of government in a federal system. Italy is a unitary Republic with three layers of sub-national governments. The territory is divided in 20 Regions (five of which with a

special statute that gives them higher autonomy from the central government), managed by elected regional governments that account for 19% of total current public expenditure (143 billion euros). The main responsibilities of regional governments are in the following sectors: healthcare; public transportation; complementary social welfare; higher education; and vocational training.

The second layer of the institutional system is represented by 93 Provinces (17 of which within special regions) and 14 Metropolitan districts (4 of which within special regions), managed by local administrators appointed among the members of the municipal councils elected within the boundaries of each province or metropolitan district. At this level of government is allocated the 0.8% of total current public expenditure (6 billion euros) in order to provide services related to the maintenance of provincial road network, the management of public high school buildings, environmental protection and, depending on the regions, other delegated functions by regional governments in local public transportation or vocational training.

The third and most important layer of the institutional system is represented by municipalities (*Comuni*), which have a long and important historical tradition in Italy. Municipal governments are ruled by a city council and an executive committee appointed by the elected mayor (*Sindaco*). The council and the mayor are directly elected for a five-year term and are subject to a two-term limit.[10] As in many other European countries, also in Italy, there is a high level of fragmentation at the municipal level. There exist 7,978 municipalities (1,351 of which within special regions); 85% of all municipalities have less than 10,000 inhabitants, 75% less than 5,000, 24% less than 1,000 inhabitants, while only 6 cities have more than 500,000 inhabitants. At this level of government is allocated 6.8% of total current public expenditure (52.2 billion euros), by which a wide range of essential public services are provided: environment protection and waste management, social services to elderly and disabled persons, childcare and nursery schools, school-related services (such as school meals and transportation), local police, maintenance of municipal roads, management of civil registries, town planning, culture, recreation, and economic development.

In our analysis, we focus on municipalities within normal-statute regions, as they share the same set of fiscal rules. In particular, the current expenditure of these 6,627 municipalities is fully financed by local taxes and fees plus horizontal (non earmarked) equalization grants allocated with a system based on historical expenditure up to 2014; after that year a new equalization system based on the difference between standard expenditure needs and fiscal

[10]The electoral system is different according to the population: in small municipalities (below 15,000 inhabitants) there is single-round plurality system; instead, in larger municipalities (above 15,000 inhabitants) there is a run-off system. See Galasso and Nannicini (2015) for further details on Italian politics.

capacity has been gradually introduced with the goal of completely replacing the previous method in 2021. Specific grants are exceptional and earmarked; they are a residual source of funding provided by the central or the regional government, in favor of municipalities with specific investment needs.

Municipalities' own fiscal revenues come from two main sources: (1) local taxes, among which the most relevant are the Property Tax (called "ICI" until 2011 and "IMU" afterward), the tax on waste disposal (called "TARSU" until 2011 and "TARI" afterward), and the local income tax surcharge; (2) local fees related to road and traffic, libraries, theaters and culture, burial services, and other services such as the occupation of public spaces, public billboards, certificates.

According to the Italian Constitution, all local governments are subject to a balanced-budget constraint and fiscal deficit is allowed only to finance capital expenditure. Moreover, as an additional and fundamental fiscal discipline mechanism, all municipalities (with the exception of those below 5,000 inhabitants until 2013), provinces, and metropolitan districts must comply with the rules of the "Domestic Stability Pact" (DSP). The DSP was introduced in Italy, as in other European countries, in 1999 after the European Union adopted its Stability and Growth Pact in 1997. According to the rules of the DSP, local governments have to keep their fiscal gap below a specific target fixed by the central government. Since 1999, the definition of the fiscal gap has changed multiple times.[11]

3.2 Fiscal consolidation

In the aftermath of the financial crisis, starting in 2010, the Italian government has implemented an intense program of spending cuts.[12] In the period 2010–2015, approximately one third of the fiscal consolidation occurred through a permanent cut in transfers to municipal governments, which were reduced by 8.6 billion euros, corresponding to roughly 16% of current expenditure or 33% of capital expenditure at the municipal level. As a result of these cuts, in 2015 the vertical component of the equalization grants was abolished, and the equalization system became horizontal.

Figure 1 provides a snapshot of the different laws through which the cuts in federal transfers were gradually imposed. Our empirical analysis exploits the 2.5 billion euros reduction introduced by the art. 14 par. 2 of the decree 78/2010, which became effective in 2012. This reduction in federal transfers is particularly interesting because municipalities below 5,000 inhabitants were fully exempted from it. As far as the other transfer cuts are

[11]For a detailed analysis on the impact of the DSP on local governments' fiscal policy, see Grembi et al. (2016). On the impact of the DSP on the dynamics of firms' strategies, see Coviello et al. (2018).

[12]On the impact of financial crises on public policy, see Gokmen et al. (2018).

concerned, none of them exhibits the same exemption, only municipalities affected by the 2009 and 2012 earthquakes were exempted by the 2013 and the final 2015 transfer cuts. Note that there are other municipal policies that also jump at 5,000 inhabitants: in particular, the wage of the mayor sharply increases above this threshold (see Gagliarducci and Nannicini 2013) and the DSP is not enforced below this threshold (see Grembi et al. 2016). The wage policy, however, is time invariant, while the DSP exemption at 5,000 did not vary until 2013 (which is why we restrict our sample to observations before this year).

Figure 2 shows the trends followed by the main municipal financial variables between 2010 and 2015. Each value corresponds to the national average of the variable expressed in per capita terms, considering only municipalities within the normal-statute regions. Although current expenditure exhibits a slight reduction between 2010 and 2015, its downward trend is less steep if compared with the trend of the cumulative grant reductions over the six years.[13] A stable decrease of capital expenditure is instead clearly visible, although it was mainly the result the fiscal constraints imposed by the DSP.

From Figure 2, we observe a clear increase in the level of the property tax, also due to the 2012 reform passed by the central government as one of the main pillar of the fiscal consolidation program implemented to cope with the consequences of the financial crisis. Between 2011 and 2012, total revenues from the property tax passed from 9.8 billion to 23.8 billion euros, thanks to the revaluation of the cadastral values and to the taxation of the owner-occupied dwellings previously exempted in 2008. However, half of the total tax revenues were retained by the central government in a peculiar form of tax-sharing (only municipal revenues are shown in the graph). Finally, no much variation is visible in the local income tax and in the level of fees.

Figure 3 provides an in-depth analysis of the current expenditure composition in the six years between 2010 and 2015. The graph shows that the reduction of current expenditure observed between 2010 and 2015 mainly comes from the reduction of personnel expenditure, achieved by the introduction of specific limitations on the hiring of new staff. From the analysis of the raw data it seems that the process of fiscal consolidation did not produce, at least in the short run, a visible contraction of total municipal current expenditure. Instead, we observe an increase in the property tax.

This general evidence may lead to the conclusion that mayors reacted to the reduction of grants mainly by increasing local taxes, and therefore there was no transmission to the local level of the spending cuts implemented by the central government. Of course, tons of

[13]Total current expenditure does not include the outlays related to waste management and local public transports, these items have been subtracted because in a large number of municipalities they are externalized and are not reported in the municipal budget account.

confounding factors may produce this descriptive evidence. To isolate the causal impact of transfer cuts on the composition of the fiscal adjustment at the local level, we exploit the richness of Italian institutions and data, and we implement a "difference-in-discontinuities" design (see Grembi et al. 2016, Eggers et al. 2018) at the 5,000 threshold in 2012. As discussed below, the sharp discontinuity at 5,000 allows us to control for time-varying confounders (e.g., the property tax reform in 2012), while the time variation before/after 2012 allows us to control for time-invariant confounders which also jump at the 5,000 threshold (e.g., the DSP and mayor's wage). In the remaining parts of this section, we describe our data and formalize the econometric design of our evaluation exercise.

3.3 Data

In order to construct our dataset as homogeneous as possible, we include in the sample only municipalities between 1,000 and 10,000 inhabitants, also excluding those in the special regions and those affected by the 2009 and 2012 earthquakes (as they all were subject to a different set of fiscal rules). Moreover, we restrict the time span to the four-year period between 2009 and 2012, as the rules of the DSP are stable over this period (in particular, the exemption threshold for the DSP shifts from 5,000 to 1,000 in 2013). Table 1 reports the descriptive statistics of the variables included in the dataset for the entire sample and, separately, for the treatment group (municipalities between 5,000 and 10,000 inhabitants) and the control group (municipalities between 1,000 and 5,000 inhabitants).

The "treatment" dummy takes value one for municipalities above 5,000 inhabitants, which represent 27% of all observations. The "post treatment" dummy takes value one for the year 2012 only for municipalities above 5,000 inhabitants, that is, 7% of the total observations and 25% of the municipalities above the 5,000 population threshold. The source of the financial information included in the dataset are the municipal budget accounts published yearly by the Italian Ministry of Internal Affairs, and the full list of financial variables include: transfer cuts, current expenses, capital expenses, local tax revenues, fees, grants, and the DSP target. Finally, the dataset is completed with the usual set of control variables including information related to the structure of the population by age, the level of average municipal income (divided between employment income and real estate income), the level of real estate market values and, finally, information about political fragmentation, electoral outcomes, electoral cycle, turnout, and ideology of the elected mayor.

Table 1 compares the means of each variable between the treatment and control groups in our sample. Almost all variables show values of similar magnitude in the two groups. There are, however, two exceptions, in addition to the level of the transfer cuts

where the difference is obviously expected: capital expenditure, which shows much higher values for municipalities below the 5,000 threshold; and the fiscal gap target of the DSP, which, as discussed above, was not applied to municipalities with less than 5,000 inhabitants until 2013 (the average below 5,000 is not exactly zero since some municipalities crossed the 5,000 threshold in some years). Regarding electoral variables we can also notice the absence of sharp differences between the two groups: both municipalities below and above 5,000 exhibit an average turnout and an average margin of victory that are close to the national mean (respectively, 76% and 18%); 38% of the mayors in municipalities above 5,000 show a term limit compared to 13% in smaller municipalities; 14% of municipalities above 5,000 face election during our sample period compared to 11% of smaller municipalities.

4 Econometric design

In order to identify the causal impact of the 2012 transfer cuts, imposed to municipalities above 5,000 inhabitants but not to those below, we need to control for a series of potential confounding factors, which prevent the use of a simple (cross-sectional) regression discontinuity design. The 5,000 threshold is in fact associated to a compound treatment, as other municipal policies use the same population cutoff. First, municipalities below 5,000 were exempted from the DSP until 2013. Second, the wage of mayors and executive committee members sharply increases at 5,000. As discussed above, we restrict our sample to observations before 2013 so that both confounding policies are time-invariant in our analysis. This allows us to control for them by exploiting the time variation before/after 2012. One additional confounding factor is the implementation of the 2012 property tax reform, which increased local tax autonomy. The reform, however, was implemented for all municipalities and this allows us to control for them by exploiting the discontinuity at 5,000. In other words, to control for all of these confounding factors, it is enough to combine the before/after and the discontinuous policy variation so as to implement a difference-in-discontinuities design (see Grembi et al. 2016, Eggers et al. 2018).

Formally, consider a simple setup where the observed (budget) outcome is equal to the potential (budget) outcome associated with the set of treatments actually received by municipality i at time t, $Y_{it} = Y(\mathbf{T}_{it})$, where $\mathbf{T}_{it} \in \mathbb{R}^3$ is a 3-dimensional vector containing the realizations of three separate treatments: (1) the transfer cuts, that is, our treatment of interest; (2) the mayor's wage; (3) the exemption from the DSP. This means that $\mathbf{T}_{it}$ can be decomposed as $\mathbf{T}_{it} = (C_{it}, \mathbf{V}'_{it})'$, where C is a dummy capturing the fact of being subject to transfer cuts or not, and $\mathbf{V}_{it}$ is a vector containing the other two (confounding) treatments. As discussed above, treatment assignment sharply changes in population size,

P_{it}, at the cutoff $P_c = 5,000$. In particular, at time $t = t_1$, the transfer cuts C are in place for municipalities above P_c, but not for those below P_c. The same cutoff, however, triggers a change in the confounding treatments too. Formally:

$$\mathbf{T}_{it} = \begin{cases} \mathbf{T}_{1v} & \text{if } P_{it} \geq P_c,\, t = t_1 \\ \mathbf{T}_{0\tilde{v}} & \text{if } P_{it} < P_c,\, t = t_1 \end{cases}$$

where $\mathbf{T}_{1v} = (1, \mathbf{v}')'$ and $\mathbf{T}_{0\tilde{v}} = (0, (\mathbf{1} - \mathbf{v})')'$, with $\mathbf{v}$ just indicating a vector of two dummy realizations.

In this setting, a simple (cross-sectional) RDD estimator cannot identify any causal effect of the transfer cuts C alone. In fact:

$$\hat{\tau}_{RDD} = E\left[Y(\mathbf{T}_{1v}) - Y(\mathbf{T}_{0v})|P_{it} = P_c, t = t_1\right] + E\left[Y(\mathbf{T}_{0v}) - Y(\mathbf{T}_{0\tilde{v}})|P_{it} = P_c, t = t_1\right],$$

where the first term is one of the (local) average treatment effects of transfer cuts C that we may want to estimate, and the second is the bias introduced by the the mayor's wage and the DSP exemption.

To remove this bias and isolate the causal effect of C alone, we can exploit the time variation discussed above, that is, the fact that transfer cuts were implemented at $t_1 = 2012$ as they were not in place at $t0 < t_1$, while the other confounding policies are time-invariant in our sample. Formally:

$$\mathbf{T}_{it} = \begin{cases} \mathbf{T}_{1v} & \text{if } P_{it} \geq P_c,\, t = t_1 \\ \mathbf{T}_{0v} & \text{if } P_{it} \geq P_c,\, t = t_0 \\ \mathbf{T}_{0\tilde{v}} & \text{if } P_{it} < P_c \end{cases}$$

In addition to the standard continuity assumption of any RDD design, identification rests on the following assumption of *local parallel trends* (see Eggers et al. 2018):

$$\mathrm{E}[Y(\mathbf{T}_{0v}) - Y(\mathbf{T}_{0\tilde{v}})|P_{it} = P_c, t = t_1] = E\left[Y(\mathbf{T}_{0v}) - Y(\mathbf{T}_{0\tilde{v}})|P_{it} = P_c, t = t_0\right],$$

$$\mathrm{E}[Y(\mathbf{T}_{1v}) - Y(\mathbf{T}_{1\tilde{v}})|P_{it} = P_c, t = t_1] = E\left[Y(\mathbf{T}_{1v}) - Y(\mathbf{T}_{1\tilde{v}})|P_{it} = P_c, t = t_0\right].$$

This assumption can be interpreted from two viewpoints. It states that the combined effect of the mayor's wage and the DSP exemption ($\mathbf{v}$ vs $\tilde{\mathbf{v}}$), holding fixed the transfer cuts C, is time invariant. In other words, municipalities just above and just below P_c would have been on parallel trends between t_0 and t_1 had transfer cuts C not been introduced at t_1. (Note that

this assumption is more local than the standard parallel trends assumption of the difference-in-differences design, as it must hold only in the neighborhood of the policy threshold P_c.) From a different angle, the assumption states that the (time) difference in potential outcomes between t_0 and t_1, again holding fixed the transfer cuts C, must be continuous in population size at P_c. From this second perspective, the assumption is analogous to the RDD assumption of continuity in potential outcomes around the threshold.

Eggers et al. (2018) show that the above assumption is sufficient for identification. Under continuity and local parallel trends, the following difference-in-discontinuities estimator yields the (local) average treatment effect of policy C conditional on $\mathbf{V} = \mathbf{v}$:

$$\begin{aligned}
\hat{\tau}_{DDISC} \equiv & \Big(\lim_{p \to P_c^+} E\left[Y_{it} | P_{it} = p, t = t_1\right] - \lim_{p \to P_c^-} E\left[Y_{it} | P_{it} = p, t = t_1\right] \Big) \\
& - \Big(\lim_{p \to P_c^+} E\left[Y_{it} | P_{it} = p, t = t_0\right] - \lim_{p \to P_c^-} E\left[Y_{it} | P_{it} = p, t = t_0\right] \Big) \\
= E\left[Y(\mathbf{T}_{1v}) - Y(\mathbf{T}_{0\tilde{v}}) | P_{it} = P_c, t = t_1\right] & - E\left[Y(\mathbf{T}_{0v}) - Y(\mathbf{T}_{0\tilde{v}}) | P_{it} = P_c, t = t_0\right] \\
& = E\left[Y(\mathbf{T}_{1v}) - Y(\mathbf{T}_{0v}) | P_{it} = P_c\right].
\end{aligned}$$

Note that the estimand identified above is conditional on specific realizations of the mayor's wage and the DSP policy (i.e., $\mathbf{V} = \mathbf{v}$). In other words, the causal effect of transfer cuts on fiscal policy that we can identify with the estimator $\hat{\tau}_{DDISC}$ refers to municipalities that are subject to the DSP fiscal rules and where mayors are paid a higher wage.

To implement the above difference-in-discontinuities estimator, we run two models: a local linear regression (LLR) with optimal bandwidth (see Calonico et al. 2014) and a 2nd-order local (spline) polynomial regression (LPR). In the case of LLR, given the optimal bandwidth Δ, we restrict the sample to cities in the interval $P_i \in [P_c - \Delta, P_c + \Delta]$ and run the following model:

$$Y_i = \delta_0 + \delta_1 \tilde{P}_i + C_i(\gamma_0 + \gamma_1 \tilde{P}_i) + A_i[\alpha_0 + \alpha_1 \tilde{P}_i + C_i(\beta_0 + \beta_1 \tilde{P}_i)] + \varepsilon_i \tag{15}$$

where C_i is the treatment, $A_i = 1$ after 2011, $\tilde{P}_i$ is the normalized population, and standard errors are clustered at the city level. The parameter β_0 identifies the after treatment effect.

In the case of LPR, we consider a more flexible functional form to fit the relationship between Y and P on either side of P_c in the entire sample and run the following model:

$$Y_i = \sum_{k=0}^{p} (\delta_k \tilde{P}_i^k) + C_i \sum_{k=0}^{p} (\gamma_k \tilde{P}_i^k) + A_i \left[\sum_{k=0}^{p} (\alpha_k \tilde{P}_i^k) + C_i \sum_{k=0}^{p} (\beta_k \tilde{P}_i^k) \right] + \varepsilon_i \tag{16}$$

where again standard errors are clustered at the city level. Also in this case the parameter β_0 identifies the after treatment effect.

5 Empirical results

5.1 Main findings

Table 2 reports the main results on the causal effect of transfer cuts on the composition of the fiscal adjustment by municipal governments. As a benchmark, we always report a standard difference-in-differences estimation (DID) in our restricted sample of all municipalities below 10,000 inhabitants. We then provide the difference-in-discontinuities estimations, both with a local linear regression (LLR) and with a local polynomial regression (LPR). For all estimations, we provide results without and with control variables. The point estimates show that municipal governments reacted to transfer cuts by increasing local tax revenues, rather than cutting expenditure. The size of this revenue based fiscal adjustment is larger in the neighborhood of the policy threshold, where we can identify a causal effect of about 50 euros on per-capita tax revenues. As for the size, this tax increase corresponds to the 75% of grants cuts in 2012, 8% of the average current expenditure, and 20% of the average total tax revenues (measured for the treatment group of municipalities above 5,000).

The point estimates are stable across all difference-in-discontinuities estimation methods, supporting the robustness of the findings. The increase in tax revenues is mainly due to an increase in revenues from the property tax, but also municipal fees are increased. In other words, we disclose a pass-through mechanism by which local governments react to the contraction of intergovernmental grants by increasing local taxes. As the fiscal policy variables we evaluate capture the sudden response of local governments to the fiscal shock, we identify a partial-equilibrium effect, which speaks directly to the theoretical hypotheses of the macro literature on fiscal consolidations. In other words, we can rule out general-equilibrium feedbacks that would make our results more difficult to interpret.[14]

Figure 4 reports, for the main financial variables, the graphical analysis of the discontinuities around the threshold of 5,000 inhabitants, that is, the jump (if any) in the spline polynomial approximation. As expected, this analysis confirms the zero effect on local spending and the positive jump in tax revenues. Figure 5 provides the same graphical analysis of the discontinuities around the threshold of 5,000 inhabitants for the main components

[14]See Guren et al. (2020) on how to disentangle partial and general equilibrium effects in cross-regional empirical estimates in macroeconomics.

of total tax revenues. All revenue components display a positive discontinuity, which—as expected—is more pronounced for the revenues from the property tax.

To shed more light on the mechanism of the transmission from transfer cuts to higher local taxes, we go back to the implications of our theoretical framework and investigate if they are met in our data. Specifically, we perform heterogeneity analysis with respect to both pre-treatment fiscal variables and political variables. Table 3 reports the heterogeneous effects of the reduction in intergovernmental grants estimated considering municipalities with:

- *high vs low fiscal effort*, namely those local authorities that set the property tax rate or the local income tax rate above the 75th percentile of the distribution of the tax rates computed separately for each year and for each group of municipalities belonging to the same population bracket;[15]

- *high vs low current expenditure* in euros per capita, namely those local authorities that show a value of total current expenditure (excluding waste management and local public transport) above the 75th percentile of the distribution of the current expenditure distribution computed separately for each year and for each group of municipalities belonging to the same population bracket;

- *high vs low tax revenues* in euros per capita, namely those local authorities that show a value of total tax revenues per capita (property tax, income tax, waste collection tax, and other fees) above the 75th percentile of the total tax revenues distribution computed separately for each year and for each group of municipalities belonging to the same population bracket.[16]

The results reported in Table 3 show that, in line with the predictions of our theoretical framework, only municipalities with low fiscal effort and low tax revenues react to the contraction of intergovernmental grants by increasing local taxes. Moreover, although point estimates of the treatment effect are not statistically different from zero, we can also observe that municipalities with high expenditure are more prone to reduce current expenditure to offset cuts in grants.

Table 4 turns to the political expectations of our theoretical framework, and reports the heterogeneous effects of the reduction in intergovernmental grants estimated considering municipalities with:

[15]The population brackets considered in the analysis are: between 1,000 and 2,000, between 2,000 and 3,000, between 3,000 and 5,000, and finally between 5,000 and 10,000.

[16]The total tax revenues and current expenditure adopted in this analysis correspond to the OLS residuals obtained by regressing actual revenues and expenditure per capita over a set of variables including years dummies, population brackets dummies and, respectively, fiscal capacity and standard expenditure needs.

- *high vs low political competition*, measured by the margin of victory of the elected mayor;[17]

- *political fragmentation*, measured by the fact that the mayoral coalition is formed by a single party or by more parties (municipalities with high fragmentation are identified among those with a number of parties forming the coalition above the median of two parties);

- *ideology of the mayor*, measured by the left-wing vs right-wing orientation of the mayor's political party.[18]

The results reported in Table 4 show that the revenue based fiscal consolidation is driven by political environments with low political competition and no party fragmentation in the government coalition.[19] This is in line with our theoretical prior. As tax hikes are faster to adopt and bring revenues more rapidly than expenditure cuts, a mayor may be prone to adopt them to realize the fiscal adjustment, unless he faces (external or internal) political competition by parties that have an incentive to emphasize the tax increase in the public discussion and campaign against the mayor. We detect, instead, no effect of political ideology (left vs right) on the composition of fiscal adjustment.[20]

5.2 Robustness and validity checks

In this section, we evaluate the robustness of our main findings. First, we perform a set of permutation-based placebo tests to evaluate the possibility that our results arise from random chance rather than a causal relationship. Figure 6 reports the empirical c.d.f. of the point estimates from a set of difference-in-discontinuities estimations at 1,000 false thresholds below and above the true threshold at 5,000 (namely, any point from 4,900 to 3,900 and any point from 5,100 to 6,100). The estimation method adopted for the placebo tests is the spline polynomial approximation with 2rd-order polynomial; the vertical lines indicate our benchmark estimate and its negative value as reported in Table 2. Focusing on the case of total revenues, where the possibility of false positive estimates is what worries us, the placebo exercise reported in the right-hand side panel of Figure 6 shows that only 2.33% of

[17]Municipalities with low political competition have been identified as those with a margin of victory above the median value of 14%.

[18]Unfortunately, this analysis could not be done for municipality ruled by civic lists with no clear ideological orientation, therefore the final sample has been restricted to a smaller number of observations.

[19]On the impact of political fragmentation on fiscal adjustment, see Alesina et al. (1998), Perotti and Kontopoulos (2002), Schaltegger and Feld (2009), Grier et al. (2015), Artés and Jurado (2018).

[20]On the impact of ideology on fiscal adjustment, see Tavares (2004).

the placebo estimates are above the baseline (true) estimate of 50 euros, thereby supporting the robustness of our results.

As discussed by Eggers et al. (2018), the difference-in-discontinuities design crucially rests on the assumption of local parallel trends between treatment and control units of observation in the neighborhood of the discontinuity. Figure 7 and Figure 8 show that the financial variables were on local parallel trends before the treatment kicks in, again confirming the robustness of our results.

In Figure 10, in the spirit of McCrary (2008), we test the null hypothesis of continuity of the difference in the density at 5,000 between the pre-treatment and the post-treatment year, by drawing both scatters and (2nd-order) polynomial fits. Indeed, if mayors were able to manipulate population size and sort below the threshold to avoid transfer cuts, our estimates would suffer from selection bias. This is not the case, however, as there is no discontinuity in the density test (the point estimate of the discontinuity in the density test is 0.070 with a robust standard error of 0.046).

Figure 9 and Table 5 evaluate the sensitivity of the difference-in-discontinuities estimates to the bandwidth selection. Results are robust to the choice of different bandwidths. In particular, for the two main variable of interests (i.e., total tax revenues and current expenditure), Figure 9 reports the point estimates obtained by changing continuously the chosen bandwidth between 500 and 1,500. As far as the total tax revenues is concerned, the estimates are always above zero and fluctuate very little around the average of 45 euros, confirming the robustness of our main result. Instead, and again confirming the main finding, the point estimates on total current expenditure are never statistically different from zero.

Finally, Table 6 reports difference-in-discontinuities estimates for the main control variables, in order to test the absence of discontinuity in the main municipal structural features. In particular, the following variables are included in the test: the structure of population by age, the percentage of the mountain surface, the degree of urbanization, and a set of dummy to identify the geographical location of each municipality across the peninsula. As reported in the table, none of these variables show a non-zero discontinuity around the 5,000 population threshold before and after the 2012 transfer cuts.

6 Conclusion

Our results show that Italian municipalities reacted to the contraction of intergovernmental grants by mainly increasing local taxes rather than reducing expenditure. Thanks to the peculiarity of Italian institutions, we can claim that this effect is causal (internal validity) and can be extended to many other government settings with a certain degree of

decentralization (external validity). The implications of the evidence we provide on this transmission mechanism are twofold. First, the macro literature on the output effect of fiscal consolidations should be extended to the analysis of local public finance. Second, the emergence of revenue vs expenditure based fiscal consolidations crucially rests on the forces at play in the underlying political environment, as we also find that the increase in local taxation is mainly driven by local governments with low electoral competition and low party fragmentation. Macro predictions on the policy responses to fiscal shocks should therefore incorporate both institutional and political factors.

References

[1] Alesina, A., R. Perotti, and J. Tavares (1998). "The Political Economy of Fiscal Adjustments." *Brookings Papers on Economic Activity*, 1:197-266.

[2] Alesina, A., and S. Ardagna (2013). "The Design of Fiscal Adjustments." *Tax Policy and the Economy*, Volume 27.

[3] Alesina, A. Barbiero O. Favero C. Giavazzi F. and Paradisi M. (2017). "The Effects of Fiscal Consolidations: Theory and Evidence." *NBER working paper* N.23385.

[4] Alesina, A., C. Favero, and F. Giavazzi (2019). "Effects of Austerity: Expenditure- and Tax-based Approaches." *Journal of Economic Perspectives*, 33(2):141-162.

[5] Ardagna, S. and Caselli F. (2014). "The Political Economy of the Greek Debt Crisis: A Tale of Two Bailouts." *American Economic Journal: Macroeconomics*, 6(4):291–323.

[6] Auerbach, A. J. and Gorodnichenko Y. (2013). "Corrigendum: Measuring the Output Responses to Fiscal Policy." *American Economic Journal: Economic Policy*, 5(3):320-322.

[7] Asatryan, Z. Castellón C., and Stratmann T. (2018). "Balanced budget rules and fiscal outcomes: Evidence from historical constitutions." *Journal of Public Economics*, 167:105-119.

[8] Artés, J., and Jurado I. (2018). "Government fragmentation and fiscal deficits: a regression discontinuity approach." *Public Choice*, 175(3–4):367–391.

[9] Autor, D. H., Dorn, D. and Hanson, G. H. (2013). "The China Syndrome: Local Labor Market Eects of Import Competition in the United States." *American Economic Review*, 103:2121-2168.

[10] Azzimonti, M., Battaglini, M. and Coate S. (2016). "The costs and benefits of balanced budget rules: Lessons from a political economy model of fiscal policy." *Journal of Public Economics*, 136:45-61.

[11] Barro, R.J. (1990). "Government spending in a simple model of endogeneous growth." *Journal of Political Economy*, 98:103-125.

[12] Bailey, S. J., and Connolly S. (1998). "The flypaper effect: identifying areas for further research." *Public Choice*, 95:335–361.

[13] Bracco, E. Lockwood B. Porcelli F. and Redoano M. (2015). "Intergovernmental Grants as Signals and the Alignment Effect: Theory and Evidence." *Journal of Public Economics*, 123:78–91.

[14] Brender, A. (2003). "The Effects of Fiscal Performance on Local Government Election Results in Israel: 1989-1998." *Journal of Public Economics*, 87:2187-2205.

[15] Brender, A. and Drazen A. (2005). "Political Budget Cycles in New Versus Established Democracies." *Journal of Monetary Economics*, 52:1271-1295.

[16] Berndt, A. Lustig H. and Yeltekin Ş. (2012). "How Does the US Government Finance Fiscal Shocks?" *American Economic Journal: Macroeconomics*, 4 (1):69-104.

[17] Brollo, F. and Nannicini T. (2012). "Tying Your Enemy's Hands in Close Races: The Politics of Federal Transfers in Brazil." *American Political Science Review*, 106:742-761.

[18] Calonico, S. Cattaneo M. D. and Titiunik R. (2014). "Robust Nonparametric Confidence Intervals for Regression Discontinuity Designs." *Econometrica*, 82:2295–2326.

[19] Case, A.C., Hines J.R. and Rosen, H.S. (1993). "Budget Spillovers and Fiscal Policy Interdependence: Evidence from the States." *Journal of Public Economics*, 52(3):285–307.

[20] Chodorow-Reich, G. (2019). "Geographic Cross-Sectional Fiscal Multipliers: What Have We Learned?" *American Economic Journal: Policy*, 11:1-34.

[21] Corbi, R. Papaioannou, E. and Surico, P. (2019). "Regional Transfer Multipliers." *The Review of Economic Studies*, 86(5):1901–1934.

[22] Coviello, D. Marino I. Nannicini T. and Persico N. (2018). "Direct Propagation of a Fiscal Shock: Evidence from Italy's Stability Pact." mimeo.

[23] Dahlberg, M. Mörk E. Rattsø J. and Ågren H. (2008). "Using a discontinuous grant rule to identify the effect of grants on local taxes and spending." *Journal of Public Economics*, 92:2320–2335.

[24] Drazen, A. and Eslava M. (2010). "Electoral Manipulation via Voter-Friendly Spending: Theory and Evidence." *Journal of Development Economics*, 92:39-52.

[25] Eggers, A.C. Freier R. Grembi V. and Nannicini T. (2018). "Regression Discontinuity Designs Based on Population Thresholds: Pitfalls and Solutions." *American Journal of Political Science*, 62:210-229.

[26] Eliason, P. and Lutz B. (2018). "Can Fiscal Rules Constrain the Size of Government? An Analysis of he Crown Jewel' of Tax and Expenditure Limitations." *Journal of Public Economics*, 166:115-144.

[27] Erceg, C.J. and Lendè J. (2013). "Fiscal Consolidation in a Currency Union: Spending Cuts Vs Tax Hikes." *Journal of Economic Dynamics and Control*, 37(2):422-445.

[28] Favero, C. and Giavazzi F. (2012). "Measuring Tax Multipliers: The Narrative Method in Fiscal VARs." *American Economic Journal: Economic Policy*, 4(2):69–94.

[29] Forni, L. Gerali A. and Pisani M. (2010). "The Macroeconomics of Fiscal Consolidations in Euro Area Countries." *Journal of Economic Dynamics and Control*, 34(9):1791-1812.

[30] Gagliarducci, S. and Nannicini T. (2013). "Do Better Paid Politicians Perform Better? Disentangling Incentives from Selection." *Journal of the European Economic Association*, 11:369-398.

[31] Galasso, V. and Nannicini T. (2015). "So Closed: Political Selection in Proportional Systems." *European Journal of Political Economy*, 40:260-273.

[32] Gemmell, N. Morrissey O. and Pinar A. (2002). "Fiscal Illusion and Political Accountability: Theory and Evidence from Two Local Tax Regimes in Britain." *Public Choice*, 110:199–224.

[33] Gennari, E. and Messina G. (2014). "How Sticky Are Local Expenditures in Italy? Assessing the Relevance of the Flypaper Effect Through Municipal Data." *International Tax and Public Finance*, 21:324-344.

[34] Giavazzi, F. and Pagano M. (1990). "Can Severe Fiscal Contraction be Expansionary? Tales of Two Small European Countries." *NBER Working Paper Series*, 3372.

[35] Gokmen G., Onorato M. Papageorgiou C. and Nannicini T. (2018). "Policies in Hard Times: Assessing the Impact of Financial Crises on Structural Reforms." *IGIER working paper* N.605.

[36] Gong, L., and Zou H. (2002). "Optimal taxation and intergovernmental transfer in a dynamic model with multiple levels of government." *Journal of Economic Dynamics and Control*, 26(12):1975-2003.

[37] Grembi, V. Nannicini T. and Troiano U. (2016). "Do Fiscal Rules Matter?" *American Economic Journal: Applied Economics*, 8(3):1-30.

[38] Grier, K. Lin S. and Ye H. (2015). "Political fractionalization and delay in fiscal stabilizations: a duration analysis." *Public Choice*, 164(1–2):157–175.

[39] Guren, A. McKay A. Nakamura E. and Steinsson J. (2020). "What do we Learn from Cross-Regional Empirical Estimates in Macroeconomics?" *NBER Working Paper* 26881.

[40] Hamilton, B.W. (1983). "The flypaper effect and other anomalies." *Journal of Public Economics*, 22:347–361.

[41] Herwatz, H. and Theilen B. (2014). "On the Political and Fiscal Determinants of Income Redistribution Under Federalism and Democracy: evidence from Germany." *Public Choice*, 159:121-139.

[42] Hines, J.R. and Thaler R.H. (1995). "The Flypaper Effect." *Journal of Economic Perspectives*, 9(4):217-226.

[43] Inman, R.P. (2008). "The flypaper effect." *NBER Working Paper Series*, N.14579.

[44] Knight, B. (2002). "Endogenous federal grants and crowd-out of state government spending: Theory and evidence from the Federal Highway Aid Program." *American Economic Review*, 92:71–92.

[45] Leduc, S. and Wilson D. (2017). "Are State Governments Roadblocks to Federal Stimulus? Evidence on the Flypaper Effect of Highway Grants in the 2009 Recovery Act." *American Economic Journal: Economic Policy*, 9 (2):253-92.

[46] Legrenzi, G. (2009). "Asymmetric and Non-linear Adjustments in Local Fiscal Policy." *CESifo working paper series*, N.2550.

[47] Levaggi, R. and Zanola R. (2003). "Flypaper Effect and Sluggishness: Evidence from Regional Health Expenditure in Italy." *International Tax and Public Finance*, 10:535–547.

[48] Martin, P. and Philippon T. (2017). "Inspecting the Mechanism: Leverage and the Great Recession in the Eurozone." *American Economic Review*, 107:1904-1937.

[49] McCrary, J. (2008). "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics*, 142(2):698-714.

[50] Mertens, K. and Ravn M. O. (2013). "The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States." *The American Economic Review*, 103(4):1212–1247.

[51] Mian, A. and Sufi A. (2014). "What Explains the 2007-2009 Drop in Employment?" *Econometrica*, 82:2197-2223.

[52] Mieszkowski, P. (1972). "The Property Tax: An Excise Tax or a Profits Tax?" *Journal of Public Economics*, 1(1):73-96.

[53] Nakamura, E. and Steinsson J. (2014). "Fiscal Stimulus in a Monetary Union: Evidence From US Regions." *American Economic Review*, 104:753-792.

[54] Perotti, R. (2014). "Defense Government Spending is Contractionary, Civilian Government Spending is Expansionary." *IMF Working Paper*.

[55] Perotti, R. and Kontopoulos Y. (2002). "Fragmented fiscal policy." *Journal of Public Economics*, 86(2):191-222.

[56] Romer, C. D. and Romer D. H. (2016). "Transfer Payments and the Macroeconomy: The Effects of Social Security Benefit Increases, 1952-1991." *American Economic Journal: Macroeconomics*, 8(4):1-42.

[57] Skidmore, M. (1999). "Tax and Expenditure Limitations and the Fiscal Relationships between State and Local Governments." *Public Choice*, 99:77-102.

[58] Schaltegger, C.A. and Feld L.P. (2009). "Do Large Cabinets Favor Large Governments? Evidence on the Fiscal Commons Problem for Swiss Cantons." *Journal of Public Economics*, 93(1–2):35-47.

[59] Surico, P. and Trezzi R. (2019). "Consumer Spending and Property Taxes." *Journal of the European Economic Association*, 17(2):606–649.

[60] Tavares, J. (2004). "Does Right or Left matter? Cabinets, Credibility and Fiscal Adjustments." *Journal of Public Economics*, 88(12):2447-2468.

[61] Tovmo, P. and Falch T. (2002). "The Flypaper Effect and Political Strength." *Economics of Governance*, 3:153–170.

[62] Turnovsky, S.J. and Fisher W.H. (1995). "The Composition of Government Expenditure and its Consequences for Macroeconomic Performance." *Journal of Economic Dynamics and Control*, 108:747–786.

[63] Vega, L.G. and Vega F.J. (2013). "Intergovernmental Fiscal Transfers as Pork Barrel." *Public Choice*, 155:335-353.

[64] Yang, W. Fidrmuc J. and Ghosh S. (2015). "Macroeconomic Effects of Fiscal Adjustments: A Tale of Two Approaches." *Journal of International Money and Finance*, 57:31-60.

[65] Woodford, M. (2011). "Simple Analytics of the Government Expenditure Multiplier." *American Economic Journal: Macroeconomics*, 3(1):1–35.

Figures and tables

Figure 1 Transfer cuts (*source: Ministry of Internal Affairs*)

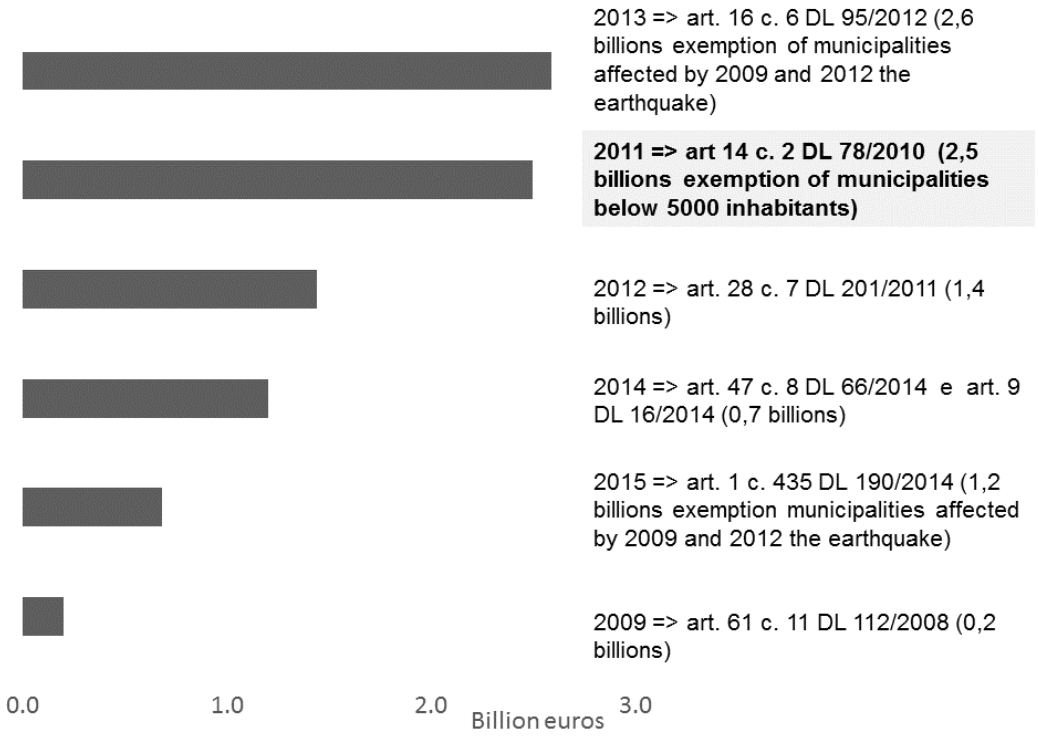


Figure 2 All municipalities, main financial variables (*source: Ministry of Internal Affairs*)

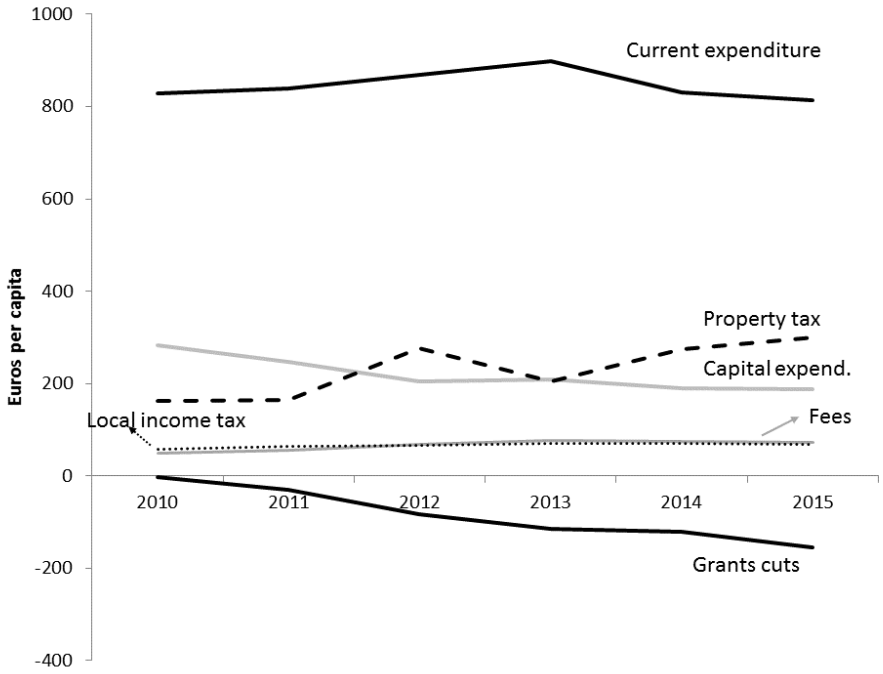


Figure 3 Current expenditure composition (*source: Ministry of Internal Affairs*)

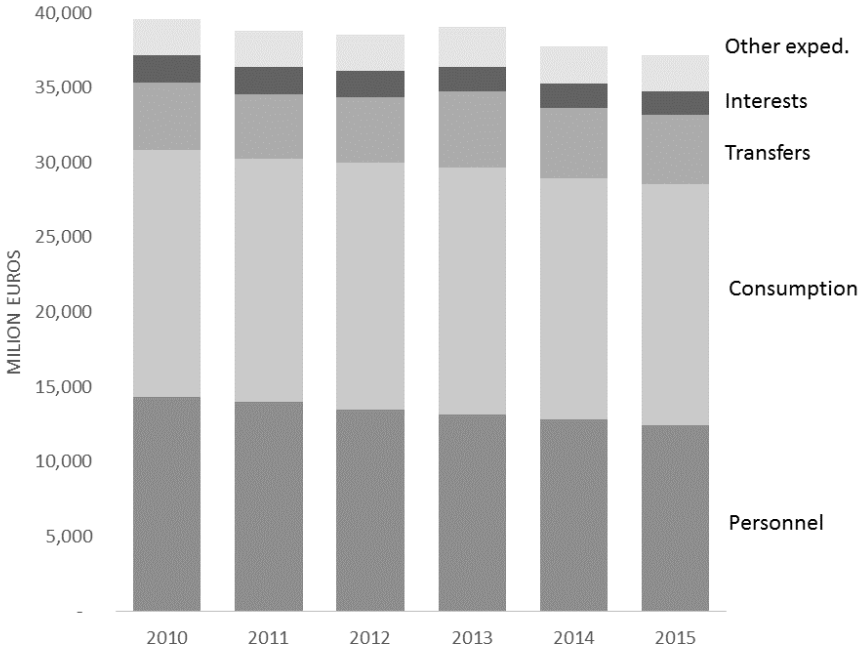
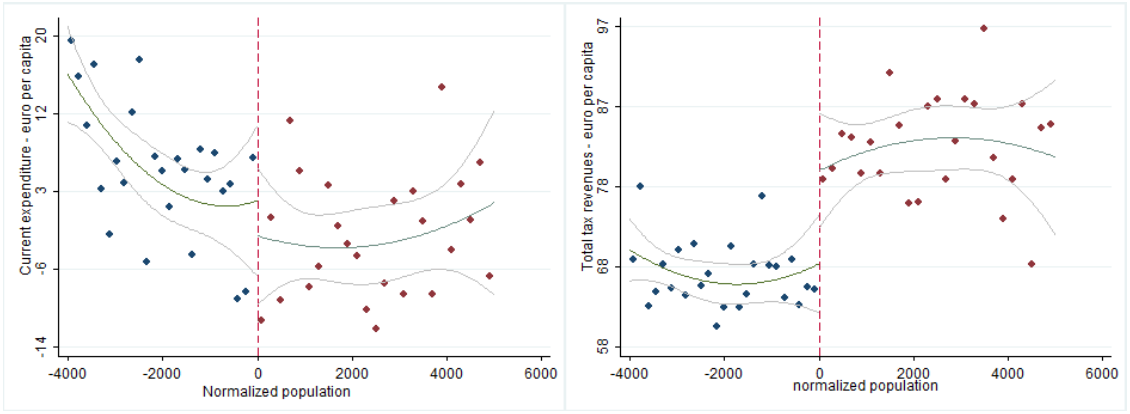
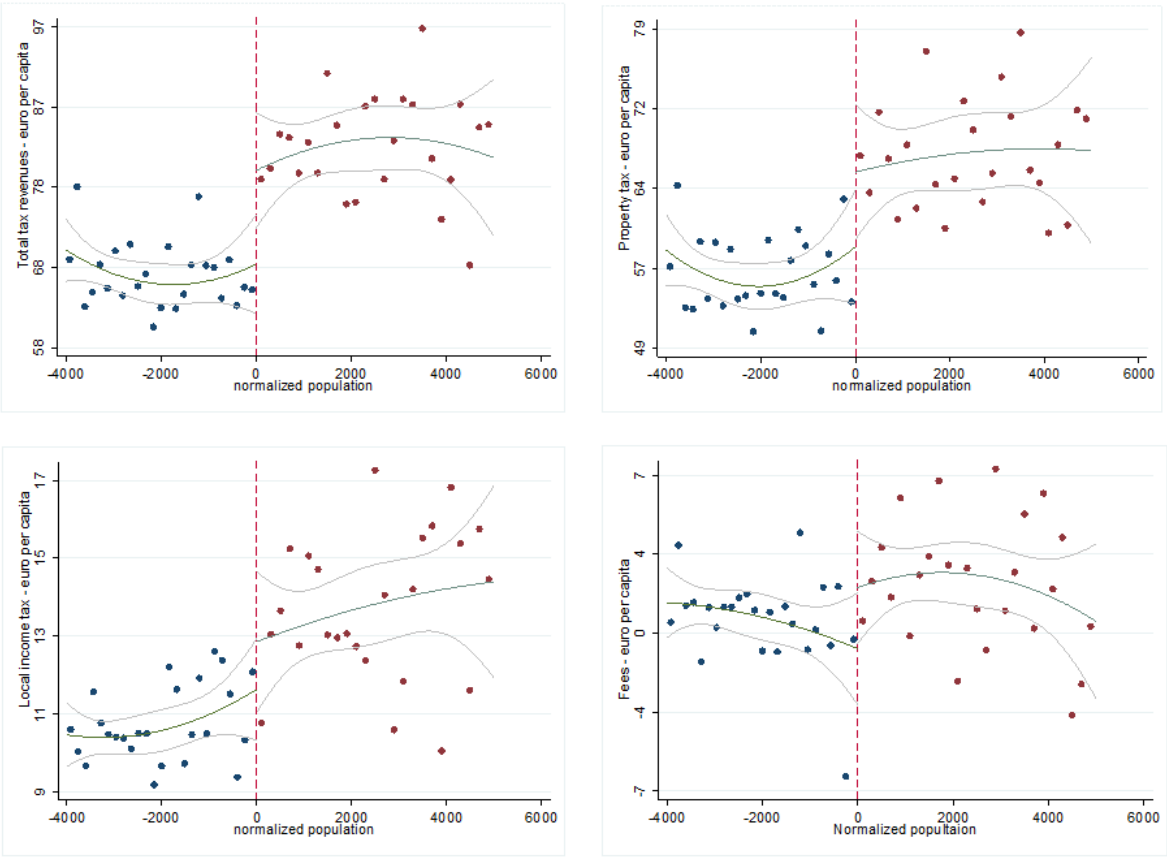


Figure 4 Difference-in-discontinuities, current expenditure and total tax revenues



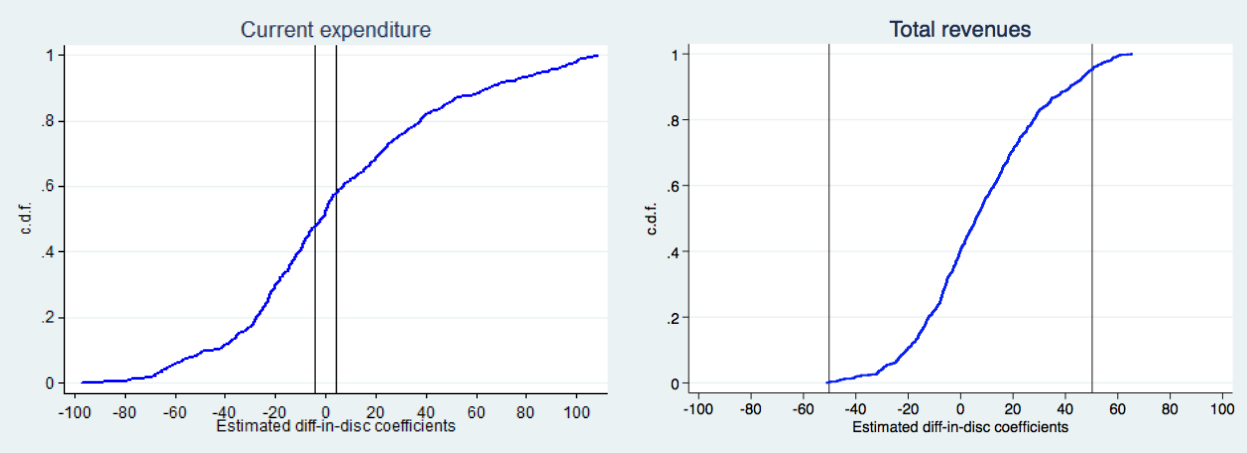
Notes. Vertical axis: difference of each post-2011 outcome value and each pre-2011 outcome value. Horizontal axis: actual population size minus 5,000. The central line is a spline 2nd-order polynomial fit; the lateral lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants.

Figure 5 Difference-in-discontinuities, main components of tax revenues



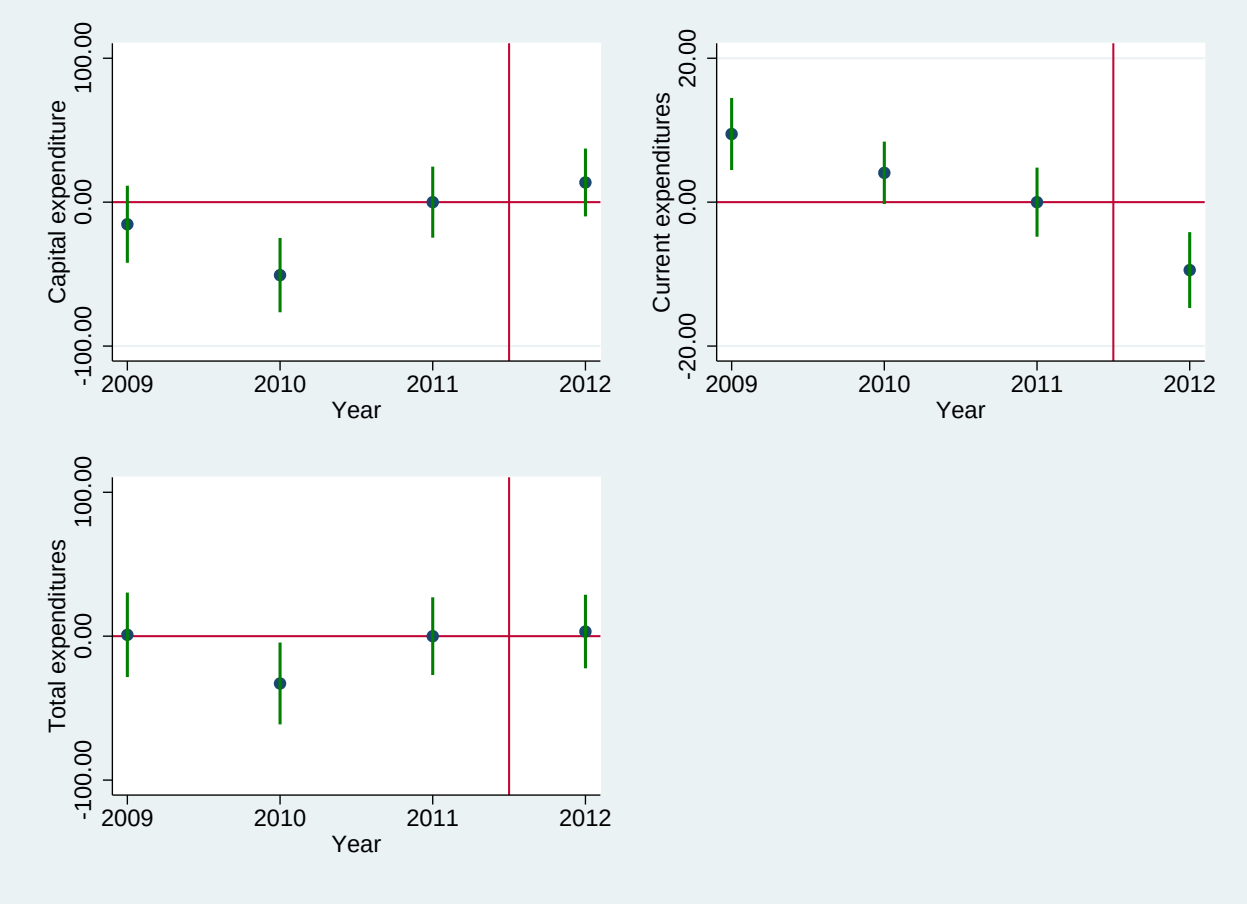
Notes. Vertical axis: difference of each post-2011 outcome value and each pre-2011 outcome value. Horizontal axis: actual population size minus 5,000. The central line is a spline 2nd-order polynomial fit; the lateral lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants.

Figure 6 Placebo tests based on permutation methods



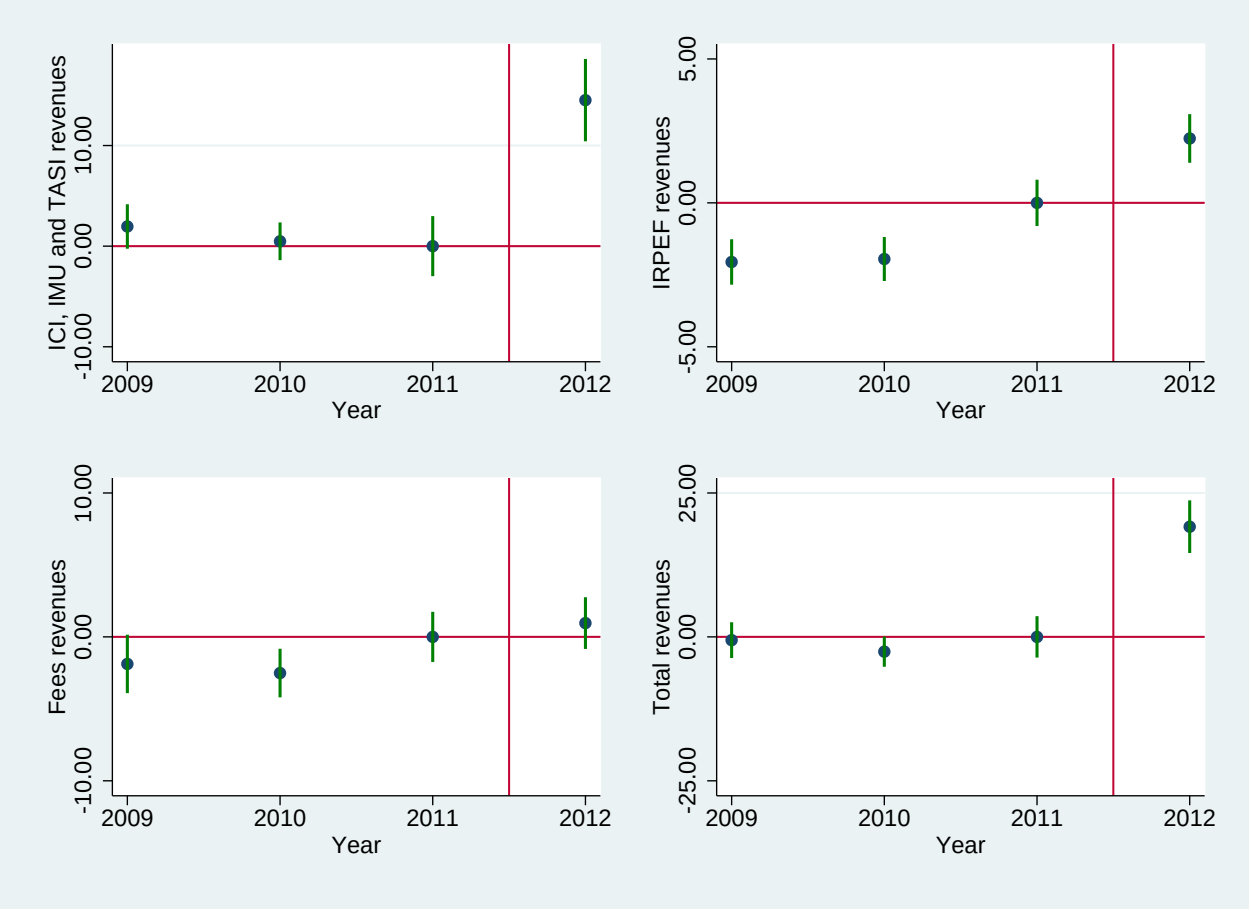
Notes. Empirical c.d.f. of the point estimates from a set of difference-in-discontinuities estimations at 1,000 false thresholds below and above the true threshold at 5,000 (namely, any point from 4,900 to 3,900 and any point from 5,100 to 6,100). The estimation method adopted for the placebo tests is the spline polynomial approximation with 2rd-order polynomial; the vertical lines indicate our benchmark estimate and its negative value as reported in Table 2.

Figure 7 Expenditure variables, pre and post-treatment trends



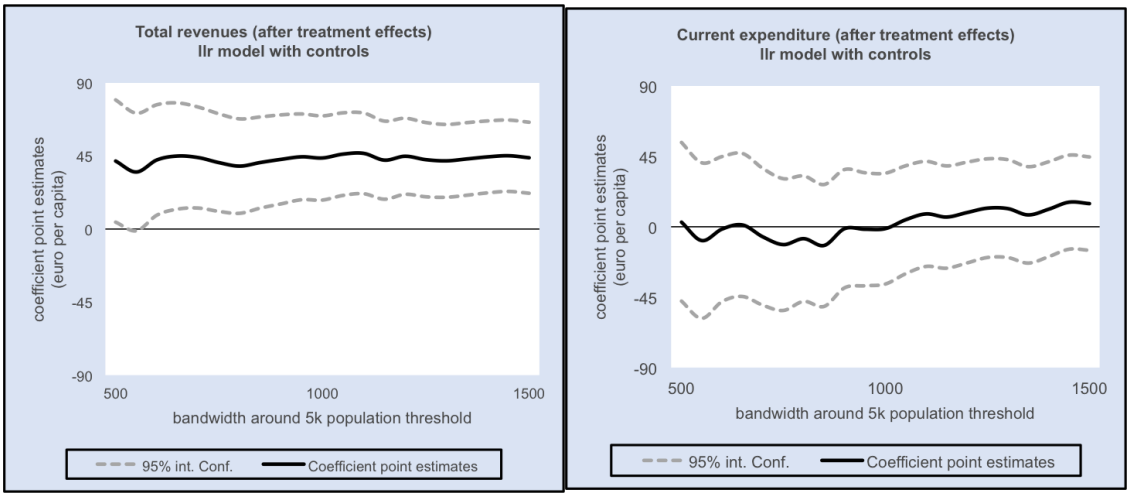
Notes. The red vertical line indicates the moment in which the treatment kicks in, for each fiscal variable reported on the vertical axis the dots indicate the average difference between treated and control groups and the 95% confidence interval.

Figure 8 Tax revenues variables, pre and post-treatment trends



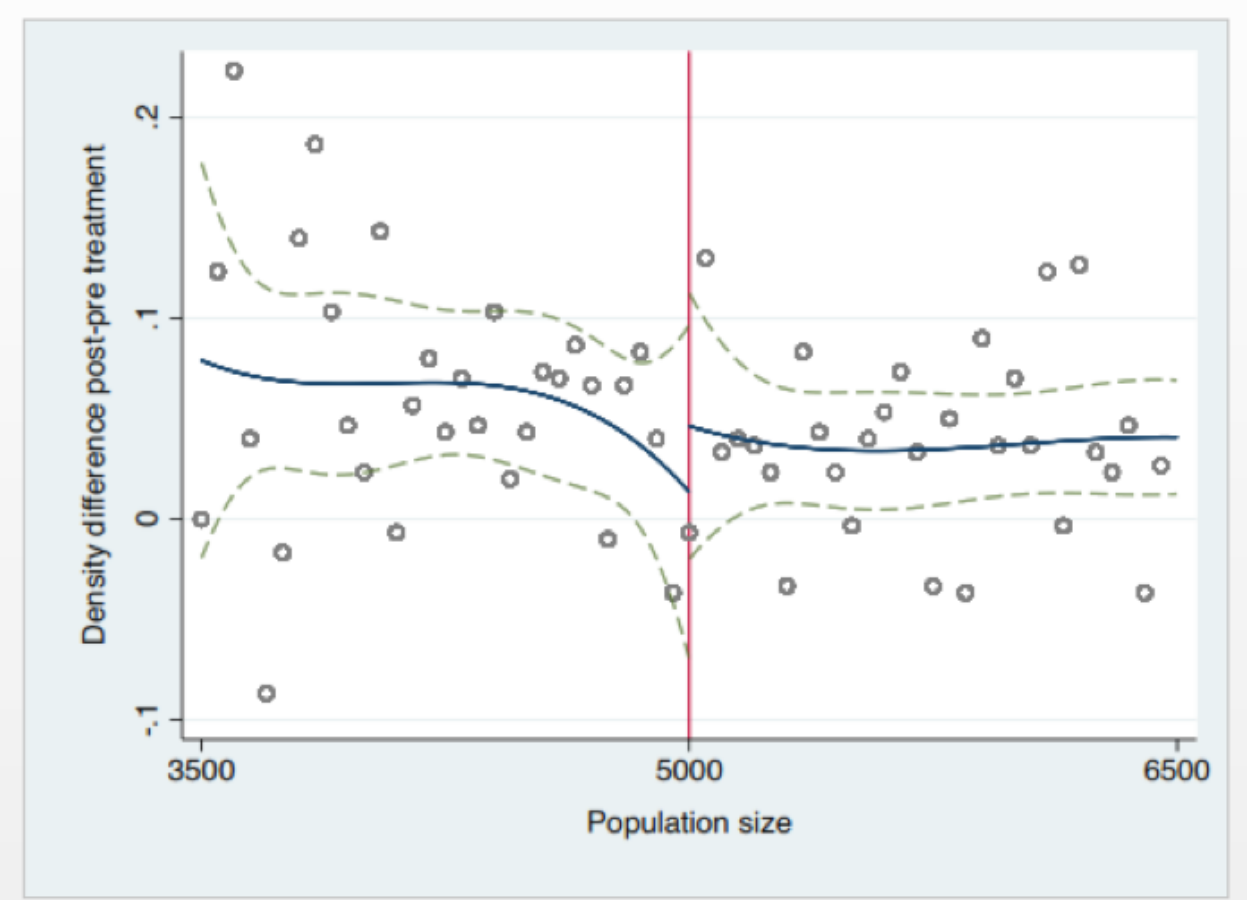
Notes. The red vertical line indicates the moment in which the treatment kicks in, for each fiscal variable reported on the vertical axis the dots indicate the average difference between treated and control groups and the 95% confidence interval.

Figure 9 Sensitivity to continuous bandwidth increases between 500 and 1,500



Notes. For each fiscal variable, the solid lines report the point estimates obtained by changing continuously the chosen bandwidth between 500 and 1,500. The dotted lines report the 95% confidence interval.

Figure 10 Density test of the discontinuity in the population threshold



Notes. Test of the continuity at 5,000 of the difference between the population density in the pre-treatment and post-treatment periods. The central line is a spline 3rd-order polynomial in population size; the lateral lines represent the 95% confidence interval. Scatter points are averaged over intervals of 50 inhabitants.

Table 1 Descriptive statistics

Variable		**All sample**		**Treatment group (pop >5,000)**		**Control group (pop <5,000)**	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Treatment	dummy	0.27	0.44	1	0	0	0
Post treatment	dummy	0.06	0.28	0.25	0.47	0	0
Grants cuts (total)[(1)]	(euro per capita)	42.41	22.95	68.70	16.11	0.25	3.54
Current expenditure	(euro per capita)	589.46	211.72	527.35	178.6	612.15	218.24
Capital expenditure	(euro per capita)	279.5	329.96	172.71	208.3	318.54	356.55
Property tax	(euro per capita)	154.88	91.23	161.98	85.03	152.29	93.26
Local income tax	(euro per capita)	46.73	22.62	52.12	22.74	44.79	22.26
Fees (net of waste manag.)	(euro per capita)	61.91	52.52	55.15	44.45	64.39	54.98
Total tax revenues	(euro per capita)	261.5	120.06	266.61	109.97	259.64	123.49
Domestic stability pact (target)	(euro per capita)	4.08	27.43	15.09	51.28	0.09	3.41
Population (0-2)	% total pop.	2.67	0.64	2.88	0.53	2.6	0.67
Population (3-14)	% total pop.	10.89	1.73	11.53	1.49	10.66	1.75
Population (15-65)	% total pop.	66.16	2.81	67.04	2.24	65.84	2.92
Population (over 65)	% total pop.	21.32	4.52	19.58	3.7	21.95	4.62
Real estate declared income	(euro per capita)	355	217	397	226	339	211
Declared employment income	(euro per capita)	6240	1916	6594	1991	6112	1872
Residential estate market values	(euro per sq meter)	1087	518	1236	673	1034	438
Electoral cycle	discrete (0-4)	1.95	1.17	1.95	1.25	1.96	1.14
Term limit	dummy	0.19	0.4	0.38	0.49	0.13	0.33
Electoral year	dummy	0.11	0.31	0.14	0.35	0.1	0.3
Turnout	%	76.17	8.02	76.45	6.18	76.07	8.58
Margin of victory	%	17.95	15.38	16.23	13.62	18.59	15.94
Obs.	n.	13,795		10,124		3,671	

Notes. Average values computed for year 2012 at the end of the sample period.

Table 2 The impact of transfer cuts, difference-in-discontinuity estimates

	DID	**DID**	**LLR**	**LLR**	**LPR (2nd order)**	**LPR (2nd order)**
Local income tax	3.25	2.56	-0.05	0.36	-1.99	-1.39
bandwidth	all sample	all sample	782	782	1000	1000
Fees	9.26***	9.97***	15.78***	14.65*	22.75*	23.35*
bandwidth	all sample	all sample	1255	1255	1000	1000
Property tax	19.68***	18.62***	38.20***	32.92***	31.70	33.23*
bandwidth	all sample	all sample	715	715	1000	1000
Total tax rev.	34.48***	31.63***	57.00***	50.21***	52.66*	55.33***
bandwidth	all sample	all sample	689	689	1000	1000
Capital expend.	12.29	12.23	6.62	-1.43	-37.43	-23.45
bandwidth	all sample	all sample	1296	1296	1000	1000
Current expend.	6.34	8.37	-16.58	-16.23	-16.51	-4.43
bandwidth	all sample	all sample	778	778	1000	1000
Control variables	No	Yes	No	Yes	No	Yes

Notes.

Municipalities between 1,000 and 10,000 inhabitants; budget years between 2009 and 2012. The total number of observations corresponds to 13,795.

Difference-in-discontinuity estimates of the impact of grants reductions on fiscal variables in municipalities above 5,000 inhabitants after 2011.

Estimation methods: Local Linear Regression (LLR) with optimal bandwidth, as in equation (15);

2nd-order spline polynomial approximation (LPR), as in equation (16).

All policy outcomes are in euros per capita. Year and municipal fixed effects are included in all specifications.

Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *,

at the 5% level by **, and at the 1% level by ***.

Table 3 Heterogeneous effects by pre-treatment financial variables

		High fiscal effort			**High expenditure**			**High tax revenues**		
	Baseline	High	Low	Interaction	Yes	No	Interaction	Yes	No	Interaction
Total tax revenues	45.05***	-1.20	41.84***	-43.04				-1.30	39.38**	-40.68
Current expenditures	2.24				-13.64	3.42	-17.06			

Notes.

Municipalities between 1,000 and 10,000 inhabitants; budget years between 2009 and 2012. The total number of observations corresponds to 13,795.

Heterogeneous difference-in-discontinuity estimates of the impact of grants reductions on fiscal variables in municipalities above 5,000 inhabitants after 2011.

All policy outcomes are in euros per capita. Year and municipal fixed effects are included in all specifications.

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Table 4 Heterogeneous effects by pre-treatment political variables

		Political competition			**Party fragmentation**			**Ideology**		
	Baseline	High	Low	Interaction	Yes	No	Interaction	Left	Right	Interaction
Local income tax	1.37	-2.04	4.89	-6.93	-10.19	1.9	-12.08	-8.29	0.98	-9.27
Fees	21.57***	7.12	34.32***	-27.2***	11.96	22.47***	-10.52***	62.22	8.06	54.16
Property tax	22.11*	17.43	28.27	-10.84	-13.76	22.4*	-36.16	34.61	16.87	17.73
Total tax revenues	45.05***	22.5	67.48***	-44.97***	-11.99	46.77***	-58.76***	88.54	25.92	62.62
Capital expenditures	31.71	86.18	-9.07	95.25	-147.36	40.27	-187.63	187.56	9.14	178.43
Current expenditures	2.24	-11.71	14.74	-26.45	107.92	-1.3	109.22	127.39	-3.95	131.34

Notes.

Municipalities between 1,000 and 10,000 inhabitants; budget years between 2009 and 2012. The total number of observations corresponds to 13,795.

Heterogeneous difference-in-discontinuity estimates of the impact of grants reductions on fiscal variables in municipalities above 5,000 inhabitants after 2011.

All policy outcomes are in euros per capita. Year and municipal fixed effects are included in all specifications.

Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 5 Sensitivity of all estimates to the bandwidth selection

	LLR 500 bwt	**LLR controls 500 bwt**	**LLR 1000 bwt**	**LLR controls 1000 bwt**
Local income tax	-2.06	-2.05	0.51	-0.31
Fees	24.39*	20.02*	16.46***	16.80***
Property tax	27.87	28.33	28.27***	26.06***
Total tax rev.	50.23*	46.31*	45.16***	42.51***
Capital expend.	3.38	4.55	7.32	1.90
Current expend.	3.4	-3.42	7.30	10.73

Notes.

Municipalities between 1,000 and 10,000 inhabitants; budget years between 2009 and 2012. The total number of observations corresponds to 13,795.

Difference-in-discontinuity estimates of the impact of grants reductions on fiscal variables in municipalities above 5,000 inhabitants after 2011 with different bandwidths.

All policy outcomes are in euros per capita. Year and municipal fixed effects are included in all specifications. Robust standard errors clustered at the municipality level are in parentheses. Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.

Table 6 Balance tests of control variables

	DID	**LLR**	**LPR) (2nd order)**	**LPR (3rd order)**
Population age 0-14	-0.169	-0.434	-0.156	-0.503
Population age over 65	0.377	0.256	0.412	1.364
Mountain surface (%)	-1.113	-5.005	0.272	10.74
Degree of urbanization	-0.014	0.047	-0.061	-0.200
North west	-0.020	0.004	-0.095	-0.080
North est	0.015	-0.046	0.023	-0.113
Center	-0.018	-0.031	0.021	0.001
South	0.041	0.119*	0.103	0.187
Main islands	-0.018	-0.047	-0.052	0.006

Notes.

Municipalities between 1,000 and 10,000 inhabitants; budget years between 2009 and 2012. The total number of observations corresponds to 13,795.

Difference-in-discontinuity estimates of the impact of grants reductions on pre-treatment covariates in municipalities above 5,000 inhabitants after 2011.

Estimation methods: Local Linear Regression (LLR) with optimal bandwidth, as in equation (15); 2nd-order spline polynomial approximation (LPR), as in equation (16).

All policy outcomes are in euros per capita. Year and municipal fixed effects are included in all specifications. Robust standard errors clustered at the municipality level are in parentheses.

Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***.