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Does local fiscal autonomy increase local income?

Evidence from Italy*

Massimiliano Ferraresi [†], Benedikt Herrmann [‡], Luisa Loiacono [§], Leonzio Rizzo[#], Riccardo Secomandi ^{††}

Abstract

Can fiscal autonomy affect per-capita income levels? The existing literature shows mixed results on the impact of fiscal autonomy on GDP growth, it often uses cross-country datasets comparing nations with different socio-economic contexts. Even when it digs into the subnational entities of a nation either financial indexes or institutional dummies are used as proxies for fiscal autonomy: both can imply endogeneity due either to measurement errors or reverse causality. We empirically investigate the impact of fiscal autonomy on per-capita income stimulated by the proper use of local financial resources. We do this by exploiting an Italian natural experiment comparing the impact on per-capita income of the use of own resources in municipalities belonging to the autonomous provinces of Trento and Bolzano, which manage almost all their taxes autonomously, to those belonging to the neighbouring regions of Veneto and Lombardy, which manage only a small fraction of taxes paid by their citizens. We use a spatial fuzzy regression discontinuity design to compare similar municipalities on the border between the provinces of Trento and Bolzano and Lombardy and Veneto. We find that the higher the level of local financial fiscal autonomy, proxied by the ratio of own tax revenue to total revenue, the higher the level of per-capita income. The proxy is instrumented with a dummy indicating municipalities with a real institutional fiscal autonomy: those belonging to the provinces of Trento and Bolzano. This allows us to interpret the proxy as an exogenous variation indicating institutional fiscal autonomy. We find that a 10 percentage points increase in financial fiscal autonomy increases per-capita income by 3%. Hence, our results suggest that local governments that are more accountable and closer to citizens, manage their revenues in a more efficient way than in the case when they receive transfers from the centre.

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1. Introduction

The discussion on possible economic benefits of fiscal decentralisation has become salient over the last decades given the increasing number and complexity of public services and the subsequent increase in government spending¹. Oates posited in 1972 (E. Oates, 1972) that fiscal decentralisation serves as a driver towards greater experimentation and innovation and towards greater investments, leading to improved public services at lower costs.² Therefore, decentralization in public services is likely to create the ground for a more stimulating economic environment that enables investments and increases per-capita income.

Italy is a very interesting lab to study the impact of institutional decentralization on per-capita income. In Italy there are, in fact, fifteen ordinary statute regions, four autonomous regions and two autonomous provinces. On the one hand, citizens in the ordinary statute regions pay most part of their taxes to the central government. The central government then redistributes this raised revenue through transfers at regional, provincial and municipal level. On the other hand, in the autonomous regions and provinces taxes paid by citizens remain almost all inside the territory. The two provinces of Trento and Bolzano withhold most of their tax revenues. In fact, 90% of state personal income tax (PIT) and 90% of state corporate income tax (CIT) remain into the budgets of the two provinces. Most of it is then distributed to municipalities which see these provincial transfers as money of their citizens much more than if they came from the central government. We exploit the geographical proximity of municipalities in the neighbouring ordinary statute regions, which in terms of institutional fiscal autonomy are very different from the provinces of Trento and Bolzano, to test whether higher financial fiscal autonomy is associated with higher per-capita income.

We posit that the large share of PIT and CIT remaining in the provinces of Trento and Bolzano is a powerful incentive for their local governments to invest in public infrastructure and services, which is costly in terms of time and money as local authorities not only have to invest but also to face costs arising from the local externalities and seek consensus with the local population regarding land planning and construction permits. We exploit the fiscal autonomy of the Provinces of Trento and Bolzano to show that when taxes do not go to the central level, per-capita income levels are higher than the economies of nearby municipalities located in the regular regions of Lombardy and Veneto. This is because local authorities have more financial opportunity to take measures in order to promote economic growth (Weingast 1995; Amoroso et al., 2023).

On the methodological side, the existing literature on the impact of fiscal decentralization uses two different approaches. On the one hand, a very widespread branch of literature considers as proxy for fiscal autonomy the ratio of local expenditure on total expenditure or the ratio of local revenue to total revenue (Akai and Sakata, 2002; Desai, Freinkman, and Goldberg, 2005; Lin and Liu, 2000; Burrett, Feld and Schlategger, 2022; Lledó, Gbohoui and Ncuti, 2022). However, it is not always true that higher ratios correspond to higher levels of institutional fiscal autonomy. In fact, the expenditure and revenue ratios can also be high because the corresponding local institution is particularly rich and therefore has high levels of local

¹ Moreover, as in 2022, the general government expenditure in the EU-27 countries faced a sharp spike and increased by 25% compared to 2019. This variation is driven by the healthcare spending due to the COVID-19 pandemic and the energy crisis that started in 2021 and escalated after Russia's invasion of Ukraine.

² Fiscal decentralization is the process of shifting revenue collection and expenditure execution from the central to the local level as local governments.

expenditure and revenue, even in the presence of low levels of institutional fiscal autonomy. On the other hand, there is another branch of literature testing the impact of fiscal autonomy by using exogenous institutional variables (Treisman 2000; Fan, Lin and Treisman, 2009; Li and Luo, 2023; Siedel, 2023). One of the most common proxies is the number of government tiers of a given institution. However, also in this case it is possible that even if an institution is more decentralized than another, this does not necessarily imply a higher share of local expenditure and/or revenue compared to total expenditure and/or revenue than in an institution with less decentralization. The decentralization, in fact, needs also to be implemented.

Our goal is to measure the impact of the institutional fiscal autonomy leading to more financial fiscal autonomy, on the level of per-capita income. To do so, we combine the two approaches described above, by using the exogenous variation deriving from the institutional fiscal autonomy to instrument the level of financial fiscal autonomy given by the ratio of local revenues to total revenues in a fuzzy spatial regression discontinuity design. This eliminates the measurement bias of the financial fiscal autonomy, because it allows us to use the variability of the ratio explained by the institutional fiscal autonomy. At the same time a direct use of the discontinuous institutional variable in a sharp regression discontinuity would end up in a variable that does not sharply separate municipalities with high financial fiscal autonomy from municipalities with low financial fiscal autonomy.

We find that municipalities with higher financial fiscal autonomy have a higher per-capita income. We compare the municipalities close to the border between the autonomous provinces of Trento and Bolzano and the ordinary statute regions of Veneto and Lombardy. In our analysis, we control for per-capita local revenue and the percentage of workers who commute to a municipality other than the one in which they live. More specifically we find that a 10 percentage points in fiscal autonomy increases per-capita income by 3%. To give an idea of the scale of the increase, the annual growth in per capita gross domestic product over the period 2001-2020 was 2% in the member states of the European Union and 1% in Italy (Eurostat, 2023). Hence, our results suggest that a government that collect and spend tax revenues within the local territory will manage its revenue more efficiently than in the case when it receives transfers from the centre.

The paper is organized as follows. Section 2 summarises the literature related to fiscal decentralisation and economic growth presenting current findings on the role fiscal autonomy in stimulating per-capita income. Section 3 describes the institutional background; section 4 describes the data and section 5 discusses the estimation strategy. Section 6 present results and section 7 the robustness checks. Section 8 discusses the results.

2. Related literature

A core assumption of the first generation of theoretical work on fiscal decentralisation and economic growth, formulated by Tiebout (1956), Olson (1969) and Oates (1972) is that public authorities act in the spirit of public interest. According to them, benevolent public authorities of sub-national entities would compete with each other and generate innovative public services, tailored to the preferences of the local citizens, leading to public goods at a lower cost. Brennan and Buchanan (1980) challenged this assumption by arguing that public authorities might act in a rather “Leviathan way”, serving their own interests rather than the public leading to socially and economically suboptimal outcomes. But even under the assumption that agents of the governments act in self-interest, as public choice theory suggests, decentralisation should also

generate economic benefits (Niskanen 1971), as competition between subnational entities should tame the growth of bureaucracies, malfunctioning, and corruption (Weingast 1995; Qian and Weingast 1997). But would decentralization in the end be beneficial for economic growth?

In recent decades, extensive empirical research has mixed results on the impact of fiscal decentralisation on economic growth (for excellent surveys on the evolution of theoretical concepts and empirical research see Martinez-Vazquez, Lago-Peñas, and Sacchi, 2017 and Baskaran, Feld, and Schnellenbach, 2016). Among them Ligthart and van Oudheusden (2017) and Canavire-Bacarreza, Martinez-Vazquez, and Yedgenov (2020) have recently provided with strong evidence, using cross-country data and various instrumental variables that fiscal decentralisation stimulates economic growth. Amoroso et al. (2023) provide evidence that economic benefits from decentralisation and high quality governments include the presence and a flourishing high growth of firms.

A major part of the empirical literature on fiscal decentralization and economic growth consists of cross-country analyses that distinguish between centralised and decentralised countries (Baskaran and Feld, 2013; Enikolopov and Zhuravskaya, 2007; Rodriguez-Pose and Ezcurra, 2010). However, there are substantial economic, historical, administrative, legal and cultural differences across decentralised countries that makes difficult to isolate the effect of fiscal federalism from other determinants of economic performance (Burret, Feld, and Schaltegger, 2022). On the other hand, there are some single-country studies that exploit differences in tax decentralization between states, regions, or cantons. These studies suggest positive effect of fiscal decentralization on regional economic growth, in the United States (Akai and Sakata, 2002), in Switzerland (Burret, Feld, and Schaltegger, 2022), in Spain (Aray and Pedauga, 2022), in Russia (Desai, Freinkman, and Goldberg, 2005), in China (Lin and Liu, 2000), and in Central and Eastern Europe (Rodríguez-Pose and Krøijer, 2009).

All these studies measure financial fiscal decentralization in terms of ratio of local revenues to total revenues or that of local expenditures on total expenditures. However, these ratios can be high because the corresponding local institution is particularly rich and therefore has high levels of local expenditure and revenue, even in presence of low levels of institutional fiscal autonomy. If it were the case, we would have an endogeneity problem due to measurement error. Moreover, using these ratios could also raise endogeneity because of reverse causality when we consider either GDP growth or per-capita income as dependent variables. Another branch of literature tries to solve these econometric problems by using exogenous institutional variables as proxy for financial fiscal autonomy (Treisman, 2000; Fan, Lin and Treisman, 2009; Li and Luo, 2023; Siedel, 2023). However, also in this case it is possible that even if an institution has more formal local fiscal power than another, it does not necessarily have higher financial fiscal autonomy, just because it does not use its power. To sort this out, we use a fuzzy regression discontinuity design (RDD) where we use the institutional fiscal autonomy variable to instrument the financial fiscal autonomy variable and analyse the impact on per-capita income of the fitted financial fiscal autonomy.

3. Institutional background

Italy counts four administrative government layers: the central authority and, at the local level, regions, provinces and municipalities. While most Regions and Provinces are ruled by 'ordinary' statutes, four of them (Aosta Valley, Friuli-Venezia Giulia, Sardinia and Sicily) plus the provinces of Trento and Bolzano are 'autonomous' and ruled by 'special' statutes. Being a

special status region or province means having more power over public functions than ordinary regions, as well as an autonomous financing system. In fact, while the finances of the ordinary regions are regulated in a uniform manner by the Italian Constitution and by corresponding national acts and decrees, the four special regions plus the two autonomous provinces have a different finance system, each regulated by a distinct national act along with the rules given by the respective autonomy statutes. The financing system of the autonomous regions and provinces, during the 1980s, gradually shifted from a derivative finance (direct transfers from the central state's budget linked to the general chapters of its expenditures) to a system based on a fixed percentage and a variable quota - negotiated each year between the state and the autonomous regions/ provinces - of participation in the state's tax revenues (Cerea, 2013). During the 1990s, all the autonomous regions and provinces lost the right to cash in the transfer sums from national funds, as they could benefit from around 90–100% of the tax revenues collected by the state tax offices in their territories (Cerea, 2013).

In particular, the Autonomous Provinces of Trento and Bolzano, cash 90% of all revenues from personal income and corporate taxes that originate on their territories, while the remaining 10% is withheld by the central government. Municipalities finance their expenditure through their own revenues and through transfers from the provinces which are financed by all taxes paid by citizens of the same province. Citizens belonging to municipalities of the provinces of Trento and Bolzano withhold, through local public expenditures in their territory, almost all taxes that they pay. Things differ for municipalities in ordinary statute regions, where a large portion of citizens' taxes can finance municipalities that are poorer and far away from their territory.

The financial autonomy of municipalities of the provinces of Trento and Bolzano arises from revenues generated from municipal taxes and local fees. The provinces contribute to finance municipalities with transfers for the operation and management of services and the development of investments. The system of provincial transfers is guaranteed by the revenue collected on the municipal and provincial territory and so can be thought as money collected at local level. This feature allows us to test whether having more fiscal autonomy, i.e., relying on own taxes and local transfers and not on transfers from the central government, has a positive impact on citizens' income.

4. Data

We exploit a rich dataset at municipal level in Italy, that includes balance sheets and per-capita income, from 2001 to 2020³. We include all municipalities in the provinces of Trento and Bolzano and in the regions of Lombardy and Veneto, excluding those that, during the observed period, were either merged with other municipalities or newly constituted from the merging of existing municipalities⁴. We also exclude from our dataset the nine municipalities in Lombardy and Veneto that passed a referendum to join the province of Trento. We collect data on per-capita income from the personal income tax base available in the tax returns from the Ministry of Economy. We merge municipal-level per-capita income data with a comprehensive dataset at the local level, detailing information on balance sheet of Italian municipalities from the Ministry of Interior. More in depth, we have access to information on

³ Both the balance sheets and income are deflated using the consumer price index.

⁴ We drop a total of 55 municipalities either because they were merged or because they were merged in a newly constituted one. We pass from the initial dataset of 2351 municipalities to 2296 municipalities, thus dropping the 2% of our sample.

all type of revenues (own taxes, fees and transfers) of the municipalities⁵. We also use as control variables population data retrieved from the *Atlante statistico dei comuni* from ISTAT and the altitude above sea-level collected from 2001 Census by ISTAT as municipalities as the municipalities around the area under consideration are mountainous. Finally, we include the percentage of commuter workers from the 2011 Census conducted by ISTAT. We do this because commuters living near the border in the ordinary statute regions could move their residence to take advantage of some tax benefits in the autonomous provinces (e.g., most municipalities in the autonomous provinces do not apply the surtax on personal income tax).

Our main variable of interest is the financial fiscal autonomy which is constructed as the ratio between municipal own revenue to municipal total revenue following Lledó, Gbohoui and Ncuti (2022). This index is calculated annually in each municipality. The financial fiscal autonomy ranges from 0 to 1.

The numerator, namely the municipal own revenues, includes municipal tax revenues and, only for municipalities in the provinces of Trento and Bolzano, local transfers. As municipal tax revenue, we include the municipal tax on rented, second housing and firm's properties (ICI/IMU), the surtax on the personal income tax (IRPEF surtax), the tourist tax, and building permits⁶. These types of revenue apply to all municipalities in Italy, regardless of whether they are in ordinary statute regions or autonomous regions or provinces. For the provinces of Trento and Bolzano we add local transfers from the provinces because these transfers are financed through taxes generated within the same municipalities. Mayors who manage local transfers allocated by the province, know that these are resources coming from their own territory as taxes paid by their own citizens and so they reasonably pay particular attention in managing them. The denominator is made up of what is contained in the numerator tax revenues, total (central regional and provincial) transfers, and extra tax revenues.

$$\text{Fiscal autonomy} = \frac{\text{Tax revenues} + \text{provincial transfers (only for Trento and Bolzano)}}{\text{Tax revenues} + \text{Total transfers} + \text{Extra tax rev.}}$$

Since we implement a spatial RDD, we also use the distance from the border. First, we use Google Earth to identify the municipalities located on the border between the province of Trento and Bolzano and the regions of Lombardy and Veneto. According to Jofre-Monseny (2014) the distance between the province of Trento and Bolzano and Lombardy and Veneto is computed as the air distance between the centre of a given municipality and the nearest centre of a municipality on the other side of the border. Data on distance are retrieved from the proximity matrices made available from ISTAT.^{7 8}

5. Estimation Strategy

We estimate the impact of fiscal autonomy on per-capita income. Financial fiscal autonomy could suffer from reverse causality: municipalities could have high level of fiscal autonomy due to their high level of per-capita income and vice-versa. Moreover, high financial fiscal autonomy could not always be due to high institutional fiscal autonomy, but it may simply be

⁵ The revenues data are accrual data, as reported in the municipal balance sheet (Ministero dell'Interno, Finanza Locale).

⁶ The government decree no.93/2008 abolished the property tax on main residence and introduced a vertical transfer to cover the loss in tax yields (Ferraresi et al., 2019).

⁷ For an example on how distances are computed, see Figure A.1 in Appendix.

⁸ For descriptive statistics, see Table A.1 in Appendix.

the case that the considered local government is wealthy and therefore has a substantial amount of local revenue: this would give rise to measurement error. In both these cases our estimates would be affected by endogeneity bias. One solution could be to use exogenous institutional features differentiating municipalities in autonomous provinces from municipalities in non-autonomous regions. This could be the case of municipalities belonging to the provinces of Trento and Bolzano and those belonging to Lombardy and Veneto. Using an RDD we could compare municipalities' per-capita income near the border, as they are characterized by similar territorial and socio-economic characteristics. However, even in this case, we would not be able to sharply separate municipalities with high financial fiscal autonomy from municipalities with low financial fiscal autonomy as there is no sharp discontinuity in this continuous variable. In fact, it is possible to find municipalities in Veneto and Lombardy with higher levels of financial fiscal autonomy than in the provinces of Trento and Bolzano⁹. This is because, in some cases, the financial fiscal autonomy index is high even though the institutional fiscal autonomy is low. A solution to this puzzle, is to use a fuzzy RDD, where we instrument the financial fiscal autonomy with the institutional fiscal autonomy variable and therefore estimate the impact of financial fiscal autonomy explained by the exogenous institutional fiscal autonomy.

Namely, we instrument the financial fiscal autonomy with a dummy variable equal to one for municipalities in the provinces of Trento and Bolzano, and zero otherwise. Therefore, we can identify those municipalities that have a higher fiscal autonomy because they belong to an autonomous province while excluding those municipalities that belong to an ordinary region and whose high level of financial fiscal autonomy is due to factors different from institutional fiscal autonomy. More precisely, by using municipalities close to the border, we compare to municipalities of the province of Trento and Bolzano to those that, even not in an autonomous province, are very similar. The dummy variable, thus, accounts for an exogenous variation in the institutional fiscal autonomy and it has an impact on the per-capita income via the quota of total revenues coming from local revenue.

Under the assumption that all characteristics other than being in an autonomous province are continuous at the border, we estimate the local average treatment effect (LATE) by using a fuzzy discontinuity design. In fact, there might be some municipalities close to the border that, despite belonging to the provinces of Trento and Bolzano, have a fiscal autonomy lower than that observed for other municipalities close to the border but belonging to either Lombardy or Veneto. Put it differently, the probability of treatment is discontinuous at the cut-off, but not to the degree of a definitive 0 to 1 jump (Lee and Lemieux, 2010). We have causal identification because we compare municipalities in the autonomous province of Trento and Bolzano, that have a higher level of financial fiscal autonomy because of the special statute of the province, to municipalities in the neighbouring regions of Veneto and Lombardy, that are in regions with ordinary statutes (Figure 1).¹⁰

⁹ In fact, as shown in Figure A.2 in Appendix, the average fiscal autonomy is sometimes higher for some municipalities in the ordinary-statute regions compared to the fiscal autonomy in the autonomous provinces of Trento and Bolzano.

¹⁰ We use the municipalities of the autonomous provinces of Trento and Bolzano as the treated municipalities because: I) Sicily and Sardinia regions are islands and we are not able to identify municipalities at the border; II)

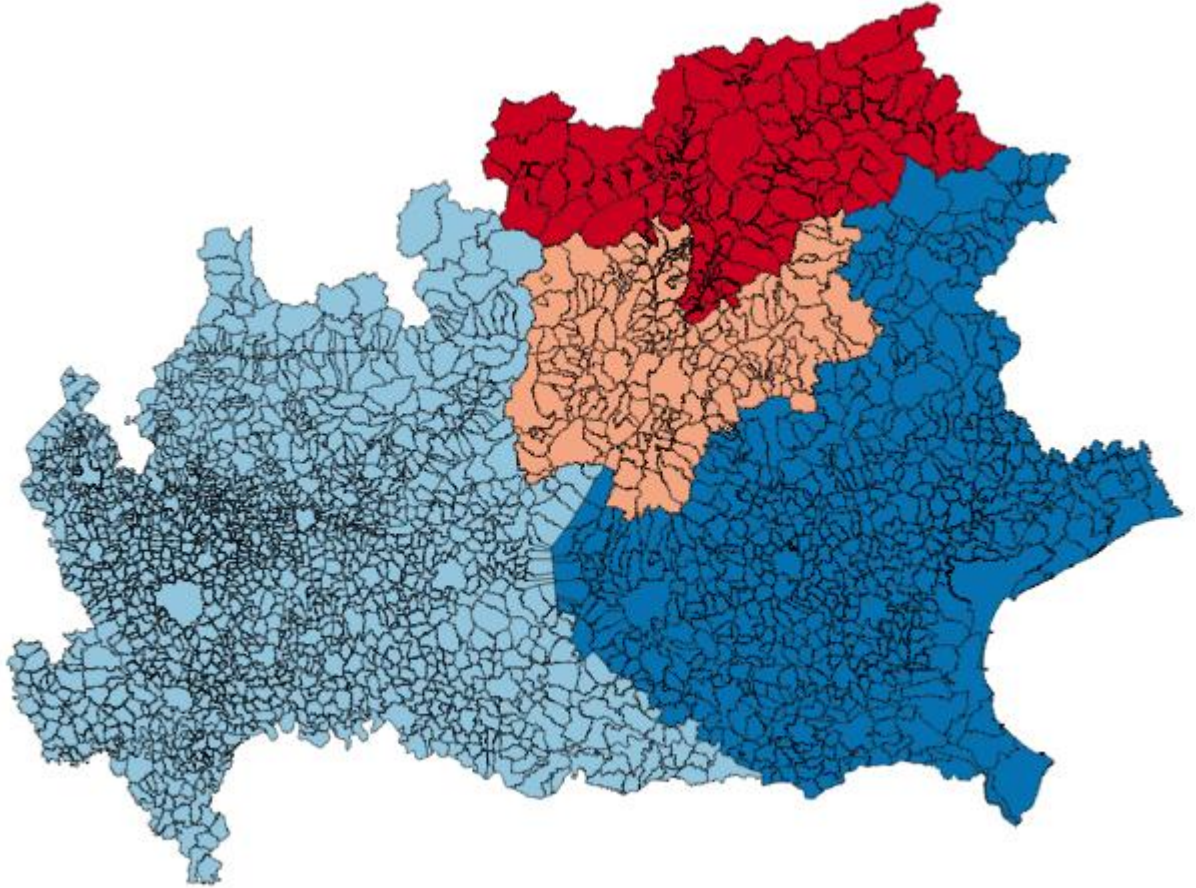


Figure 1. Map of the two regions and the two autonomous provinces: A.P. Bolzano (red), AP. Trento (light red), Veneto region (blue) and Lombardy region (light blue).

The identifying assumption behind the discontinuity design is that absent the financial fiscal autonomy of the provinces of Trento and Bolzano, per-capita income would change smoothly at the border. Therefore, we assume that municipalities at the border in the neighbouring regions work as a counterfactual for those in Trento and Bolzano. Following the models used by Imbens and Lemieux (2008) and Gelman and Imbens (2019), our specification uses local linear regression within a given bandwidth of the treatment threshold, and controls for the running variable, distance from the border, on either side of the threshold. We estimate the following model:

First stage:

$$Autonomy_{m,y} = \gamma_0 + \gamma_1 D_m + \gamma_2 Distance_m + \gamma_3 D_m \cdot Distance_m + \eta X_{m,y} + \mu_y + u_{m,y}$$

Second stage:

$$Income_{m,y} = \beta_0 + \beta_1 \widehat{Autonomy}_{m,y} + \beta_2 Distance_m + \beta_3 D_m \cdot Distance_m + \theta X_{m,y} + \alpha_y + \varepsilon_{m,y}$$

In the second stage $Income_{m,y}$, the income per capita, is the outcome of interest in year y in

Valle d'Aosta has too few municipalities and an overall small population; III) Friuli-Venezia Giulia has only one neighbouring Italian region therefore results would be less reliable.

municipality m , while in both the first and second form $D_{m,y}$ is a dummy variable that is equal to one when the municipality is in the treated province, $Distance_{m,y}$ is the distance in kilometres of each municipality from the border between the province and the region and vice-versa, $X_{m,y}$ is the vector of municipal controls and μ_y and α_y are year fixed effects. Municipal controls include total revenue, population, altitude above sea-level and commuter workers. The variable $Autonomy_{m,y}$ in the first stage is the financial fiscal autonomy indicator which is computed each year in each municipality, and it expresses the quota of total revenue coming from local taxes and provincial transfers (only in the case of the province of Bolzano and Trento). Values close or equal to one indicate high financial fiscal autonomy¹¹.

One of the key-identifying assumptions of the RDD design is that estimates can be causally interpreted when there is no manipulation at the threshold. The classical density test (McCrary, 2008) to establish that density of municipalities is continuous at the threshold is not reliable in a spatial discontinuity design case. However, we use three additional tests to support that there is no manipulation at the threshold. Firstly, we test for observable characteristics at the threshold, and we verify that there is no discontinuity. This test suggests that the considered municipalities are similar in observable characteristics and the only differences we estimate arise from being part of the autonomous provinces of Bolzano and Trento. Secondly, we run a placebo test using Lombardy as the treated autonomous region and Veneto as the control region. We perform this test and show that belonging to Lombardy does not correspond to higher financial fiscal autonomy. Thirdly, we repeat the fuzzy regression discontinuity estimation using municipalities on the border between the autonomous provinces of Trento and Bolzano, to verify that municipalities of the autonomous provinces do not have different levels of financial fiscal autonomy. Tests for the absence of discontinuity at the threshold are furtherly discussed in Section 7. Moreover, being part of a given region or province is difficult to manipulate. In Italy, while municipalities have the possibility to change region, the procedure is long and complex, it requires a referendum, followed by the approval of both the regions and the enactment of a law. The procedure is rarely put in place: between 2005 and 2014 there were 18 referenda of municipalities that from Veneto and Lombardy regions asked to move to the provinces of Bolzano and Trento. In 9 out of 18 municipalities the referendum passed, however, because of the long procedure, none of these municipalities has switched region, yet. We remove from our dataset the 9 municipalities where the referendum passed, as they are likely to be influenced by the ongoing procedure.

6. Results

Our estimate displays a two-stage process. In the first stage we estimate the impact of the institutional fiscal autonomy on the financial fiscal autonomy through an RDD approach, and in the second stage we use the fitted values of the first stage to estimate the impact of the financial fiscal autonomy on per-capita income. In particular, in the first stage we use the dummy splitting municipalities in autonomous provinces and municipalities in ordinary regions by applying the optimal bandwidth in two different specifications: first, we narrow down the sample without including the running variable (the distance from the border) as in

¹¹ For further information on the index composition, refer to section 4. *Data*.

Jofre-Monseny (2014) and second, by using the same sample, we control for the distance from the border as in a conventional regression discontinuity approach.¹²

Firstly, we show the first stage of our chosen specifications, and we observe that the treated variable used as instrument (i.e., 1 if a municipality belongs the province of Trento and Bolzano and 0 otherwise), is significant at 1 percent level. This holds for the specification without (Column 1 of Table 1) and with the running variable (Column 2 of Table 1).

Table 1 – First stage: effect of being in an autonomous region (treated) on financial fiscal autonomy.

DV: Financial fiscal autonomy	(1)	(2)
	W/O Run. Var.	W/ Run. Var.
Treated	0.247*** (0.009)	0.265*** (0.049)
DV mean	0.514	0.514
Observations	4,042	4,042
F-statistics/Wald	326	271
BW	41km	41km
Year FE	yes	yes

Note: Errors are clustered at country level. *** p<0.01, ** p<0.05, * p<0.1.

We then run a simple ordinary least square where we find that the financial fiscal autonomy is significant in determining the level of per-capita income (Column 1 of Table 2): 10-percentage points increase in the financial fiscal autonomy is associated with an increase in per capita income of 194 which corresponds to 1.4 percent. Moreover, when we run the two-stage least-squares estimates, the positive impact on per capita income of the financial fiscal autonomy is confirmed. If we assume a 10 percentage points increase in financial fiscal autonomy, in the specification where the running variable is not included as control (Column 2, Table 2), we observe 290 euros increase (2.1%) while in the linear (Column 3, Table 2) specification that include the running variable as control the observed increase in income is equal to 686 (5%)¹³.

A correct objection to these results is that municipalities in the provinces of Trento and Bolzano receive, on average, higher revenues than those in ordinary statute regions because they do not participate in the national equalization system. For this reason, we also control for total revenue. Despite so, we still get an important effect due to financial fiscal autonomy which is therefore depurated by the possible impact since municipalities in the provinces of Trento and Bolzano receive, on average, much more public money than municipalities in ordinary statute regions. Nonetheless, we further investigate whether the observed results hold when we compare municipalities that are similar in terms of per-capita total revenues. We run the fuzzy RDD as in Column 3 of Table 2 weighting all observations with the score

¹² The optimal bandwidth is calculated with the selector proposed by to Calonico, Cattaneo, and Titiunik (2014).

¹³ The results do not change when we transform the dependent variable into the logarithmic form (Table A.2). The coefficient of interest indicates an increase in fiscal autonomy of 10 percentage points corresponds to an increase in per-capita income equal to 2.3% in the OLS specification. In the 2sls without the running variable we observe that a 10 percentage points increase corresponds to a positive variation in income by 2.2%, while in the 2sls where the running variable is included as control, we observe an increase equal to 4.4% of the dependent variable (all the coefficients are statistically significant at 1% level).

obtained with the propensity score matching (Table A.3) where we include, among the variables used for the matching, per-capita revenues, altitude and population. We use the nearest neighbour method where treatment and control units are first randomly sorted and then the treatment unit is selected to find its closest neighbour control. The results from the fuzzy RDD combined with the propensity score matching confirm our findings from the main analysis.

Table 2 – Impact of fiscal autonomy on per-capita income, main specification.

	(1) OLS Income	(2) 2SLS Income W/O Run. Var.	(3) 2SLS Income W/ Run. Var.
Fiscal autonomy	1,938.302*** (495.402)	2,895.175*** (848.529)	6,863.170*** (2,558.925)
Distance			-17.734 (10.815)
Total revenues	874.520*** (218.025)	836.138*** (216.460)	963.147*** (253.846)
Population	0.051*** (0.016)	0.048*** (0.016)	0.042*** (0.014)
Altitude	-0.582* (0.322)	-0.605* (0.314)	-0.497 (0.325)
Commuter workers	179.477 (923.331)	-14.700 (933.396)	446.838 (1,033.974)
DV mean	13,845	13,845	13,845
Observations	4,042	4,042	4,042
R-squared	0.271	0.264	0.155
Bandwidth	41km	41km	41km
Year FE	yes	yes	yes

Note: Errors are clustered at municipal level. *** p<0.01, ** p<0.05, * p<0.1. Total revenues is the sum of tax revenues, current transfers from local government, current transfers from central government and extra-tax revenues.

7. Robustness checks

We present a range of robustness checks on the primary results. We explore the manipulation at the threshold, a different time span, an alternative dependent variable, the placebo test between Lombardy and Veneto, the placebo test between Trento and Bolzano and the robustness of the institutional fiscal autonomy result at varying bandwidths.

7.1 Manipulation at the threshold

We show that there are no discontinuities in the observable characteristics at the threshold (Figure 2). To show the absence of discontinuities, we plot the control variables around the exogenous threshold between Trento and Bolzano and Lombardy and Veneto. The observed absence of discontinuities at the threshold in the observable characteristics guarantees that the municipalities are very similar and that the effect we capture with our regression discontinuity is due to the exogenous variation of being part of autonomous provinces and not to other confounding factors. In particular, we observe population, altitude, total revenue and commuter workers that correspond to the control variables included in our first stage estimate and we do not see any discontinuity in any of them. Another confounding factor determining

the discontinuity in per capita income could be a different level of human capital between municipalities belonging to Trento and Bolzano and those belonging to Veneto and Lombardy. The available indicator that can proxy the level of human capital is given the Invalsi test which however available at provincial and regional level. The Invalsi test is developed by the National Institute for the evaluation of the education and training system, under the control of the Ministry of Education. Its purpose is to provide a statistical reference framework for measuring the degree of learning of Italian students, through the most objective assessments possible, which allows comparisons to be made among schools. Using the results of this test we can additionally stress out that characteristics between Lombardy and Veneto and the provinces of Trento and Bolzano (Trentino- Alto Adige) are very similar. In fact, on average, pupils perform similarly in the Invalsi test (Table 3). The t-tests between the observed means confirm that results on learning skills in the Invalsi tests do not differ between treated and control groups, thus suggesting similar levels of human capital.

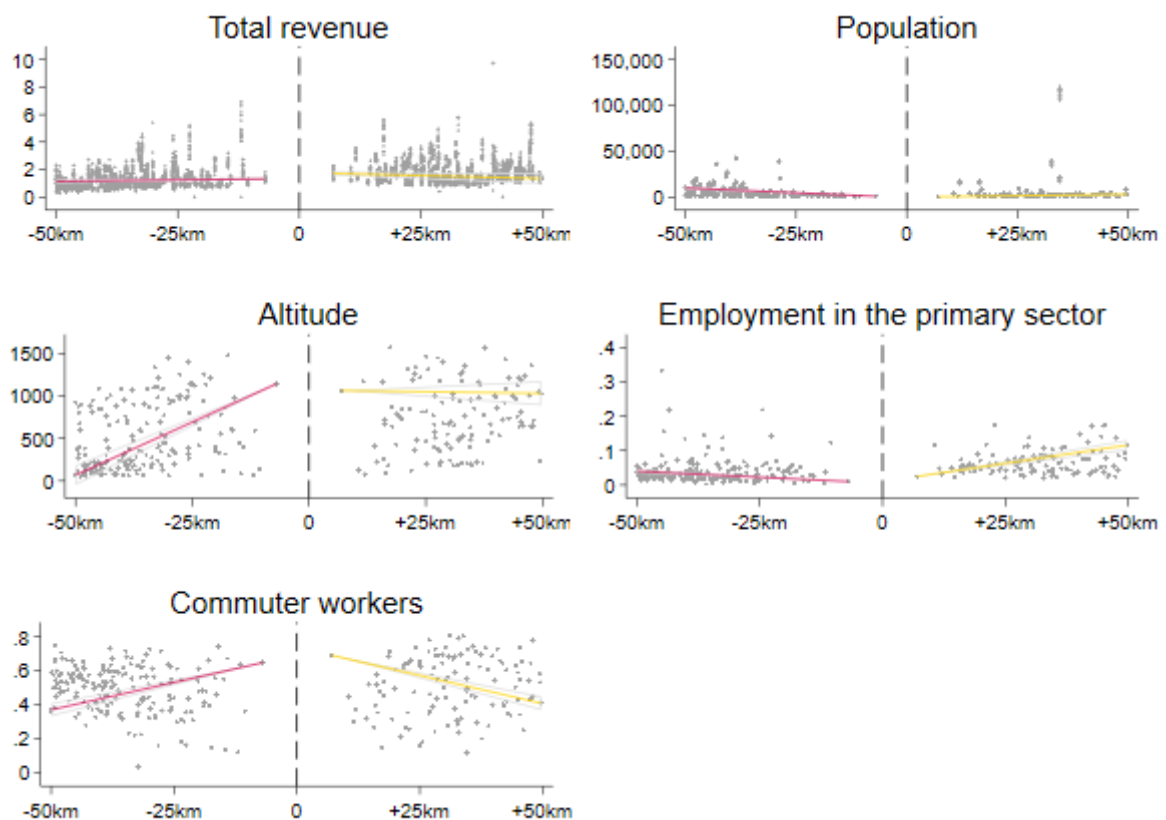


Figure 2. Regression discontinuity on observable characteristics at the threshold: total revenue, population, altitude, employment and commuter workers.

Table 3. – T-test for Invalsi results between Veneto, Lombardy, Trentino-Alto Adige and between the provinces of Trento and Bolzano.

Trentino-Alto Adige vs Lombardy/Veneto	Test for equal variance Trentino-Alto Adige		Test for unequal variances Trentino-Alto Adige	
	Italian	Mathematics	Italian	Mathematics
Lombardy/Veneto	1.04 (15.07)	1.88 (16.63)	1.06 (15.07)	1.89 (16.63)

7.2 Different time span

The main analysis includes data from 2001 to 2020 and adds year fixed effects to control for common shocks over the years. However, a change in the constitutional law took place in 2012. The modified article (119) was previously amended in 2001, when regions, provinces and municipalities were granted a certain fiscal autonomy in terms of revenues and expenditures.

From 2012, when the European Union agreed on the Stability and Growth Pact, the article was amended to implement this innovation. In the new framework, regions, provinces and municipalities were called to contribute to the national budget balance and to comply with the economic and financial constraints of the European Union. Because of this change, the main analysis is repeated using a shorter time span, from 2012 to 2020 (Table 4).

Results from the ordinary least square show that, also in this smaller time span, financial fiscal autonomy is significant in determining the level of per-capita: a 10-percentage points increase in the financial fiscal autonomy is associated with an increase in per capita income of 189 which corresponds. When we run the two-stage least-squares estimates, a 10 percentage points increase in financial fiscal autonomy is associated with an increase of 338 increase when the running variable is not included which rise to 727 euros when the running variable is included as control.

Table 4 – Impact of fiscal autonomy on per-capita income, 2012-2020.

First stage DV: Fin. fiscal autonomy	(1) OLS	(2) 2SLS W/O Run. Var.	(3) 2SLS W/ Run. var
Treated		0.192*** (0.014)	0.230*** (0.043)
DV mean		0.521	0.521
F-statistics/Wald		201.5	81.88
DV: Income			
Fiscal Autonomy	1,891.197*** (524.700)	3,384.919*** (1,165.005)	7,268.180** (3,444.233)
Distance			-11.877 (10.005)
Total revenues	928.673*** (232.339)	918.210*** (226.910)	1,058.230*** (275.406)
Population	0.045** (0.018)	0.040** (0.017)	0.033** (0.015)
Altitude	-0.149 (0.353)	-0.231 (0.351)	-0.161 (0.360)
Commuter workers	-224.559 (996.647)	-411.001 (1,008.635)	43.473 (1,135.268)
DV mean	14,115	14,115	14,115
R-squared	0.262	0.250	0.132
Bandwidth	46km	46km	46km
Year FE	yes	yes	yes
Observations	2,065	2,065	2,065

7.3 Alternative dependent variable

We replicate the same analysis using the employment rate instead of income per capita. The employment rate, taken from the ISTAT database, is defined as the ratio of employed people to the total population available for work. The employment rate is one of the most common and useful ways (Ehrenberg, 2012) of assessing the health of a labour market: economic growth is claimed to have positive effects on employment rate, especially in developed countries (Azad et al., 2023). As in the main analysis, we firstly run a simple ordinary least square where we find that the financial fiscal autonomy is significant in determining the employment rate (Column 1 of Table 5): 10-percentage point increase in the financial fiscal autonomy increases the employment rate by 1%. When we run the two-stage least-squares estimates, the positive impact on the employment rate of the financial fiscal autonomy is confirmed. If we assume a 10 percentage points increase in financial fiscal autonomy, in the specification where the running variable is not included as control (Column 2, Table 5), we observe a 1.8% increase; while in the linear (Column 3, Table 5) specification that include the running variable as control the observed increase in employment rates is equal to 2%.

Table 5 – Impact of fiscal autonomy on employment rate.

	(1) OLS Employment rate	(2) 2SLS Employment rate W/O Run. Var.	(3) 2SLS Employment rate W/ Run. Var.
Fiscal autonomy	0.104*** (0.019)	0.180*** (0.030)	0.202*** (0.076)
Distance			-0.000 (0.000)
Total revenues	0.005 (0.005)	0.003 (0.005)	0.003 (0.006)
Population	-0.000 (0.000)	-0.000** (0.000)	-0.000** (0.000)
Altitude	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)
Commuter workers	-0.024 (0.024)	-0.041 (0.025)	-0.041 (0.027)
DV mean	13,792	13,792	13,792
Observations	2,937	2,937	2,937
R-squared	0.168	0.088	0.038
Bandwidth	34km	34km	34km
Year FE	yes	yes	yes

Note: Errors are clustered at municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Total revenues is the sum of tax revenues, current transfers from local government, current transfers from central government and extra-tax revenues.

7.4 Placebo test between Lombardy and Veneto

We run a placebo test to show that the effect that we find is due to the fact that treated municipalities belong the provinces autonomous, and not just in a region from different the one of the control municipalities. To do so, we treat municipalities in Lombardy as if they were in the treated group, and we use Veneto municipalities as the control group. Results show that there is no effect (Table 6). With this test we show that the LATE effect is not due to the

municipality being in another non-autonomous region, but it is the causal effect of being in an autonomous province. In the first stage we do not find any statistically significant effect contrasting municipalities belonging to Lombardy (treated municipalities) to those of Veneto (control municipalities). This reinforces the idea that municipalities belonging to ordinary regions that we include in our analysis have similar institutional fiscal autonomy and so their derived financial fiscal autonomy does not impact differently on their per capita income.

Table 6 – First stage: placebo test, Lombardy as treated region and Veneto as control region.

	(1)	(2)
	2SLS	2SLS
	W/O	W/
	Run. Var.	Run. Var
First stage		
DV: Financial fiscal autonomy		
Treated	-0.011 (0.011)	0.030 (0.027)
DV mean	0.428	0.428
F-statistics/Wald	0.87	81.27
Observations	3,701	3,701
Bandwidth	41km	41km

Note: Errors are clustered at municipal level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All the specifications also include distance, total revenues, population and altitude as in the main specification.

7.5 Placebo test between Trento and Bolzano

The placebo test between municipalities lying in the border between Trento and Bolzano shows that there is no significant different impact both in the first stage on financial fiscal autonomy when municipalities belonging to Bolzano are used as treated and those belonging to Trento as control and in the second stage estimating the impact of financial fiscal autonomy on per capita income (Table 7). This result is driven by the fact that both municipalities belong to provinces with institutional fiscal autonomy.

Table 7 – First stage: placebo test, Bolzano as treated region and Trento as control region.

First stage	
DV: Financial fiscal Autonomy	
Treated	-0.033 (0.028)
DV mean	0.634
F-statistics	0.25
Observations	817
Bandwidth	Only municipalities on the border

Note: Errors are clustered at country level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

7.6 Varying bandwidths

We show that our results hold for different bandwidths, and we find statistically significant coefficients for all the regressions run at 5 kilometres intervals between 31 and 51 kilometres (Figure 3). We additionally run the bandwidth sensitivity test using the specification that includes the running variable and we also find statistically significant effects for the whole considered bandwidth, between 31 and 51 kilometres (Figure A.3).

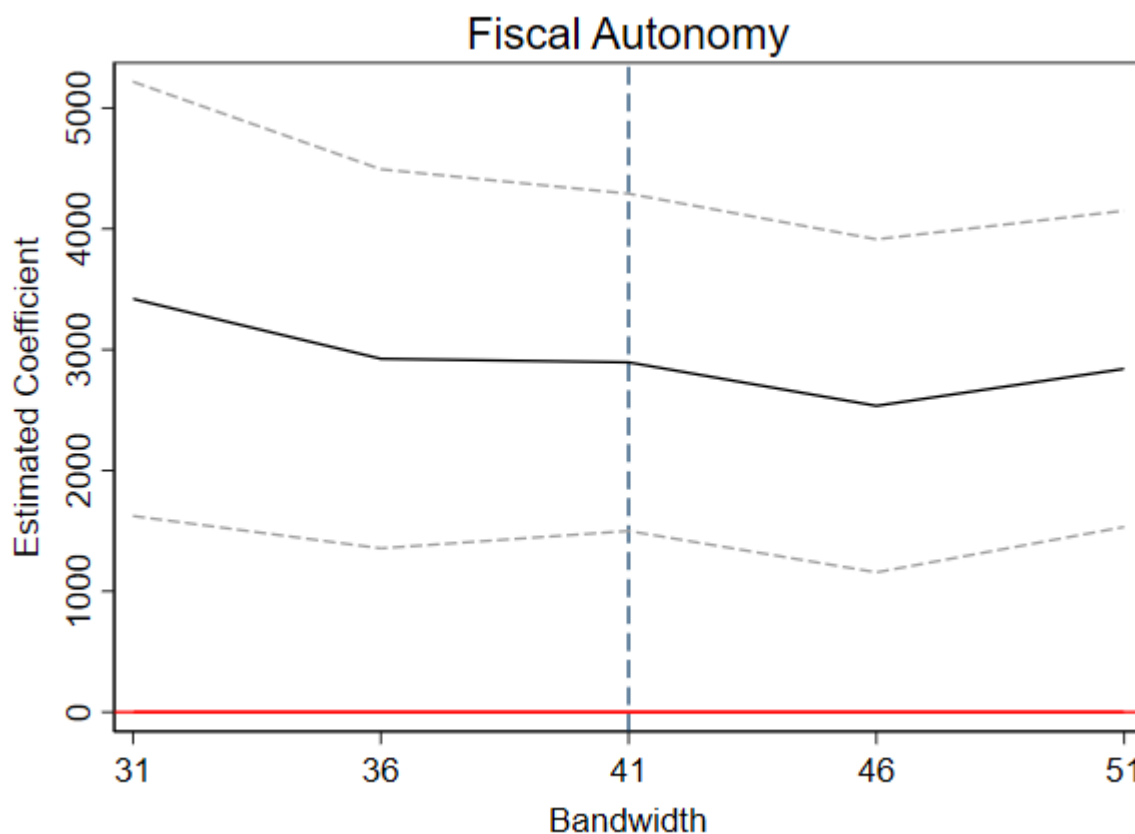


Figure 3. Sensitivity of coefficient of interest (Financial Fiscal Autonomy) to varying bandwidth. The figure reports fuzzy regression discontinuity estimates and 90 percent confidence intervals obtained from estimating the regression as in Column (2) of Table 2 where the running variable and its interactions are excluded (w/o running variable and its interaction). The regressions are run at 5 kilometres intervals over a range of bandwidths varying between 40 and 60 kilometres.

8 Conclusions

The existing literature has extensively analysed the impact of fiscal autonomy on income and/or GDP growth (Aray, 2022; Baskaran et al, 2016; Canavire-Bacarreza, 2020; Burret, 2022; Ligthart, 2017; Rodríguez-Pose, 2009). However, it either relies on exogenous variation institutional designs or on some balance sheets ratios indicating the share of own revenues/expenditure on total revenues/expenditure. The first case does not necessarily capture actual financial fiscal autonomy, because there are cases where institutional fiscal autonomy holds and governments do not use it properly by increasing their autonomous revenue. On the other side there are states or regions registering very high levels of local revenue with respect to the total revenue raised in their territory, however, the high share of own revenues can be driven by large local tax bases (due to their territory being rich) and not by a high institutional fiscal autonomy. In both these cases we incur in measurement errors. Moreover, in the case of the balance sheet ratios there can also be the threat of reverse causality since rich regions can call for and obtain more financial fiscal autonomy. All these critical issues result in endogeneity biases.

We sort out these problems by estimating the impact of financial fiscal autonomy on the level of per capita income by merging the two described approaches to identify the financial fiscal

autonomy because of the institutional fiscal autonomy. To do so, we apply a spatial fuzzy regression discontinuity design where we instrument the financial fiscal autonomy with the exogenous feature of the municipalities belonging to the provinces of Trento and Bolzano, which essentially makes them autonomous in the management of the total taxes paid by their citizens. We find that municipalities with higher financial fiscal autonomy have a higher per-capita income. We show that this result holds controlling for the per-capita local revenue. More specifically, we find that a 10 percentage points increase in fiscal autonomy increases, on average, per-capita income by about 3%.

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Appendix

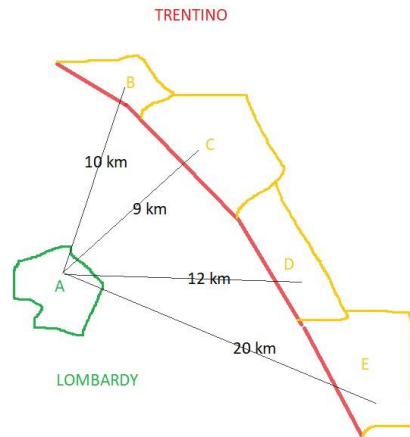


Figure A.1. Example of how the distance from a random municipality (A) in Lombardy is computed. Firstly, distances between the centre of municipality A and the centres of all the municipalities on the border in Trentino-Alto Adige is computed. The centre of the municipality is calculated as the centroid of the census section of the municipality in which the Municipality is contained. Namely the distance between A and B is 10 km, the distance between A and C is 9 km, the distance between A and D is 12 km and the distance between A and E is 20 km. Secondly, the minimum distance between municipality A and one of the municipalities on the border is selected, in this specific case the minimum distance is the one between A and C. The selected distance identifies the distance between the given municipality and the other region/province.

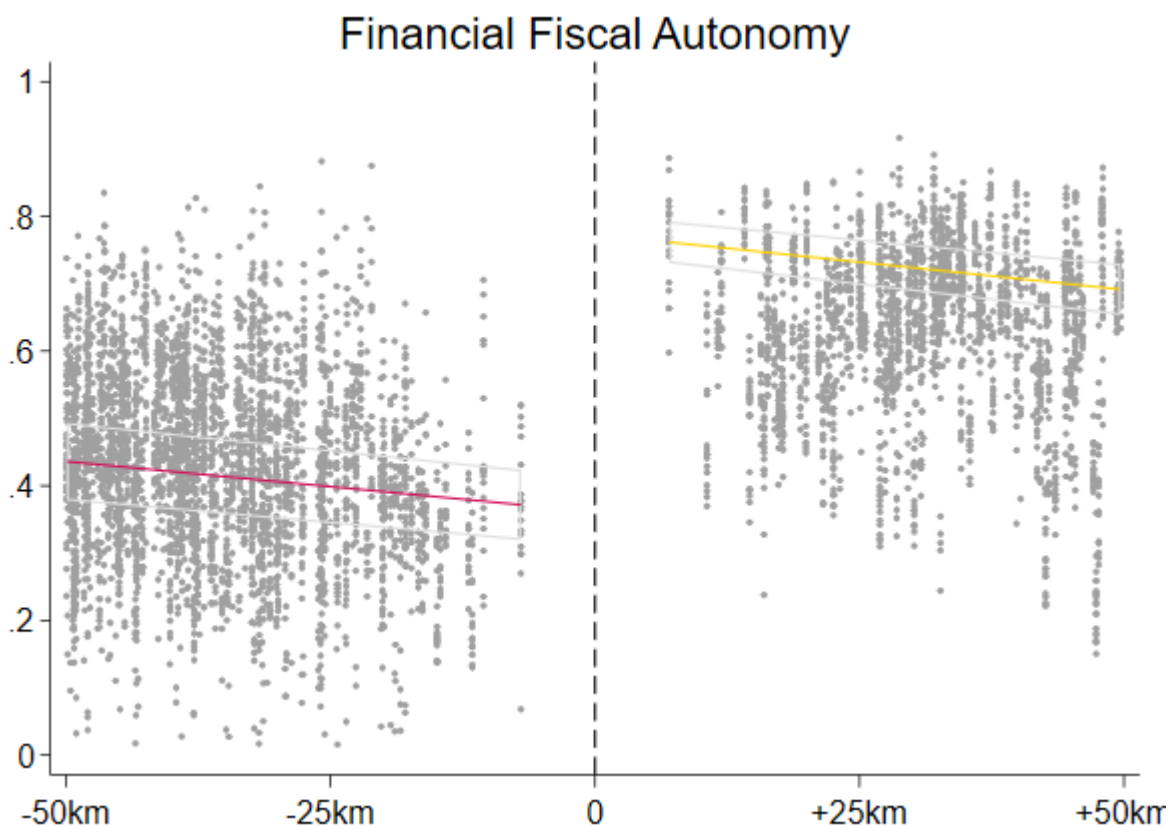


Figure A.2. Financial Fiscal Autonomy on the two sides of the threshold. Municipalities are observed between 2001 and 2020.

Table A.1. Descriptive statistics, municipal level data, 2001 – 2020. Means are calculated using the 41km threshold. Values on income and total revenues are expressed in euros. Altitude is expressed in meters. Commuter workers is the percentage of workers who commute to a municipality other than the one in which they live.

Variable	Mean	Standard deviation
Per-capita income	13,845	(1,960)
Financial fiscal autonomy	0.514	(0.172)
Total revenues	1,416,187	(798,511)
Population	4,215	(9,564)
Altitude	627	(397)
Commuter workers	0.490	(0.162)
Employment rate	0.512	(0.044)
Observations	4,042	

Table A.2. – Impact of fiscal autonomy on per-capita income. Dependent variable in logarithmic form.

	(1) OLS Log Income	(1) 2SLS Log Income	(2) 2SLS Log Income
		W/O Run. Var.	W/ Run. Var.
Fiscal autonomy	0.122*** (0.041)	0.220*** (0.072)	0.435** (0.202)
Distance			-0.001 (0.001)
Total revenues	0.068*** (0.016)	0.064*** (0.016)	0.072*** (0.019)
Population	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Altitude	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Commuter workers	0.121 (0.080)	0.097 (0.082)	0.115 (0.088)
DV mean	9.522	9.522	9.522
Observations	2,787	2,787	2,787
R-squared	0.285	0.271	0.177
Bandwidth	34km	34km	34km
Year FE	yes	yes	yes

Note: Errors are clustered at municipal level. *** p<0.01, ** p<0.05, * p<0.1. Total revenues is the sum of tax revenues, current transfers from local government, current transfers from central government and extra-tax revenues.

Table A.3. First stage and impact of financial fiscal autonomy on per-capita income, propensity score matching weights with one nearest neighbour.

First stage	(1)
DV: Financial fiscal Autonomy	
Treated	0.241*** (0.060)
DV mean	0.507
F-statistics/Wald	192.74
2 SLS	
DV: Income	
Fiscal Autonomy	8,443.6** (3,081.4)
Distance	-15.1 (10.7)
Total revenues	1,088.9*** (316.8)
Population	0.027* (0.012)
Altitude	-0.692* (0.387)
Commuter workers	-1,145.7 (1,039.4)
DV mean	13,827.4
R-squared	0.155
Bandwidth	41km
Year FE	yes
Observations	3,822

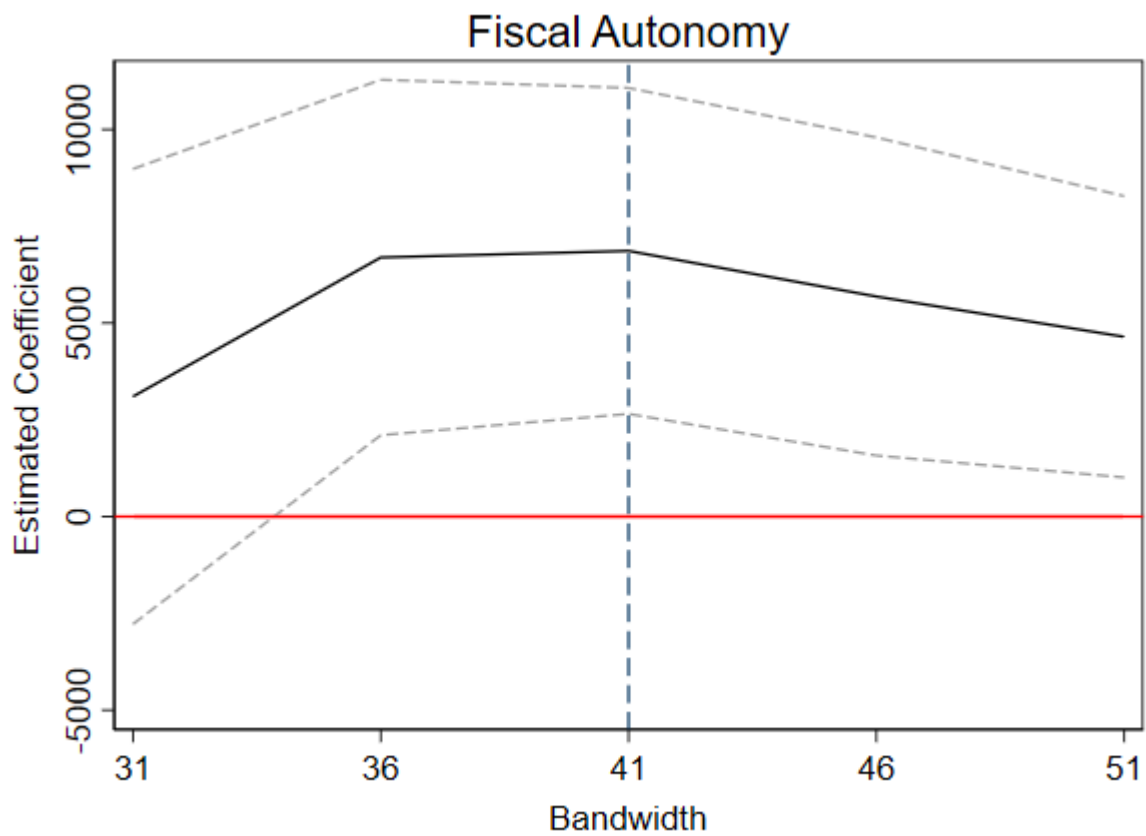


Figure A.3. Sensitivity of coefficient of interest (Financial fiscal Autonomy) to varying bandwidth. The figure reports fuzzy regression discontinuity estimates and 90 percent confidence intervals obtained from estimating the regression as in Column (3) of Table 2 on a range of bandwidths varying between 40 and 60 kilometres.