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Does fiscal autonomy increase local income? Evidence from Italy☆

Massimiliano Ferraresi [a], Benedikt Herrmann [b], Luisa Loiacono [c,d,*], Leonzio Rizzo [c,e], Riccardo Secomandi [c,e]

[a] Regione Emilia-Romagna, Directorate-General for Knowledge, Research, Labour and Enterprises, Monitoring, Evaluation and Control Unit, Italy
[b] European Commission, Joint Research Centre, Ispra, Italy
[c] Department of Economics and Management, University of Ferrara, Italy
[d] London School of Economics Visiting Fellow, London, United Kingdom
[e] Barcelona Institute of Economics, Spain

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ABSTRACT

Can fiscal autonomy affect per capita income levels? We empirically investigate the impact of fiscal autonomy on per capita income through the proper use of local financial resources. Exploiting a natural experiment in Italy, we compare municipalities in the Autonomous Provinces of Trento and Bolzano, which retain and manage almost all their tax revenues, with neighbouring municipalities in Lombardy and Veneto, where only a small fraction of revenues is autonomously managed. Using a spatial fuzzy regression discontinuity design, we estimate the effect of financial fiscal autonomy on per capita income. We address the potential endogeneity of financial fiscal autonomy with a dummy variable identifying municipalities that manage almost all their tax revenues. Our findings show that higher levels of local financial fiscal autonomy increase per capita income: a one percentage point rise in the financial fiscal autonomy raises per capita income by 0.2–0.7%. This effect is largely driven by higher municipal-level administrative quality in municipalities with stronger fiscal autonomy. The results highlight that granting fiscal autonomy can enhance local economic performance.

1. Introduction

The role of fiscal decentralisation in shaping Gross Domestic Product (GDP) is particularly relevant in the European context, where each country operates under the external fiscal constraints imposed by the European Stability Pact. Member states are required to finance increasing expenditures in strategic sectors such as defence, pensions, and health care, while simultaneously complying with stringent European rules (Carnazza et al, 2023). In this setting, fostering GDP becomes the only sustainable way to reconcile fiscal

☆ The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the Emilia-Romagna region, the European Commission or of the University of Ferrara.

* Corresponding author. Department of Economics and Management, University of Ferrara, Italy.
E-mail addresses: massimiliano.ferraresi@regione.emilia-romagna.it (M. Ferraresi), benedikt.herrmann@ec.europa.eu (B. Herrmann), luisa.loiacono@unife.it (L. Loiacono), leonzio.rizzo@unife.it (L. Rizzo), riccardo.secomandi@unife.it (R. Secomandi).

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discipline with growing public needs ([1]). This has brought renewed attention to fiscal decentralisation ([2]). The literature highlights that decentralisation should support economic growth by enabling local governments to provide public services more efficiently, aligning them with the preferences and needs of their citizens (Oates, 1972). Moreover, it influences the behaviour of local governments by enhancing their accountability, improving the overall quality of governance (Oates, 2005).

Martinez-Vazquez and McNab (2003) review theoretical and empirical perspectives on fiscal decentralisation's impact on economic growth. Their review focuses on a broad spectrum of countries, from OECD countries to transitional economies. The authors find that, for OECD countries, where local entities have administrative capacity, there is a positive link between fiscal decentralisation and economic growth. They show that fiscal decentralisation promotes efficiency in resource allocation (particularly by reducing central government control), thereby encouraging economic development. Baskaran et al. (2016) conduct a meta-analysis of studies on fiscal decentralisation and economic growth to identify determinants. The authors analyse 31 studies across multiple countries and from various periods, finding that, for developed economies, fiscal decentralisation promotes economic growth by enhancing government accountability and responsiveness, thus creating a more favourable business environment. The existing literature on the impact of fiscal decentralisation uses two different approaches. On the one hand, it considers as a proxy for fiscal autonomy the ratio of local expenditure to total expenditure or the ratio of local revenue to total revenue (Lin and Liu, 2000; Akai and Sakata, 2002; Desai et al, 2005; Burret et al, 2022; Lledó et al, 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 government is particularly rich and therefore levels of local expenditure and revenue are high, even in the presence of low levels of institutional fiscal autonomy. On the other hand, another branch of the literature tests the impact of fiscal autonomy using exogenous institutional variables (Treisman, 2000; Fan et al, 2009; Li and Luo, 2023; Seidel, 2023). One of the most common proxies is the number of government tiers of a given country. In this regard, however, even if a local government is embedded in an institutional setting that provides more fiscal autonomy, this does not necessarily mean that it manages a larger share of expenditure or collects a greater share of revenue. In practice, a local government in a more autonomous setting may still rely heavily on central transfers, while a government in a less decentralized institutional context may have more control over its financial resources.

To overcome the limitation described above, we exploit a comparison between Italian municipalities in the Autonomous Provinces of Trento and Bolzano and those in the regions of Lombardy and Veneto to assess the impact of local management of revenue on per capita income. More specifically, we combine the two approaches, using the exogenous variation deriving from the institutional fiscal autonomy in two provinces of Italy to instrument the level of financial fiscal autonomy (FFA) measured by the ratio of local revenue to total revenue. This approach eliminates the measurement bias of financial fiscal autonomy, because it allows the variability of the ratio that is explained by institutional fiscal autonomy to be used. In doing so, we find that municipalities with higher financial fiscal autonomy have a higher per capita income. More specifically, we find that a 1-percentage-point increase in fiscal autonomy results in a 0.2–0.7% increase in per capita income, depending on the econometric specification.[(3)] This result is driven by an increase in administrative quality of municipalities with greater fiscal autonomy, enabling an increase in per capita income.

The paper is organised as follows. Section 1 summarises the literature related to fiscal decentralisation and economic growth, presenting current findings on the role of fiscal autonomy in stimulating per capita income. Then, Section 2 provides the institutional background, Section 3 describes the data analysed and Section 4 discusses the estimation strategy. Next, Section 5 presents the results of the analysis and Section 6 details the robustness checks. Finally, Section 7 draws conclusions on the results.

2. Related literature

There is an extensive literature highlighting the relationship between fiscal decentralisation and socio-economic outcomes, which are directly or indirectly related to income levels and/or growth. A first set of contributions examines the impact of fiscal decentralisation on socio-economic outcomes, such as government size, fiscal responsibility, governance quality, service provision, demographic trends, and political selection, generally pointing to improvements in welfare and resource allocation. A second line of research looks at the link between fiscal decentralisation and the income levels and growth, with both cross-country and single-country analyses suggesting often positive effects. Yet, this evidence remains fragile, as most studies rely on proxies for fiscal autonomy that suffer from measurement error, reverse causality, or capture only formal rather than effective autonomy. Although some refinements have been proposed, robust causal identification of the effect of fiscal decentralisation on economic indicators is still limited.

2.1. Fiscal decentralisation and socio-economic outcomes

Choudhury and Sahu (2022) explore the relationship between fiscal decentralisation and government size, using a panel regression approach and instrumental variables with data from 65 developed and developing countries between 1972 and 2013. Their focus is on the mediating role of ethnic fragmentation, finding that while fiscal decentralisation generally reduces government size, this effect

[1] In 2022, general government expenditure in the EU-27 countries saw a sharp increase, by 25% compared with 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 decentralisation is the process of transferring financial powers and responsibilities from central to local governments, allowing them to manage revenue and/or expenditure to better address local needs.

[3] To give an idea of the scale of the increase, the annual increase in per capita gross domestic product over 2001–2019 was 2% in the EU Member States and 1% in Italy (Eurostat, 2023).

becomes positive in ethnically diverse regions due to varying demands for public goods. Therefore, fiscal decentralisation can either decrease or increase public expenditure depending on ethnic fragmentation. When increasing public expenditure aligned with social needs, it could also be welfare-enhancing and therefore relevant for economic growth and the income path.

On the financial side, Feld et al. (2011) investigate the determinants of municipal debt in Switzerland, analyzing a cross-section of 137 large Swiss cities and municipalities in 2004, concluding that local fiscal autonomy significantly contributes to lower levels of municipal debt. This suggests that robust decentralized institutions can foster greater fiscal responsibility, which is a prerequisite for a stable and attractive local business climate.

Further elaborating on governance quality, Schaltegger and Küttel (2002) show that in Switzerland both direct democracy and fiscal autonomy lessen mimicking behaviour, allowing local governments to be more responsive to their citizens' specific preferences. Fiscal decentralisation can also mean allowing some expenditure functions at the local level. One example is child-care, through the provision of public kindergartens and targeted services for children. Increasing the quantity and quality of these services can raise the fertility rate (Koka and Rapallini, 2023) and therefore the potential for income, because of the increase in population and because parents are able to work instead of staying home with their children full-time.

Conversely, Peralta and Santos (2020) analyse the impact of limited local fiscal autonomy on political selection. Employing a difference-in-differences strategy based on a not expected reduction in the maximum local property tax rate, they use a comprehensive dataset for all mainland Portuguese municipalities for the 2005 and 2009 elections. They find that affected mayors, particularly those with high professional status, are less likely to seek re-election. This points to a mechanism where institutional constraints on local autonomy can degrade the quality of local political leadership, potentially hindering local economic development by affecting the efficiency of public service provision.

The results of the papers discussed above are consistent with Garcia-Milà et al (2018), who offer a comprehensive descriptive treatment of fiscal federalism in the 50 states of the United States between 1977 and 2011. They show that subnational fiscal autonomy (Oates, 1972) is likely to lead to improved social welfare and a better allocation of public sector resources, which is therefore important in enhancing the productivity of the economic system.

2.2. Fiscal decentralisation and economic growth

In recent decades, extensive empirical research has produced mixed results on the impact of fiscal decentralisation on economic growth (for surveys on the evolution of theoretical concepts and empirical research, see Baskaran et al, 2016; Martinez-Vazquez et al, 2017). Ligthart and van Oudheusden (2017) and Canavire-Bacarreza et al. (2020) have recently provided strong evidence, using cross-country data and various instrumental variable strategies, that fiscal decentralisation stimulates economic growth. Following Weingast (2009), who postulated that local tax revenue – as an incentive for local governments to invest in infrastructure – is important for local economic growth, Chen et al. (2020) investigated the impact of the share of district administrations in enterprise tax in China, finding that the higher their share in the enterprise tax the stronger the local economic growth.

A large part of the empirical literature on fiscal decentralisation and economic growth consists of cross-country analyses that distinguish between centralised and decentralized countries (Enikolopov and Zhuravskaya, 2007; Rodríguez-Pose and Ezcurra, 2010; Baskaran and Feld, 2013). However, there are substantial economic, historical, administrative, legal and cultural differences across decentralized countries that make it difficult to distinguish the effect of fiscal federalism from other determinants of economic performance (Burret et al, 2022). In this sense it seems to be more reliable to conduct single-country studies exploiting differences in tax decentralisation between states, regions, cantons or municipalities. These studies suggest a positive effect of fiscal decentralisation on regional economic growth, in China (Lin and Liu, 2000), Russia (Desai et al, 2005), Spain (Aray and Pedauga, 2022), Switzerland (Burret et al, 2022), United States (Akai and Sakata, 2002), and Central and Eastern Europe (Rodríguez-Pose and Krøijer, 2009) .[4]

2.3. Identifying the fiscal decentralisation impact

While these studies aimed at shedding light on the role of fiscal decentralisation in shaping economic growth, the majority of them proxy financial fiscal decentralisation by using the ratio of local revenue to total revenue or with that of local expenditure to total expenditure. However, these ratios can be high if the corresponding local government is particularly rich and, hence, has high levels of local expenditure and revenue, even if it is embedded in an institutional setting that provides a low degree of fiscal autonomy. If this is the case, there is an endogeneity problem due to measurement error; moreover, the observed correlation between the autonomy index and per capita income may arise because the index captures, in addition to fiscal autonomy, the wealth of the local government. Furthermore, using these ratios may also generate endogeneity due to reverse causality: the higher the per capita income, the greater the ratio of local to total revenue tends to be.

A branch of literature tries to solve these econometric problems by employing exogenous institutional variables as proxies for financial fiscal autonomy (Treisman, 2000; Fan et al, 2009; Li and Luo, 2023; Seidel, 2023). One of the most common proxies is the number of government tiers of a given institution. However, in this regard, even when a local government is embedded in an institutional setting that provides a high degree of fiscal autonomy, it may not necessarily use this autonomy.

[4] Akai and Sakata (2002) examine whether fiscal decentralisation improves economic growth, focusing on US-state-level data from 1992 to 1996. The authors use four different indices of decentralisation and exploit an ordinary least squares regression to find that states with higher degrees of fiscal decentralisation experience greater economic growth.

The problems discussed above are not new and have already been recognized by Baskaran and Feld (2013). By building on Thornton's (2007) work, they construct an index including only the tax revenue over which local authorities have autonomous decision-making power. This approach represents a step forward in studying the role of fiscal federalism in economic growth. However, it does not provide a sharp causal estimate. The variables used to measure the impact of different kinds of fiscal federalism over GDP and/or labour productivity growth could be endogenous.

To address this puzzle, we use a dataset of municipalities belonging to different institutional frameworks (some belonging to the autonomous provinces of Trento and Bolzano and others belonging to the ordinary statute regions of Lombardy and Veneto) and bordering each other. We implement a fuzzy regression discontinuity design (RDD), in which the institutional fiscal autonomy variable is used as an instrument for the financial fiscal autonomy variable (ratio of local revenue to total revenue), to analyse the impact on per capita income of the fitted financial fiscal autonomy. Our goal is to identify the financial fiscal autonomy (measured by the share of local revenue to total revenue) that stems from the power provided by the institutional setting.

3. Institutional background

Italy has four levels of administrative government: the central authority and, at the local level, regions, provinces and municipalities. While 15 regions are ruled by 'ordinary' statutes, four of them (Valle d'Aosta, Friuli-Venezia Giulia, Sardinia and Sicily), plus the provinces of Trento and Bolzano, are 'autonomous' and therefore ruled by 'special' statutes. After a major fiscal reform in the early 1970s, when almost all municipal taxes in ordinary regions were removed and replaced by transfers from the central government (Piperno, 2013), citizens in the ordinary statute regions pay most of their taxes to the central government. The central government then redistributes this revenue through discretionary and earmarked transfers at the regional, provincial and municipal levels. However, in the autonomous regions and provinces, taxes paid by citizens remain almost entirely within the territory.

Being a special statute region or province means having more power over public functions than ordinary regions, as well as an autonomous financing system. While the finances of the ordinary regions are uniformly regulated by national acts and decrees, the four special regions and the two autonomous provinces have different financing systems, regulated by a distinct national act.

In particular, the autonomous provinces of Trento and Bolzano retain 90% of all revenue from personal income and corporate taxes and VAT that originate in their territories, while the remaining 10% is withheld by the central government. Municipalities finance their expenditure through their own revenue and through transfers from the provinces that are financed by personal income and corporate taxes and VAT paid by citizens residing in municipalities of the same province. The system of provincial transfers is therefore guaranteed by the revenue collected on the municipal territories and so can be thought of as money collected at the local level. The allocations provided from the provincial budget to the municipalities are negotiated annually between the provincial associations of municipalities and the provincial governments, ensuring a close link between the municipalities and the provincial governments and their common interest in increasing the local tax base to secure and increase in future tax revenue.

With respect to tax instruments, the three main municipal taxes—the local property tax, the municipal personal income tax (PIT) surtax, and the tourist (accommodation) tax—account for about 95% of municipal own revenues both in the autonomous provinces and in neighbouring ordinary-statute regions such as Veneto and Lombardy. In all three tax instruments, municipalities set rates within nationally defined bands, while the tax base is defined at the national level; in Trento and Bolzano, provincial legislation grants somewhat wider room for manoeuvre on rates.

In line with the national framework, Italian municipalities are responsible for twelve fundamental spending functions, which include general administration, public education, social services, local police, land-use and urban planning, local public transport, waste management, water and environmental services, culture and recreation, among others.

All municipalities are subject to the same national constraints on spending and indebtedness: caps on personnel expenditure, limits on the purchase of certain goods and services, and a ceiling on debt service relative to current revenues, typically set below 10%. The provinces contribute to the municipal budget with transfers for the operation and management costs of services and the development of investments.

4. Data

We exploit a rich dataset at the municipal level in Italy, including balance sheets and per capita income from 2001 to 2019 ([5]). We include all municipalities in the provinces of Trento and Bolzano and in the regions of Lombardy and Veneto (Fig. 1), except those that, during the period observed, were either merged with other municipalities or newly constituted from the merging of municipalities ([6]). 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 information on personal income tax records available in the tax returns from the Ministry of Economy and Finance. We merge municipal-level per capita income data with a comprehensive local-level dataset, containing information on balance sheets of Italian municipalities from the Ministry of the Interior. More specifically, we have access to

[5] Both the balance sheets and income data are deflated using the consumer price index. Our analysis stops at 2019 due to the effects of the COVID-19 pandemic on municipal balance sheets.

[6] We dropped a total of 55 municipalities either because they were merged with other municipalities or because they were newly constituted following the merging of municipalities. We downsized from an initial dataset of 2351 municipalities to 2296 municipalities, thus dropping 2% of our sample.

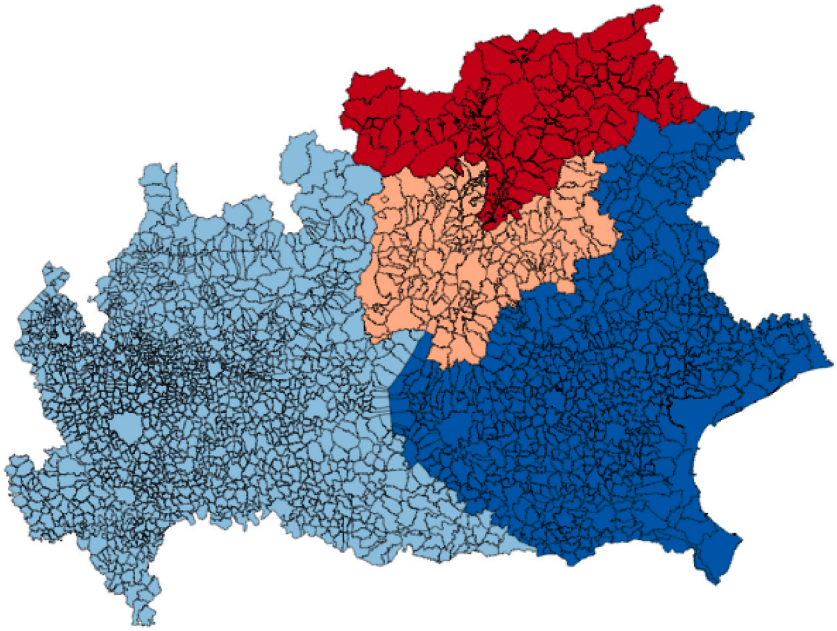

Fig. 1. Map of the two regions, Veneto (blue) and Lombardy (light blue), and the two autonomous provinces, Bolzano (red) and Trento (orange), included in this analysis.

information on all types of revenue (own taxes, fees and transfers) collected by the municipalities [(7)]. We also use as control variables population data retrieved from the statistical atlas of municipalities (*Atlante statistico dei comuni*) of the Italian National Institute of Statistics (ISTAT) and the altitude above sea level collected from the 2001 census, as the municipalities around the border considered are located in mountainous areas. Finally, we include the percentage of commuter workers from the 2011 census conducted by ISTAT. We do this because commuter workers living near the border in the ordinary statute regions could move their residence to take advantage of some tax benefits afforded in the autonomous provinces (e.g. most municipalities in the autonomous provinces do not apply a surtax on personal income tax). Additionally, we investigate the underlying mechanism using the Municipal Administration Quality Index (Cerqua et al., 2025), an index assessing the quality and capacity of local governments.[8]

Our main variable of interest is (a proxy for) financial fiscal autonomy, which is constructed as the ratio of municipal own revenue to municipal total revenue following Lledó et al. (2022). This index is calculated annually in each municipality. The financial fiscal autonomy score ranges from 0 to 100 and is computed as the average yearly financial fiscal autonomy from 2001 to 2019 (see equation (1) for the index construction and Figure A.3 for the behaviour of the index around the threshold). In the main analysis, the yearly time dimension is replaced with the average value, as the autonomy index within the municipality does not vary significantly over time. We replicate our analysis with two alternative approaches: by building up the index using a shorter period, from 2012 to 2019, and using the same index without averaging yearly observations to retain the time variation. In both cases results remain consistent (see Table 5 and Table A.3).

The numerator, namely municipal own revenue, includes municipal tax revenue and, only for municipalities in the provinces of Trento and Bolzano, local transfers. In municipal tax revenue, we include the municipal tax on rented, second and firms' properties (*ICI, Imposta Comunale sugli Immobili/IMU, Imposta Municipale Propria/IMIS, Imposta Immobiliare Semplice/IMI, Imposta Municipale Immobiliare*); the surtax on personal income tax (*Imposta sui redditi delle persone fisiche*); the tourist (accommodation) tax; and building permit fee ([9]). These taxes 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 national taxes paid by citizens living in the municipalities of the province of Trento and Bolzano and retained at the province level. Note that the same taxes for the other ordinary statute regions go to the central government and are then redistributed

[7] The revenue data are accrual data, as reported in the municipal balance sheet (from the Ministry of the Interior's Finanza Locale database: https://finanzalocale.interno.gov.it/apps/floc.php/in/cod/4).

[8] The Municipal Administration Quality Index (MAQI) is a composite index of municipal administrative quality built from three pillars: bureaucratic capacity, quality of local politicians, and fiscal/economic performance. All indicators are normalised and combined using the Adjusted Mazziotta-Pareto Index. Values are rescaled to a 70–130 range with 100 as the reference: 100 equals the national municipal average in 2001, scores above 100 indicate better administrative quality, and scores below 100 indicate worse. Because the distribution is tight in practice, a 1-point change reflects a meaningful improvement across multiple dimensions.

[9] Government Decree No 93/2008 abolished the property tax on main residence and introduced a vertical transfer to cover the loss of tax yields (Ferraresi et al., 2019). We do not include the waste disposal fee in the index, as it is often outsourced and may be misleading.

across the whole nation. Mayors who manage local transfers allocated by the province know that these resources come from their own territory as taxes paid by their own citizens, and so they reasonably pay particular attention in managing them [(10)]. The denominator is made up of total fiscal resources accrued by a given municipality: tax revenue plus total (central, regional and provincial) transfers, plus extra tax revenue such as traffic fines and income from the sale of goods and services by the municipality.

$$Financial\ fiscal\ autonomy = \frac{Tax\ revenue + Provincial\ transfers\ (for\ only\ Trento\ and\ Bolzano)}{Tax\ revenue + Total\ transfers + Extra\ tax\ revenue} \quad (1)$$

Since we implement a spatial RDD, we use the distance from the border in our calculations. We use Google Earth to identify the municipalities located on the border between the provinces of Trento and Bolzano and the regions of Lombardy and Veneto. Following Jofre-Monseny (2014), the distance between Trento and Bolzano and Lombardy and Veneto is computed as the air distance between the centre of one municipality and the nearest centre of the municipality on the other side of the border. Data on distance are retrieved from the proximity matrices available from ISTAT ([11]).

5. Estimation strategy

We estimate the impact of financial fiscal autonomy on per capita income[12].

The relationship between the financial fiscal autonomy and the per capita income is likely to suffer from reverse causality: richer municipalities (in terms of per capita income) could have a high level of financial fiscal autonomy, when it is measured based on the share of local revenue in total revenue. Moreover, high financial fiscal autonomy is not always due to high institutional fiscal autonomy; it may simply be the case that the local government considered is wealthy and therefore has a substantial amount of local revenue, which would give rise to measurement error. In both 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 is the case for municipalities belonging to the provinces of Trento and Bolzano and those belonging to Lombardy and Veneto. Using an RDD, we could compare the municipalities' per capita income near the border, as they have similar territorial and socio-economic characteristics (Jofre-Monseny, 2014). However, even in this case, we would not be able to completely 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 those in the provinces of Trento and Bolzano ([13]). This is because in some cases in Lombardy and Veneto the financial fiscal autonomy index may be high even though the institutional fiscal autonomy is low. A solution to this problem is to use a fuzzy RDD, in which we instrument the financial fiscal autonomy with the institutional fiscal autonomy variable and therefore estimate the impact of financial fiscal autonomy as explained by the exogenous institutional fiscal autonomy.

More specifically, we instrument the financial fiscal autonomy using a dummy variable equal to 1 for municipalities in the provinces of Trento and Bolzano, and 0 otherwise. Thus, we can identify those municipalities that have a higher institutional 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 the municipalities of the province of Trento and Bolzano to those that, although not in an autonomous province, are very similar. The dummy variable thus accounts for exogenous variation in institutional fiscal autonomy and has an impact on the per capita income through the share of total revenue 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 using a fuzzy discontinuity design. In fact, there may be some municipalities close to the border that, despite belonging to the provinces of Trento and Bolzano, have a financial fiscal autonomy lower than that observed for other municipalities close to the border but belonging to either Lombardy or Veneto. To 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 can assume causal identification because we compare municipalities in the autonomous provinces of Trento and Bolzano, which have a higher level of financial fiscal autonomy because of their special statute, with municipalities in the neighbouring regions of Veneto and Lombardy,

[10] Note that mayors receive transfers that do not exactly coincide with the local revenue generated. There can be some redistribution among municipalities belonging to the province of Trento, but these are annually negotiated between the association of municipalities and the province government, implying that municipalities and province government have a common interest in increasing the local and provincial tax base. However, this is not comparable to the redistribution that happens between an average municipality in Lombardy and an average municipality in Calabria. Moreover, the important thing is that citizens know that their taxes remain in the province to which their municipality belongs and where spillovers between municipalities are very high.

[11] For an example of how distances are computed, see Figure A.1; for descriptive statistics, see Table A.1.

[12] We use per capita income instead of growth rates. The main reason is due to the fact that our data start in 2001, while the second Statute of Autonomy for Trentino-Alto Adige, which substantially expanded the region's fiscal autonomy, entered into force in 1973. It would therefore be difficult to capture the immediate post-reform growth dynamics. However, we capture, if any, the persistent difference in income levels. As shown by Felice (2018, p. 502, Table 1), Trentino-Alto Adige experienced a decade of catch-up growth after autonomy was granted, after which growth rates converged with those of Lombardy and Veneto, but the gap level created by the autonomy shock persisted

[13] As shown in Figure A.2, the average fiscal autonomy is sometimes higher for municipalities in the ordinary statute regions than for those in the autonomous provinces of Trento and Bolzano.

which have ordinary statute (see Fig. 1) ([14]).

The identifying assumption behind the discontinuity design is that in the absence of financial fiscal autonomy in 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 to 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:

$$Autonomy_m = \gamma_0 + \gamma_1 D_m + \gamma_2 Distance_m + \gamma_3 D_m \cdot Distance_m + \eta \boldsymbol{X}'_m + u_m \quad (2)$$

Second stage:

$$Income_m = \beta_0 + \beta_1 \widehat{Autonomy}_m + \beta_2 Distance_m + \theta \boldsymbol{X}'_m + \varepsilon_m \quad (3)$$

$Autonomy_m$ is the financial fiscal autonomy indicator, which is computed as the average fiscal autonomy between 2001 and 2019 in each municipality and expresses the share of total revenue coming from local taxes and provincial transfers (only in the case of the provinces of Bolzano and Trento). Values close to or equal to 100 indicate high financial fiscal autonomy ([15]). D_m is a dummy variable that is equal to 1 when the municipality is in the treated province (Trento or Bolzano), $Distance_m$ is the distance in kilometers of each municipality from the border, and $\boldsymbol{X}'_m$ is the vector of municipal controls. Municipal controls include per capita total revenue, population, altitude above sea level and commuter workers. $Income_m$ is the income per capita in municipality m.

One of the key identifying assumptions of the RDD is that estimates can be causally interpreted when there is no manipulation at the threshold. The classical test (McCrary, 2008) to establish that the density of municipalities is continuous at the threshold is not reliable in a spatial discontinuity design case. However, we use three additional tests to show that there is no manipulation at the threshold (see Section 6). Firstly, we test for observable characteristics at the threshold, and we verify that there is no discontinuity. This test suggests that the municipalities considered 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, to 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 the municipalities of the autonomous provinces do not have different levels of financial fiscal autonomy. Tests for the absence of discontinuity at the threshold are further discussed in Section 6. Moreover, being part of a given region or province is difficult to manipulate. In Italy, while municipalities have the possibility of changing region, the procedure is long and complex; it requires a referendum, followed by the approval of both regions and the enactment of a law. The procedure is rarely implemented: between 2005 and 2014, there were 18 referendums of municipalities that asked to move from the regions of Veneto and Lombardy to the provinces of Bolzano and Trento. For 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 these nine municipalities, as their results are likely to be influenced by the ongoing procedure.

6. Results

The formulation of our main estimate requires a two-stage process. In the first stage, we estimate the impact of institutional fiscal autonomy on financial fiscal autonomy through an RDD approach, and in the second stage we use the fitted values from the first stage to estimate the impact of financial fiscal autonomy on per capita income. In the first stage we use the dummy variable *Treated*, splitting municipalities into autonomous provinces and ordinary regions by applying the optimal bandwidth in two specifications: first, we narrow down the sample without including the running variable (the distance from the border), as in Jofre-Monseny (2014), and second we control for the distance from the border using a conventional regression discontinuity approach ([16]).

In the first stage, we observe that the treatment variable used as an instrument is significant at the 1% level. This result holds for both specifications, without the running variable (Column 1 of Table 1) and with the running variable (Column 2 of Table 1), confirming the positive relationship between being in an autonomous province and having financial fiscal autonomy.

We then run a simple OLS regression through which we find that financial fiscal autonomy is significant in determining the level of per capita income (Column 1 of Table 2): a one percentage point increase in financial fiscal autonomy is associated with an increase in per capita income of EUR 17.2, corresponding to a 0.1% increase. Moreover, when we run the two-stage least-squares regression, the positive impact of financial fiscal autonomy on per capita income is confirmed. If we assume a one percentage point increase in financial fiscal autonomy, in the specification in which the running variable is not included as a control (Column 2 of Table 2), we observe a EUR 25 increase (0.2%), while in the linear specification (Column 3 of Table 2) including the running variable as control, the

[14] The treatment group includes only municipalities in the autonomous provinces of Trento and Bolzano as (i) Sicily and Sardinia are islands and we are not able to identify municipalities at the border; (ii) Valle d'Aosta has too few municipalities and an overall small population; and (iii) Friuli-Venezia Giulia has only one neighbouring Italian region, and therefore results would be less reliable if it were included.

[15] For further information on index composition, refer to Section 3.

[16] The optimal bandwidth is calculated using the selector proposed by Calonico et al. (2014).

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

Financial fiscal autonomy	(1)	(2)
	Without running variable	With running variable
Treated	25.7***	28.7***
	(1.674)	(4.242)
Observations	167	268
F-statistic	235.08	25.86
AR test	6.01	4.95
Hansen J test	-	0.62
Mean FFA	51.9	50.1
Distance (km)	36	46

Note: ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. Both scenarios include per capita total revenue, population, altitude, commuter workers and the constant. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Mean FFA represents the average level of financial fiscal autonomy, while the AR test refers to the Anderson-Rubin test.

Table 2
Second stage: Impact of fiscal autonomy on per capita income (main scenario).

Per capita income	(1)	(2)	(3)	(4)	(5)
	OLS	2SLS	2SLS	2SLS with PSM	2SLS with PSM
		without running variable	with running variable	without running variable	with running variable
Financial fiscal autonomy	17.2***	25.0**	46.5**	45.8***	89.8*
	(6.272)	(10.146)	(22.805)	(16.965)	(47.369)
Distance			−8.3		−11.4
			(8.663)		(13.719)
Per capita total revenue	1.1***	1.0***	1.1***	1.1***	1.3***
	(0.248)	(0.201)	(0.189)	(0.314)	(0.347)
Population	109.4***	110.2***	97.1***	102.2***	140.4***
	(19.992)	(28.089)	(21.354)	(33.515)	(46.186)
Altitude	−0.6*	−0.1	−0.5	0.1	−0.4
	(0.329)	(0.364)	(0.322)	(0.350)	(0.413)
Commuter workers	859.7	1352.3	783.1	727.1	−846.8
	(943.523)	(918.245)	(826.615)	(1120.090)	(1211.126)
Constant	10 891.2***	10 080.7***	9411.1***	8967.8***	7318.7***
	(719.442)	(767.878)	(1458.385)	(1157.874)	(2653.833)
Observations	268	167	268	167	268
R-squared	0.270	0.253	0.234	0.254	0.129
Mean per capita income	13813.6	13772.8	13813.6	13772.8	13813.6
Distance (km)	46	36	46	36	46

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. 2SLS, two-stage least squares; OLS, ordinary least squares; PSM, propensity score matching. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Distance is expressed in kilometers, per capita total revenue is in thousand euros, population in thousand inhabitants, and altitude in meters. The percentage of commuter workers represents the proportion of workers who commute to a municipality other than their place of residence.

increase in income is EUR 46.5 (0.3%) [17].

One reason for this result could be that municipalities in the provinces of Trento and Bolzano collect, on average, higher revenue than those in ordinary statute regions because they do not participate in the national equalisation system and so they can spend more on supporting local income. To take account of this feature, we control for total municipal per capita revenue. We also investigate whether the observed results hold when we compare municipalities that are similar in terms of per capita total revenue and other characteristics. We run the fuzzy RDD, weighting all observations with the score obtained from propensity score matching (Columns 4 and 5 of Table 2), including, among the variables used for the matching, per capita revenue, the percentage of population employed in the secondary sector, population, altitude and percentage of volunteers in non-governmental organisations [18]. The results of this estimation confirm our findings from the main analysis. However, the magnitude of the coefficient using the propensity score matching

[17] 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 1 percentage point, corresponding to an increase in per capita income equal to 0.2% in the OLS regression. In the two-stage least squares regression, in the scenario both with and without the running variable we observe that a 1-percentage-point increase corresponds to an increase in income of 0.2% (both the coefficients are statistically significant at the 1% level). The results remain robust when using per capita annual municipal data instead of the collapsed dataset (Table A.3).

[18] For the balancing test for pre-treatment characteristics, see Figure A.3.

is higher than that estimated in the OLS analysis. The specification excluding the running variable shows an increase in per capita income from 0.2% to 0.3%, while the specification including the running variable exhibits a more substantial rise, from 0.3% to 0.7%.

After estimating the impact of fiscal decentralisation on per capita income, we turn our attention to understanding the mechanisms that drive this relationship. Following the approaches suggested by Baskaran et al. (2016), we specifically investigate whether the quality of institutions underpins the observed effect. To rigorously assess this, we employ a three-stage least-squares (3SLS) regression, a system-based approach that improves efficiency by accounting for potential endogeneity across equations in multi-equation models.

In the second stage of the 3SLS, we use the Municipal Administration Quality Index (MAQI) as dependent variable. In the 3SLS, fiscal autonomy significantly raises MAQI. In turn, MAQI has a strong, positive association with per capita income (1108.13 and 432.63 depending on the specification). A one-point increase in MAQI is associated with an increase in per capita income equivalent to between 3.1% and 8% of the sample mean. This pattern supports the mechanism that higher local fiscal autonomy improves administrative quality, which then translates into higher income per resident (Table 3).

The results are robust across both specifications applied in this study. Moreover, they are consistent with the idea that local governments find themselves under the scrutiny of their taxpayers to meet their expectations for the delivery of high-quality public services to citizens and businesses in return for their payments. Regarding this issue, Weingast (2009) suggests that if tax revenue is retained locally, it is in the self-interest of local governments to expand the tax base and raise revenue. They therefore provide high-quality public services, which in turn catalyses the growth of businesses (Amoroso et al, 2024) and, consequently, local income. The finding that administrative quality has a positive impact on per capita income aligns with the core literature that identifies governance as a key driver of growth. Specifically, Rodrik et al. (2004) demonstrate that when explaining variations in income levels across countries, the quality of institutions is more relevant compared to other potential determinants of development, such as geography or trade integration.[19] Finally, consistently with our results, at the sub-national level by Rodríguez-Pose and Di Cataldo (2015) emphasize that the quality of government is a necessary precondition for a region to successfully transform its resources into innovation and growth. Using panel data for 208 European regions, they show that regions with effective, transparent, and accountable institutions generate higher patenting activity and innovation performance. Conversely, in regions with low institutional quality, public investments in innovation policies often fail to produce significant returns, due to weak implementation capacity and lack of accountability.

7. Robustness checks

In this section, we present a range of robustness checks. We explore manipulation at the threshold, a different time span, an alternative dependent variable, a placebo test between Lombardy and Veneto, a 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 (Fig. 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 per capita total revenue, population, altitude, 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 for the discontinuity in per capita income could be differences in human capital between the municipalities in Trento and Bolzano and those in Veneto and Lombardy. A useful proxy for human capital is the Invalsi test, but it is only available for a limited number of municipalities (for those where there is more than one institute). The Invalsi test, developed by the National Institute for the Evaluation of the Education and Training System under the control of the Ministry of Education, provides a statistical reference framework for measuring the level of learning of Italian students through the most objective assessments possible, allowing cross-schools comparisons. We collect data from 2012 to 2019, and we average the value for Grade 10 at the municipal level. Based on these results, we find that the characteristics of municipalities in Lombardy and Veneto and in the provinces of Trento and Bolzano (Trentino-Alto Adige) are very similar. In fact, there is no evidence of a discontinuity in pupils' performance at the cut-off (Fig. 3). The graphical representation of the observed municipalities confirms that learning outcomes both in Italian and Mathematics do not differ between treated and control groups, suggesting comparable levels of human capital.

7.2. Different time span

The main analysis includes data from 2001 to 2019, however, a change in 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

[19] Their analysis, based on a cross-country dataset covering over 100 economies during the late 1990s, relies on instrumental-variable regressions to disentangle the effects of institutions, trade, and geography, showing that institutional quality is the most robust predictor of income levels across territories.

Table 3
3SLS regression using the Municipal Administration Quality Index (MAQI), yearly data.

	(1)	(2)
	3SLS	3SLS
	without running variable	with running variable
Dependent variable:		
Financial fiscal autonomy		
Treated	25.78***	27.08***
	(0.49)	(1.27)
Chi-squared	3230.66	4548.36
Mean of FFA	51.52	50.70
Dependent variable:		
MAQI		
Financial fiscal autonomy	0.026***	0.130***
	(0.005)	(0.01)
Chi-squared	1042.30	1783.71
Mean of MAQI	100.68	101.04
Dependent variable:		
Per capita income		
MAQI	1108.18***	432.63***
	(221.06)	(49.53)
Chi-squared	257.90	1517.75
Observations	3031	4880
Mean per capita income	13793.23	13834.31

Note: ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. 3SLS, three-stage least squares. Yearly data. Both specifications include per capita total revenue, population, altitude, commuter workers, the constant and year fixed effects. The specification with the running variable also includes the distance. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100.

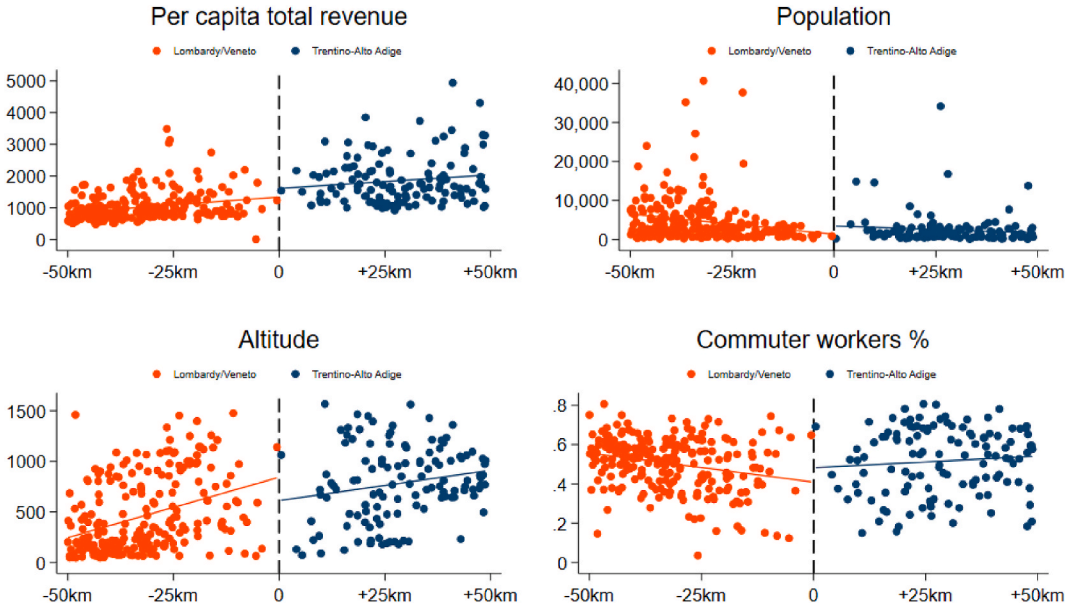

Fig. 2. Observable characteristics on the two sides of the threshold: per capita total revenue, population, altitude and commuter workers in 2001. Note: Distance is expressed in kilometers, per capita total revenue is in thousand euros, population in thousand inhabitants, and altitude in meters. The percentage of commuter workers represents the proportion of workers who commute to a municipality other than their place of residence.

terms of revenue and expenditure. From 2012, after the constitutional reform introducing the balanced-budget rule in line with European fiscal rules, Article 119 was amended to reflect this change. In the new framework, regions, provinces and municipalities were required 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 2019 (Table 4).

Results from the OLS regression show that in this shorter time span financial fiscal autonomy was significant in determining the level of per capita income: a 1-percentage-point increase in financial fiscal autonomy is associated with an increase in per capita income of EUR 15.6 (0.1%). When we run the two-stage least-squares regression, a 1-percentage-point increase in financial fiscal

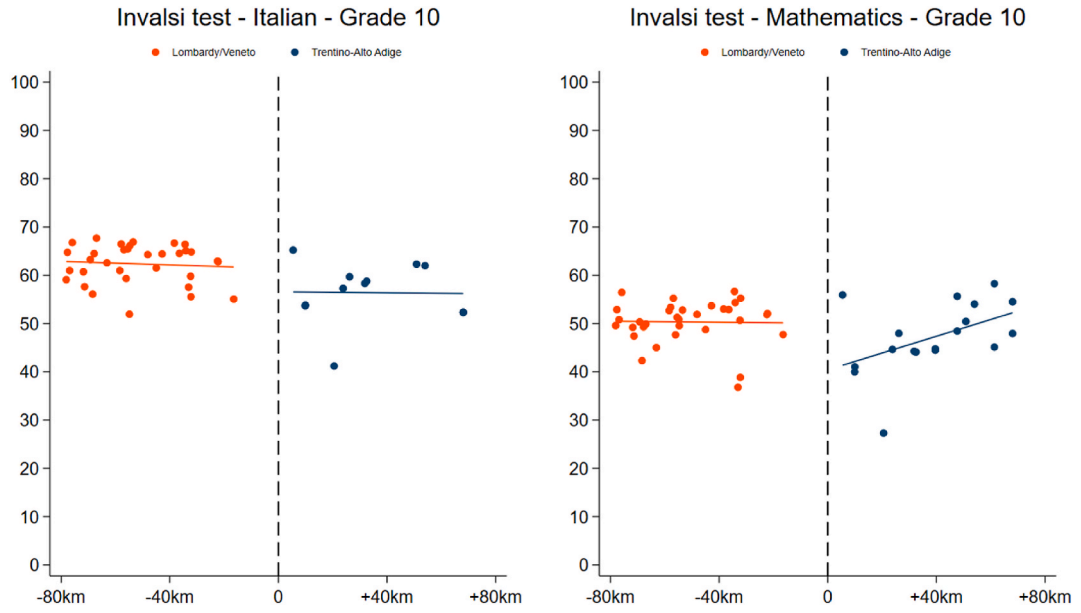

Fig. 3. Invalsi test results (normalised to 100) for Veneto, Lombardy and the provinces of Trento and Bolzano: Italian (left) and Mathematics (right).

Table 4
First stage: effect of being in an autonomous region (treated) on financial fiscal autonomy, 2012–2019.

Financial fiscal autonomy	(1)	(2)
	Without running variable	With running variable
Treated	20.349***	21.260***
	(1.704)	(4.450)
Observations	167	268
F-statistic	142.55	14.42
AR test	6.13	4.01
Mean FFA	52.1	52.1
Distance	36	46

Note: ***p < 0.01, **p < 0.05, *p < 0.1. Data collapsed at the municipal level. Both scenarios include per capita total revenue, population, altitude, commuter workers and the constant. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Mean FFA represents the average level of financial fiscal autonomy, while the AR test refers to the Anderson-Rubin test.

autonomy is associated with an increase of EUR 20.5 (0.2%) when the running variable is not included, which rises to EUR 40.2 (0.3%) when the running variable is included as a control (Tables 4 and 5).

7.3. Placebo test between Lombardy and Veneto

We run a placebo test to show that the effect that we find is caused by municipalities belonging to autonomous provinces, and not just because they are in a region different from that 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 significant relation between the placebo treated and the financial fiscal autonomy (Table 6). With this test, we show that the local average treatment effect is not due to the municipality being in another region but is the causal effect of being in an autonomous province. 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 have a different impact on their per capita income.

7.4. Placebo test between the autonomous province of Trento and the autonomous province of Bolzano

The first stage of the placebo test between municipalities lying on the border between Trento and Bolzano shows that there is no significant difference in the impact on financial fiscal autonomy. We treat municipalities in Bolzano as treated and municipalities in Trento as the control group (Table 7). This result is driven by the fact that both municipalities belong to provinces with institutional fiscal autonomy.

Table 5
Impact of fiscal autonomy on per capita income, 2012–2019.

Per capita income	(1)	(2)	(3)
	OLS	2SLS	2SLS
		without running variable	with running variable
Financial fiscal autonomy	19.8***	34.6**	59.4*
	(7.050)	(14.013)	(32.490)
Distance			−8.1
			(9.851)
Per capita total revenue	1.1***	0.9***	1.1***
	(0.249)	(0.191)	(0.200)
Population	90.6***	80.0***	71.9***
	(20.225)	(30.836)	(25.610)
Altitude	−0.0	0.4	−0.1
	(0.357)	(0.416)	(0.354)
Commuter workers	451.8	873.1	431.1
	(1040.386)	(1012.863)	(946.890)
Constant	11 013.7***	9956.5***	8938.2***
	(799.295)	(954.793)	(2049.359)
Observations	268	167	268
R-squared	0.239	0.211	0.181
Mean per capita income	14063.3	14052.6	14063.3
Distance (km)	46	36	46

Note: ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. OLS, ordinary least squares; 2SLS, two-stage least squares. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Distance is expressed in kilometers, per capita total revenue is in euros, population in inhabitants, and altitude in meters. The percentage of commuter workers represents the proportion of workers who commute to a municipality other than their place of residence.

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

Financial fiscal autonomy	(1)	(2)
	Without running variable	With running variable
Placebo treated	−0.7	3.2
	(1.258)	(2.331)
Observations	166	232
F-statistic	0.3	10.7
AR test	6.01	5.76
Hansen J test	-	0.48
R-squared	0.167	0.265
Mean FFA	43.5	42.6
Distance (km)	36	46

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. Both scenarios include per capita total revenue, population, altitude, commuter workers and the constant. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Mean FFA represents the average level of financial fiscal autonomy, while the AR test refers to the Anderson-Rubin test.

7.5. Varying bandwidths

We show that our results hold for different bandwidths, and we find statistically significant coefficients for all the regressions run at 5 km intervals for the specification without the running variable (Fig. 4, left). Similar results hold for the specification with the running variable, except for the bandwidth equal to 56 km, for which the coefficient is positive but not statistically significant (Fig. 4, right).

8. Conclusions

The existing literature has extensively analysed the impact of fiscal autonomy on income and/or GDP growth (Rodríguez-Pose and Krøijer, 2009; Baskaran et al, 2016; Ligthart and van Oudheusden, 2017; Canavire-Bacarreza et al, 2020; Aray and Pedauga, 2022; Burret et al, 2022). However, it relies either on exogenous variation in institutional designs or on balance sheet ratios indicating the share of own revenue/expenditure in total revenue/expenditure. The exogenous variation does not necessarily capture actual financial fiscal autonomy, because there can be cases in which institutional fiscal autonomy holds and governments do not use it properly by increasing their autonomous revenue. On the other hand, in some states or regions that register very high levels of the local revenue to total revenue ratio, the high share can be driven by large local tax bases (due to their territory being rich) and not by a high degree of

Table 7
First stage: placebo test, with Bolzano as the treated province and Trento as the control province.

Financial fiscal autonomy	(1)	(2)
	Without running variable	With running variable
Placebo treated	2.0	1.7
	(1.952)	(3.852)
Observations	90	124
F-statistic	1.05	0.61
AR test	13.14	2.33
R-squared	0.46	0.46
Mean FFA	62.9	62.9
Distance (km)	36	46

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. Both scenarios include per capita total revenue, population, altitude, commuter workers and the constant. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Mean FFA represents the average level of financial fiscal autonomy, while the AR test refers to the Anderson-Rubin test.

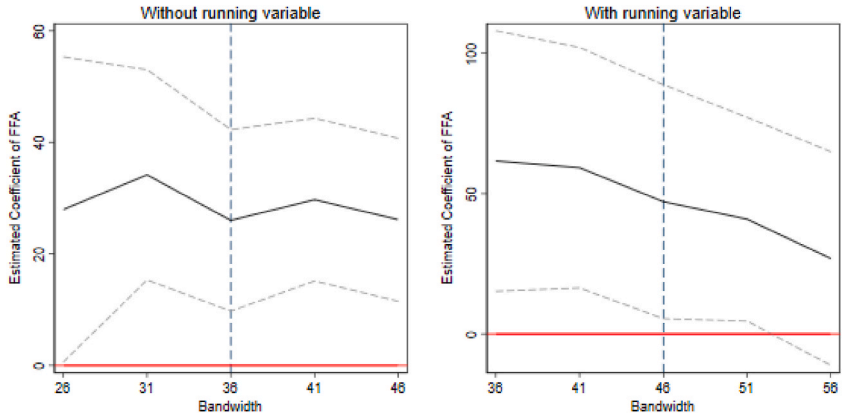

Fig. 4. Sensitivity of coefficient of interest (financial fiscal autonomy) to varying bandwidth
Note: The figure reports fuzzy regression discontinuity estimates, and 90% confidence intervals obtained from estimating the regressions in Columns (2) and (3) of Table 2. The regressions are run at 5 km intervals.

institutional fiscal autonomy. In both cases, the analysis is subject to measurement errors. Moreover, in the case of balance sheet ratios, reverse causality can pose a problem, as rich regions can show a very high level of fiscal autonomy if we look at the balance sheet index, because they have more revenue than the poor ones. All these critical issues result in endogeneity biases.

We contribute to the literature by estimating the impact of financial fiscal autonomy on per capita income by merging the two approaches described and identifying the financial fiscal autonomy due to institutional fiscal autonomy. To do so, we apply a spatial fuzzy regression discontinuity design, where we instrument the financial fiscal autonomy with a dummy variable equal to one for the municipalities in the provinces of Trento and Bolzano, which are autonomous in managing the taxes paid by their citizens.

Using a spatial fuzzy regression discontinuity design, we show that greater financial fiscal autonomy raises per capita income. We show that this result holds when controlling for per capita local revenue. More specifically, we find that a 1-percentage-point increase in fiscal autonomy increases, on average, per capita income by 0.2–0.7%. This result is driven by the positive impact of fiscal autonomy on the Municipal Quality Administrative Index, which is higher in municipalities with greater fiscal autonomy. Our finding is consistent with Baskaran et al. (2016) who show that decentralisation can foster political innovation and improve the efficiency of public service provision.

Our results also shed new light on a possible reason for the abrupt end of the "golden age" of the Italian economy in 1973. After a long period of strong economic growth across Italy since 1951, economic growth slowed significantly in 1973 and has not regained strength since then (Felice, 2018). Until the end of 1972, municipalities across Italy enjoyed a very high degree of fiscal autonomy, similar to that observed in Nordic countries today (Herrmann, 2022), due to a large number of municipal taxes (Piperno, 2013). Following the 1973 tax reform, municipal taxes almost disappeared (Piperno, 2013). As a consequence, local fiscal autonomy disappeared as did any incentive for municipalities in regions with ordinary statute to engage in local economic development.

CRediT authorship contribution statement

Massimiliano Ferraresi: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software,

Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Benedikt Herrmann:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Luisa Loiacono:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Leonzio Rizzo:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Riccardo Secomandi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

None.

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Appendix

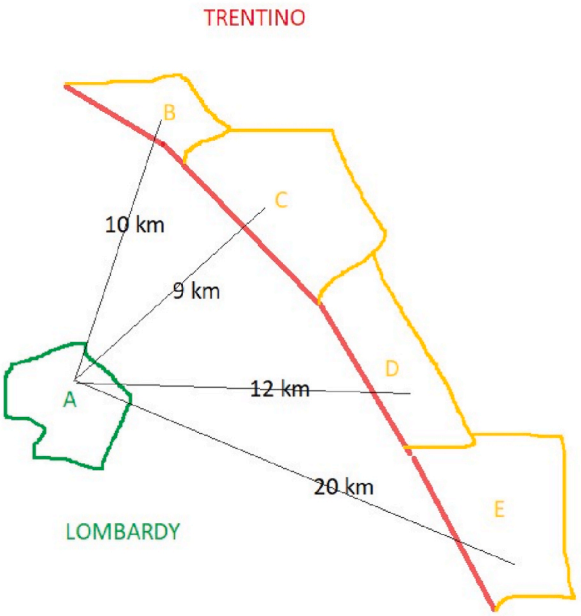

Fig. A.1. Example of how the distance from a random municipality (A) in Lombardy is computed.

Note: Firstly, distances between the centre of municipality A and the centres of all the municipalities on the border in Trentino-Alto Adige (B, C, D, and E) are computed. The centre of the municipality is calculated as the centroid of the census section of the

municipality. 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 (9 km). The selected distance is taken as the distance between the given municipality and the other region/province.

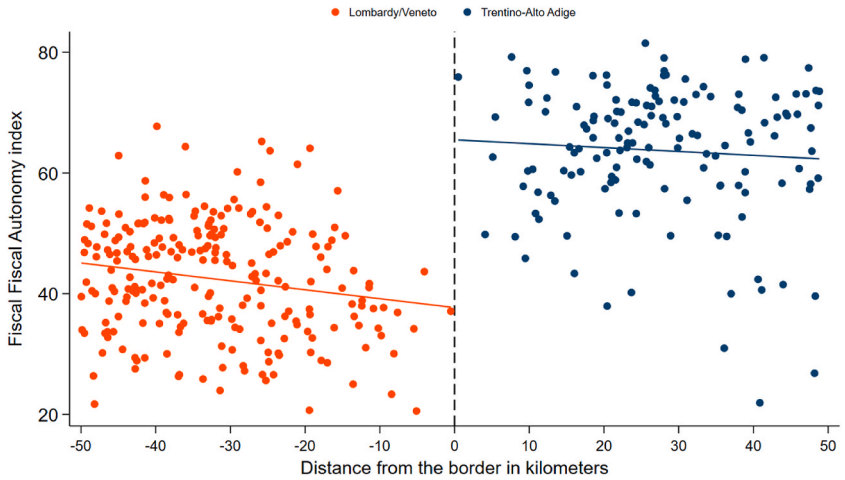

Fig. A.2. Financial fiscal autonomy index on the two sides of the threshold
Note: Data at the municipal level are averaged between 2001 and 2019.

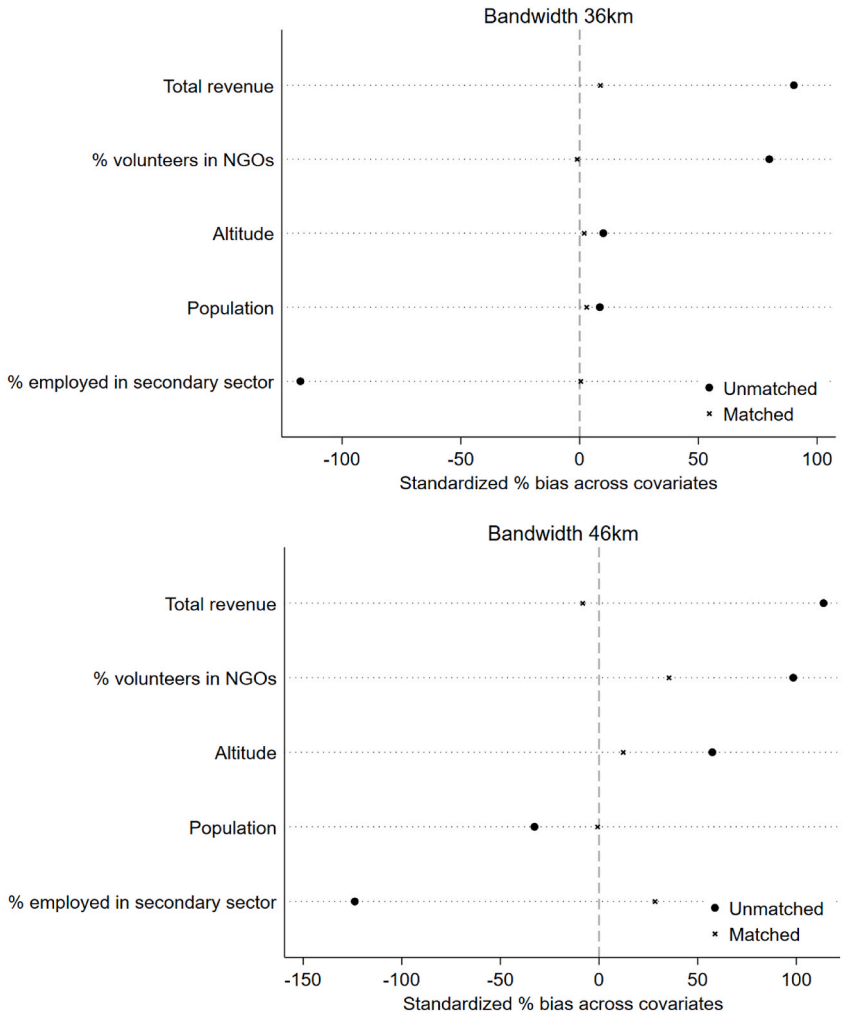

Fig. A.3. Balancing test for pre-treatment characteristics in the propensity score matching: 36 km (top) and 46 km (bottom) bandwidths.

Table A.1
Descriptive statistics for municipal-level data, 2001–2019

Variable	All	Treated	Control
Per capita income	13821.80	14322.60	13480.63
Per capita total revenue	1376.19	1716.54	1144.33
Population	3901.95	2755.92	4682.68
Altitude	614.88	748.01	524.19
Commuter workers	0.50	0.52	0.48
Financial fiscal autonomy	50.97	64.12	42.02
MAQI	101.03	100.98	101.07
Observations	268	109	160

Note: Means are calculated using the 46 km threshold. Per capita income is expressed in euros, total revenue in euros, population in number of inhabitants, and altitude in meters. The percentage of commuter workers represents the proportion of workers who commute to a municipality other than their place of residence, financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100.

Table A.2
Impact of fiscal autonomy on per capita income (dependent variable in logarithmic form)

Log per capita income	(1)	(2)	(3)
	OLS	2SLS	2SLS
		without running variable	with running variable

(*continued on next page*)

Table A.2 (*continued*)

Log per capita income	(1)	(2)	(3)
	OLS	2SLS	2SLS
		without running variable	with running variable
Financial fiscal autonomy	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)
Observations	268	167	268
Adjusted *R*-squared	0.318	0.254	0.261
Distance (km)	46	36	46

Note: ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Data collapsed at the municipal level. All the scenarios include per capita total revenue, population, altitude, commuter workers and the constant. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100.

Table A.3
Impact of fiscal autonomy on per capita income, 2001–2019, yearly data

Per capita income	(1)	(2)	(3)
	OLS	2SLS	2SLS
		without running variable	with running variable
Financial fiscal autonomy	16.6***	26.8***	47.8*
	(4.622)	(9.430)	(24.741)
Distance			−8.7
			(9.559)
Per capita total revenue	1.1***	0.9***	1.1***
	(0.212)	(0.250)	(0.237)
Population	105.0***	104.1***	92.7***
	(18.862)	(22.654)	(19.807)
Altitude	−0.6*	−0.1	−0.5
	(0.322)	(0.319)	(0.327)
Commuter workers	743.2	1122.1	726.4
	(900.733)	(1093.709)	(959.520)
Constant	10 855.0***	9887.6***	9246.2***
	(697.155)	(890.338)	(1659.834)
Observations	4919	3070	4919
R-squared	0.288	0.270	0.239
Mean per capita income	13 830.3	13 787.3	13 830.3
Distance (km)	46	36	46
Year fixed effect	Yes	Yes	Yes

Note: ***$p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Yearly data. Financial fiscal autonomy is the ratio between municipal own revenue to municipal total revenue, multiplied by 100. Distance is expressed in kilometers, per capita total revenue is in thousand euros, population in thousand inhabitants, and altitude in meters. The percentage of commuter workers represents the proportion of workers who commute to a municipality other than their place of residence.

Data availability

We have included the data repository in the txt file uploaded.

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