Three Essays on Empirical Public Economics

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Chapter 1

Introduction

If one of economists' main objectives is to increase social welfare, then public economics plays the most direct role by guiding the efficient allocation of public resources. In history, many countries have pursued government decentralization, assigning more responsibilities to lower levels of government, such as municipalities (Rodden, Eskeland, and Litvack (2003)). Their proximity to local economic issues places them in an advantageous position for decision-making. Given this shift in responsibilities, understanding how municipalities operate and overcome economic challenges is thus pivotal for the public economics literature.

This dissertation studies the behaviour of Italian municipalities between 1999 and 2015, exploring the influence of political ideologies, municipal responses to fiscal constraints, and signals of financial distress. Specifically, my analysis focuses on municipal management of real estate as a means to investigate the allocation of public resources, a topic relatively unexplored in the economic literature.

This research mainly relies on financial reports detailing revenues and expenditures of Italian municipalities between 1999 and 2015 (MI (2023a)). During this period, Italy experienced many reforms—from the increase of municipal autonomy in the 1990s (Ambrosanio, Bordignon, and Cerniglia (2010)) and the introduction of direct mayoral elections in 1993[1], to the adoption of fiscal constraints in 1999 (Legge 448/1998 art. 28), the increase in municipal financial responsibilities of 2003 (MI (2010)), and the onset of the Global Financial Crisis of 2008. Italy thus represents a suitable setting for studying municipal behaviour under administrative autonomy, fiscal constraints, and financial

[1] Legge 81/1883 and Decreto Legisativo 267/2000 (TUEL).

accountability.

The economic literature finds evidence that right and left-leaning political ideologies can meaningfully influence municipal spending (Pettersson-Lidbom (2008)), taxation (Freier and Odendahl (2015)), and outsourcing decisions (Elinder and Jordahl (2013)). Since right and left-leaning parties view the role of the state differently—for example, regarding welfare and market intervention[2]—it is reasonable to expect that these ideological differences may also impact the size of municipal real estate portfolios. Chapter 2 thus examines the effect of right and left-leaning political parties on the purchase and sales of municipal real estate. I test this hypothesis by estimating a regression discontinuity design (RDD) around Italian municipal elections between 1999 and 2012 (MI (2022)), using the purchases and sales of real estate as outcome variables. Contrary to findings on other fiscal outcomes, my analysis does not provide strong evidence on systematic differences between right and left-leaning municipalities. To further investigate this result, I explore several possible explanations, including electoral backlash, the allocation of revenues from the sale of real estate, and the heterogeneity in the types of real estate sold. The results suggest that changes in real estate portfolios are inherently noisy and influenced by local needs and opportunities, which may hide a potentially small political effect.

Beyond political ideologies, municipalities often operate under fiscal constraints imposed by higher levels of government. The literature on Italian municipalities supports that fiscal rules are responsible for reducing deficits (Grembi, Nannicini, and Troiano (2016)) and investments (Chiades and Mengotto (2013)), harming student achievement (Pavese and Rubolino (2023)), and influencing the progressivity of local taxation (Alpino et al. (2022)) and the political budget cycle (Bonfatti and Forni (2019)). Interestingly, municipalities can strategically sell real estate to find liquidity in times of financial distress and to comply with fiscal constraints. This mechanism highlights how municipalities can sell real estate to maintain investment levels when fiscal rules prove too rigid during economic downturns. To this end, Chapter 3 studies the effect of fiscal rules under Italy's Domestic Stability Pact (DSP) on municipal sales of real estate. The analysis estimates a Difference-in-Differences model on municipalities between 1999 and 2012, comparing larger municipalities, targeted by the DSP, with smaller municipalities, exempted from

[2]According to the topics of the RiLe Index (Budge (2013)).

it. The results do not find general evidence that municipalities sold real estate to fund investments, casting doubt on their ability to maintain their investment levels through their own resources while facing constraining fiscal rules. At the same time, my analysis presents evidence supporting that municipalities strategically leveraged extraordinary revenues, such as the sale of real estate, to comply with constraining fiscal rules. In particular, the revenue surge in 2008 could be indicative of how municipalities cope with the lack of flexibility of fiscal rules during a crisis. However, the skewed distribution of the outcome variable and the sensitivity of the estimates warrant caution in the interpretation of these results.

Finally, maintaining municipal financial stability is of primary importance to ensure the delivery of local public services and avoid costly bailouts. While the previous literature on Italian municipalities focuses on prediction models (Antulov-Fantulin, Lagravinese, and Resce (2021) and Cohen, Costanzo, and Manes-Rossi (2017)) or the identification of important factors (Gregori and Marattin (2019) and Padovani, Porcelli, and Zanardi (2024)), Chapter 4 investigates early and late signals of financial distress, analysing the dynamics of defaulting municipalities between 2004 and 2015. I estimate five Logit models to study the likelihood of municipal default based on financial indicators reported in Italian default declarations, capturing their relationships up to five years before default. The results highlight how financial distress is observable years before default through the rise of short-term borrowings and the accumulation of outstanding revenues. Furthermore, in the years immediately preceding the default, defaulting municipalities write off a larger share of the outstanding revenues compared to solvent municipalities, suggesting a signal for late stages of distress. These relationships can help inform monitoring systems on the proximity of municipalities to default.

Together, these studies provide a comprehensive picture of municipal behaviour under administrative autonomy and accountability. This dissertation explores how municipalities navigate fiscal constraints and financial distress, emphasizing the allocation of public resources such as real estate. From a policy perspective, the findings suggest that political ideologies are of secondary importance regarding the management of municipal real estate. At the same time, Chapter 3 and Chapter 4 provide insights that can aid policymakers in anticipating municipal reactions to fiscal and financial pressures.

Chapter 2 analyses the influence of Italian local political parties on municipal purchase

and sales of real estate. In Chapter 3, I study the effect of Italian fiscal rules on the sale of real estate. Chapter 4 investigates early and late signals of municipal financial distress. Finally, Chapter 5 concludes.

Chapter 2

Political parties and municipal real estate

JEL: D72, H41, H71

Keywords: Municipal real estate, political ideology, public asset management, RDD

2.1 Introduction

Local elections allow citizens to directly influence governance. However, political ideologies often have different solutions for economic problems. Right-leaning parties tend, for example, to favour a smaller welfare state and free market, while left-leaning parties prefer a controlled economy and an expansion of the welfare state.[1] This difference is very noticeable in the US, where Republicans favour a smaller role for the government than Democrats (PEW (2021)). Ferreira and Gyourko (2009) find that these kinds of preferences do not emerge in lower levels of government, explaining the result with a Tiebout-type of competition. Nevertheless, the economic literature also finds political differences in taxes, employment, expenditure, and outsourcing at the local level (Pettersson-Lidbom (2008), Freier and Odendahl (2015), and Elinder and Jordahl (2013)). Given these findings, it follows that meaningful differences could also arise in the management and size of local real estate portfolios. This could stem from the extension or contraction of public services, housing programs, or outsourcing strategies.

Nevertheless, there are other factors at play affecting the size of local governments

[1] According to the topics of the RiLe Index (Budge (2013)).

beyond political ideology. On one hand, the sale of real estate removes maintenance costs and other inefficiencies while providing immediate liquidity. On the other hand, the sale also removes the revenue generated by the asset and reduces municipal resources. This, in turn, diminishes municipal autonomy and flexibility in overcoming market failures and shocks with local means. Other factors include the heterogeneous local needs and opportunities in real estate allocation. Furthermore, political preferences might also be at odds with other outcomes. For instance, the sale of real estate can be weaponized by the local opposition as evidence of mismanagement and financial trouble, a strategy often used by both political leanings.[2]

This paper studies the influence of political leanings on municipal real estate portfolios in Italy. Thus, investigating important resources for municipalities as a means to deliver public service and as a source of financing. The literature already finds evidence for local political differences in Italy in the form of higher fiscal discipline for national parties (Gamalerio (2020)) and higher governmental grants for parties aligned with the central government (Bracco et al. (2015)). The Italian setting is well-suited for the analysis of a local political effect due to its background. After World War II, Italy pursued the path of fiscal decentralization (Ambrosanio, Bordignon, and Cerniglia (2010)), followed by late privatizations in the 1990s (Goldstein (2003)). Another pivotal reform was the introduction of direct mayoral elections in 1993 (Legge 81/1993 and Decreto Legislativo 267/2000 (TUEL)). This reform likely marked a strong shift in the relationship between local politics and municipal governance. Importantly, municipalities possess a large portion of public real estate. In 2015[3], municipalities owned around 67% of public buildings and 79% of public land (MEF (2015b)). Furthermore, real estate assigned to public organizations has high costs (around 3%), two or three times the costs in the private sector. At the same time, the income of the ones assigned to private organizations is around 0,5% (IFEL SSPAL (2009))[4]). These numbers do not suggest profitability in operating real estate, leaving space for political ideology to move the needle. When the

[2]Some examples: "Palazzo Carafa vende gli immobili, il Pd contesta procedure e mancate finalità sociali" lecceprima, politica, 2 gennaio 2016, V. Murr.; "Stop alla vendita degli immobili del comune: non ripetiamo gli errori del passato" sinistrapercalenzano 20 dicembre 2023; "PdL: 'Ecco l'elenco degli immobili che il comune non venderà'", cronaca, Redazione Nove da Firenze 5 febbraio 2010; "Ex Corridoni, 'Il Comune svende i propri beni'",politica, quinewsvaldera 5 ottobre 2023.

[3]Earlier reports from the Ministry of Economics and Finance have a lower percentage of municipalities sharing information, and the available data starts from 2015.

[4]Citing data reported by Fondazione Magna Carta in June 2008.

real estate is sold, the revenues can only be used for investments or to reduce municipal debt.[5] Moreover, since 2010, the Italian State has promoted transfers of real estate to lower levels of government (Decreto Legislativo 85/2010). This context is important as the overall effect of these transfers would then be particularly susceptible to local political influences on the use of real estate.

Contrary to other countries like the United States or the United Kingdom, Italy did not experience a strong movement aimed at reforming the role of the State. Nevertheless, the right-wing party led by Berlusconi was perceived as capable of bringing more market-oriented policies (Pasquino (2005)), as opposed to the centre-left, more inclined to statist approaches (Fella and Ruzza (2013)). In practice, however, Berlusconi's coalition failed to bring substantial liberal reforms (Fella and Ruzza (2013)). Furthermore, other right-wing parties such as *Alleanza Nazionale* and *Lega Nord* often adjusted their positions about markets and the role of the State, partly in an effort to find their place in the right-wing sphere (Fella and Ruzza (2006)). This ideological divide can still be observed in the recent political discourse involving housing and its lack of affordability for young and lower-income people (ISTAT (2022)). To address the issue, Italian parties presented their positions on the occasion of the 2022 national elections.[6] The political right mainly focused on ownership affordability, while the left planned the construction of 500.000 public housing units. When the topic of liberalization of local public services[7] emerged, many left-leaning municipalities[8] opposed it. These instances suggest that differences between left and right-leaning parties might also emerge in the size of local real estate portfolios.

My research question is whether right and left-leaning political ideologies influence municipalities to either expand or shrink their real estate portfolio. Such portfolio influence would then affect public service, economic opportunities, and development. Specifically, I hypothesize that a left-leaning mayor would be less likely to pursue policies conducive to shrinking the local government in terms of real estate. On average, municipal real estate

[5]Decreto Legislativo 267/2000 TUEL art. 162 c. 6 restricts the source of financing for current expenditure and debt installments, in accordance, Legge 228/2012 art. 1 c. 443 then explicitly restricts the revenues from the sale of available assets to only finance investment and reduce municipal debt.

[6]Corriere della sera, L'Economia, "Casa, dal mutuo giovani under 36 alle case popolari: le proposte elettorali dei partiti.", di Redazione Economica 23 settembre 2022.

[7]Draft of Law (Ddl) concorrenza 2021, act 2469 XVIII Legislature, in particular art. 6.

[8]List of municipalities that took action against Ddl concorrenza was presented in Forum Italiano dei Movimenti per l'acqua, Gli Enti Locali che hanno approvato atti volti al contrasto dell'art. 6 del DDL Concorrenza, 11 Marzo 2022.

portfolios consist of land (agricultural or urban), houses, and other buildings (productive or service type) (MEF (2015a), own calculations). I measure local portfolios by looking at the purchases and sales of real estate using financial reports provided by the Ministry of the Interior (MI (2023a)). These reports detail the revenues and expenditures of Italian municipalities for the period 1998-2012. The variables of interest are the expenditure for real estate purchases and revenues from the sale of real estate and property rights. Moreover, this paper also utilizes novel data on public auction of municipal assets published in the Official Gazette of the Italian Republic for the period 1999-2012 (OGIR (2025b)).

I use a regression discontinuity design (RDD) of close municipal elections to estimate the political effect on the real estate portfolio variables. Importantly, the discontinuity at the threshold is strengthened by the premium of council seats often awarded to the winning mayor.[9] I adopt the political leaning classification of Italian parties used by Gamalerio (2020) and Bracco et al. (2015). I then associate the candidate's coalition with the leaning of its most-voted party. Furthermore, this study investigates the allocation of revenues following real estate sales and the potential electoral backlash faced by incumbents running for re-election.

Contrary to the previous literature studying political effects on fiscal outcomes, my analysis does not find strong evidence for a political influence on the size of municipal real estate portfolios through real estate transactions. I find right-leaning parties to have a larger tendency for real estate sales, reflected in revenues per capita and in the proportion of years in which the sales occurred. However, these estimates do not have a consistent and robust statistical significance. While these variables are noisy and could conceal the presence of a small effect, the fits and scatterplots do not indicate strong patterns. I reach a similar conclusion for the net purchase of real estate, defined as the monetary difference between purchases and sales of real estate. Although a statistically significant difference shows that right-leaning parties are associated with more net purchases, the poor fit of the control functions renders the estimates not credible.

The main explanations I investigate are: i) an electoral backlash following real estate sales, which might mute the influence of political ideology in favour of re-election chances, ii) the inherent heterogeneity of the real estate sold, rendering the identification of the political component more statistically imprecise, and iii) the allocation of real estate

[9] Legge 81/1993 and Decreto Legislativo 267/2000 (TUEL).

sales revenues, as municipalities might use these revenues for purposes not conducive to a politically motivated contraction of the local government's size.

Despite anecdotal evidence of political backlash, I do not find a significant difference in incumbent electoral outcomes. This result could be explained by the high number of unusable real estate or by the specific allocation of the generated revenues. Furthermore, while the composition of real estate sales exhibits great heterogeneity, it aligns with the existing real estate stock. Notably, revenues from real estate sales are primarily related to capital expenditure, e.g., the expenditure contributing to asset formation (ISTAT (2012)), such as real estate purchases or road construction. In conclusion, the profound heterogeneity in local economic conditions and the diverse nature of real estate sold make it difficult to isolate the effect of a political component.

I contribute to the literature on local political effects by studying the impact on real estate. The previous literature found mixed evidence for political influence on economic outcomes. For instance, Pettersson-Lidbom (2008) estimates that Swedish left-wing parties employ more workers, increase total spending, and tax more. In contrast, Ferreira and Gyourko (2009) found no impact in the United States on many outcomes, such as total revenues, total expenditure, the composition of expenditures, or crime rates. Freier and Odendahl (2015) estimate that center-left municipalities in Bavaria (Germany) lower a local business tax and two property taxes. Additionally, Elinder and Jordahl (2013) find evidence for higher local outsourcing in right-leaning municipalities (Sweden), while Banerjee et al. (2019) estimate in an experiment in Indonesia that, with sufficient competition, outsourcing reduces the price of service without affecting quality. This paper contributes to this literature by providing evidence on instances where characteristics and dynamics of local governments dominate political influences.

Specifically for Italy, Gamalerio (2020) finds that Italian municipalities affiliated with national parties are more fiscally responsible. He presents evidence that this more disciplined behaviour is linked to a higher probability of re-election and promotion to higher tiers of government. Bracco et al. (2015) show that party alignment with the central government results in higher grants, especially around re-elections. Daniele and Giommoni (2020) find evidence for an increase in dissolutions of municipal councils affiliated with national parties connected to a big corruption scandal. Further local political effects studied in the literature include higher expenditure if council members are public

employees (Hyytinen et al. (2018)), reductions in educational scores following political turnovers (Akhtari, Moreira, and Trucco (2022)), and an increase in drug-related violence after an anti-drug trafficking party wins (Dell (2015)).

This paper contributes to the literature studying the provision of local public goods. Osborne and Slivinski (1996) presents a model where candidates compete to implement their preferred policy. However, other authors explain public good provision through other mechanisms. Tiebout (1956) presents a model where utility-motivated migration balances the provision, while Besley and Coate (2003) illustrate the effects of centralized and decentralized systems on provision, focusing on the roles of spillovers and heterogeneous preferences. The empirical literature finds that public goods influence property values (Dubé, Thériault, and Des Rosiers (2013)), and that public housing affects the construction of formal and informal housing (Bradlow, Polloni, and Violette (2023)) or impacts local poverty levels (Shester (2013)).

This paper also relates to the asset management literature by exploring the influence of political components. According to Kaganova and Nayyar-Stone (2000), few municipalities operate their assets as a portfolio to improve public service. Developing countries do not fully utilize land, forcing the private sector to operate in sub-optimal locations. Phelps (2011) finds, for the U.K. and Russia, that the main drivers for asset management adoption are statutory requirements and financial reasons. Client expectations of managers and users were considered marginal. My research contributes to this literature by studying the influence of political ideology in municipal real estate management decisions.

In Section 2.2, I summarize the Italian socioeconomic, political, and historical context. Section 2.3 presents the data used. The empirical analysis is detailed in Section 2.4. In Section 2.5, I conclude.

2.2 Background

This section begins by presenting the evolution of Italian municipal governance in relation to public real estate. It then summarizes the characteristics of local real estate management. Finally, it details the Italian mayoral electoral system.

2.2.1 Municipal governance and political discourse

Italy is composed of twenty regions. Among these, five[10] enjoy special autonomy due to historical and geographical reasons (Camera dei Deputati (2021)). At a lower level of government, there are Italian municipalities, numbering around 8,100 between 2001 and 2011 (ISTAT (2025c)). They have revenue and expenditure autonomy, own property, and can incur debt only for financing investments (art. 119, Italian Constitution[11]). Importantly, municipal revenue autonomy permits the sale of real estate and the imposition of local taxes within certain limits. For instance, between 1999 and 2012, municipalities could set an income surcharge tax[12] or adjust the local property tax[13]; nevertheless, both taxes were bound by a maximum rate ceiling. Importantly, the Italian State bears no responsibility for municipal loans.[14]

Leading up to the investigation period, the Italian public sector experienced several transformations. After World War II, Italy moved towards fiscal decentralization (Ambrosanio, Bordignon, and Cerniglia (2010)). In the late 1980s, the expansion of social rented housing came to a halt, shifting to the promotion of owner-occupied housing and the credit market (Belotti and Arbaci (2021)). By the 1990s, the Italian public enterprise sector was massive compared to other OECD countries, burdened by production inefficiencies and misallocation of resources (Goldstein (2003)). This period also witnessed a pivotal reform in local political governance with the introduction of direct mayoral elections in 1993.[15] Despite earlier reforms, Italy needed fiscal consolidation and more decentralization to join the Euro (Ambrosanio, Balduzzi, and Bordignon (2016)). Consequently, in 1998 Italy introduced a collection of fiscal rules—the Domestic Stability Pact

[10] Friuli-Venezia Giulia, Sardegna, Sicilia, Trentino-Alto Adige, and Valle d'Aosta (Italian Constitution art. 116).

[11] The article was introduced by Legge Costituzionale 3/2001 and formalized municipal autonomy. This was part of a process mostly carried out in 1997-2000 with the intent to decrease dependence on governmental grants and increase municipal revenues (Camera dei Deputati (2008)). Debt contraction being limited to investment purposes was, however, only introduced in 2001.

[12] Decreto Legislativo 360/1998.

[13] Decreto Legislativo 504/1992.

[14] The article was introduced by Legge Costituzionale 3/2001. The municipal default is handled by an extraordinary committee, and the Italian State played different roles during the years. Prior to 2001, municipalities unable to finance themselves could borrow from Cassa Depositi e Prestiti — a financial institution mainly owned by the Ministry of Economics and Finance — to cover the deficit and off-balance sheet debts, with the Italian State bearing the full costs. After November 2001, borrowing to restructure debt was subject to more restrictions and the Italian State did not cover the costs; instead provided extraordinary contributions to aid the liquidation process (MEF (2010)). For more information, Turco (2015) explores the case study for the municipality of Taranto in 2006.

[15] Legge 81/1993 and Decreto Legislativo 267/2000 (TUEL).

(DSP)—involving local governments in national deficit objectives (Camera dei Deputati (2017)). Although these rules were subject to many revisions, they mainly applied to municipalities above 5.000 inhabitants.[16] At the time, nearly half of public investments were carried out by municipalities. However, a significant contraction followed after 2004, when the DSP began constraining investments, leading to a stronger decline in municipalities subject to these fiscal rules (Chiades and Mengotto (2013)). Besides the DSP, the Italian government also sought to improve municipal efficiency through two key policies concerning real estate management. The first was in 2008, when a reform compelled municipalities to list the properties not vital for public functions, simplified the bureaucracy of the sale, and incentivised the contribution to real estate investment funds.[17] This reform likely made municipalities more aware of their real estate portfolio and improved allocations and sales. The second was in 2010, when the State started promoting real estate transfers to local governments (Decreto Legislativo 85/2010).

According to the RiLe index (Budge (2013)), right-leaning parties favour a smaller welfare state and free market, whereas left-leaning parties prefer a controlled economy and an expansion of the welfare state. While Italy did not experience a strong movement aimed at reforming the role of the State, this difference was still observable. For instance, the right-wing party led by Berlusconi was perceived as capable of bringing more market-oriented policies (Pasquino (2005)), as opposed to the centre-left, more inclined to statist approaches (Fella and Ruzza (2013)). In practice, however, Berlusconi's coalition failed to bring substantial liberal reforms (Fella and Ruzza (2013)). Moreover, other right-wing parties such as *Alleanza Nazionale* and *Lega Nord* adjusted their positions about markets and the role of the State over the years, partly in an effort to find their place in the right-wing sphere (Fella and Ruzza (2006)). This ideological divide is nevertheless exemplified by the recent Italian political discourse. The role of the public sector became a key topic of the political discussion surrounding the 2022 national elections, concerning housing[18] and local services.[19] Young and poor people have been the most affected by the lack

[16] In 1999-2000, the DSP applied to all municipalities, in 2001-2012, excluded municipalities with less than 5.000 inhabitants, and from 2013, excluded municipalities with less than 1.000 inhabitants. There were further changes, but they are beyond the scope of this research.

[17] Art. 58 Decreto legge 112/2008, enacted in June, converted by Legge 133/2008.

[18] Corriere della sera, L'Economia, "Casa, dal mutuo giovani under 36 alle case popolari: le proposte elettorali dei partiti.", di Redazione Economica 23 Settembre 2022.

[19] Draft of law (Ddl) concorrenza 2021, act 2469 XVIII Legislature, in particular art. 6. A list of municipalities that took actions against Ddl concorrenza was presented in Forum Italiano dei Movimenti per l'acqua, Gli Enti Locali che hanno approvato atti volti al contrasto dell'art. 6 del DDL Concorrenza,

of affordable housing (ISTAT (2022)), and the national parties had different positions. The right (*Fratelli d'Italia*, *Forza Italia*, and *Lega*) focused on ownership affordability, while some were still open to an expansion of public housing. In contrast, the left-leaning *Partito Democratico* (PD) proposed a 10-year plan to build 500.000 public housing units. In the same period, the PD presented a competition law[20] involving the liberalization of local public services that faced different types of resistance. The right opposed for sectors such as taxis and beaches[21] while the left[22] opposed the liberalization of local public services. Moreover, more than fifty municipalities (including major cities) spoke against these liberalization measures.[23] Their leanings were 42% left, 7% right, 46% local parties, and the remainder others.[24] Local parties generally focus on local politics and have increased in popularity after the numerous corruption investigations started in 1992, *Mani Pulite* (Daniele and Giommoni (2020)). Importantly, while these political preferences might influence parties' policies, they might also conflict with other outcomes. For instance, the sale of real estate to shrink the size of the local government can be weaponized by the local opposition as evidence of mismanagement, financial trouble, and *selling off people's properties*; as both leanings have been reported in news articles.[25]

2.2.2 Real estate assets

In 2015[26], municipalities owned around 67% of public buildings and 79% of public land (MEF (2015b)). These real estate assets are classified either as available, unavailable, or public domain.[27] The latter comprises several different types of real estate, such as

11 Marzo 2022.

[20] Draft of law (Ddl) concorrenza 2021, act 2469 XVIII Legislature, in particular art. 6.

[21] "Ddl concorrenza, su taxi e concessioni balneari parte l'assalto del centro destra.", Serenella Mattera,la Repubblica, 16 marzo 2022.

[22] *Verdi* and *Sinistra Italiana*. Party program for the 2022 national elections. https://verdisinistra.it/wp-content/uploads/2022/09/Programma-Alleanza-Verdi-e-Sinistra.pdf.

[23] The list of municipalities that took actions against the Draft of law (Ddl) concorrenza was presented in Forum Italiano dei Movimenti per l'acqua, Gli Enti Locali che hanno approvato atti volti al contrasto dell'art. 6 del DDL Concorrenza, 11 Marzo 2022.

[24] Own calculations and political leaning identification based on the list of municipalities mentioned before.

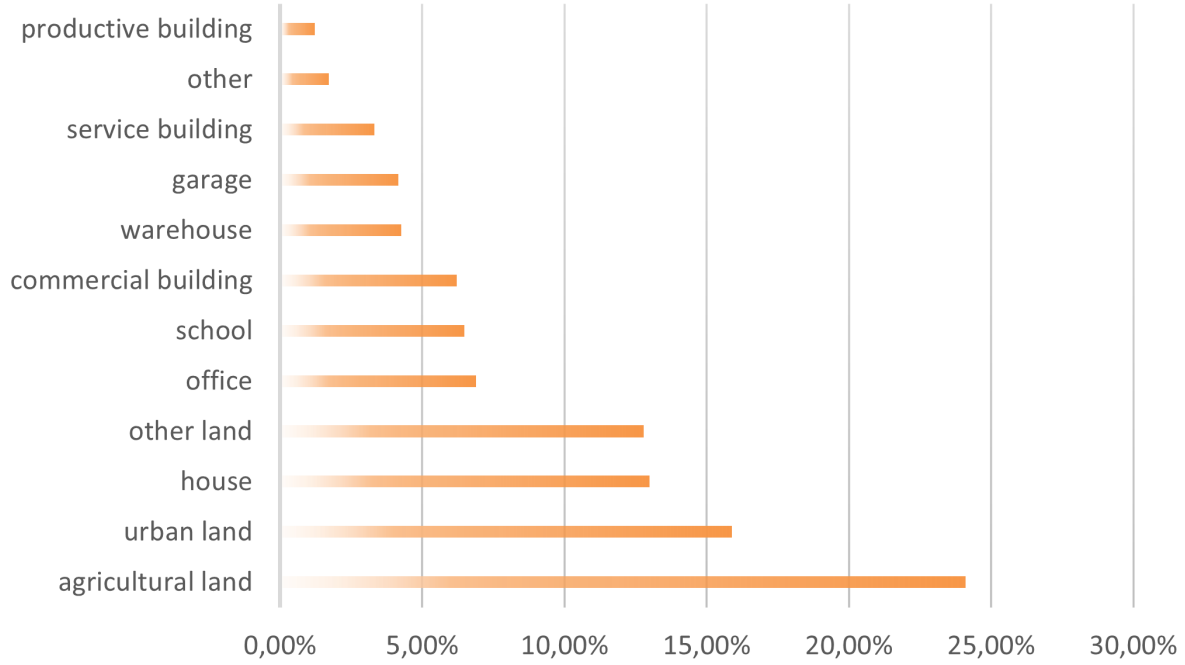
[25] Some examples: "Palazzo Carafa vende gli immobili, il Pd contesta procedure e mancate finalità sociali" lecceprima, politica, 2 gennaio 2016, V. Murr.; "Stop alla vendita degli immobili del comune: non ripetiamo gli errori del passato" sinistrapercalenzano 20 dicembre 2023; "PdL: 'Ecco l'elenco degli immobili che il comune non venderà'", cronaca, Redazione Nove da Firenze 5 febbraio 2010; "Ex Corridoni, 'Il Comune svende i propri beni'",politica, quinewsvaldera 5 ottobre 2023.

[26] Earlier reports from the Ministry of Economics and Finance have a lower percentage of municipalities sharing information, and the available data starts from 2015.

[27] Art. 822-828 Codice Civile.

highways, archives, and graveyards. Unavailable real estate is defined as that used for public service, and the rest are classified as available. This distinction is important as only available real estate can be simply sold, while public domain cannot be sold, and unavailable real estate, though allowed for sale, must keep its intended use. In 2015, the average municipal real estate composition was around 34% unavailable and 60% available (MEF (2015a), own calculations). As shown in Figure 2.1, municipal properties consist mostly of urban or agricultural land and residential buildings (MEF (2015a), own calculations).

Figure 2.1: Municipal real estate composition (Italy)

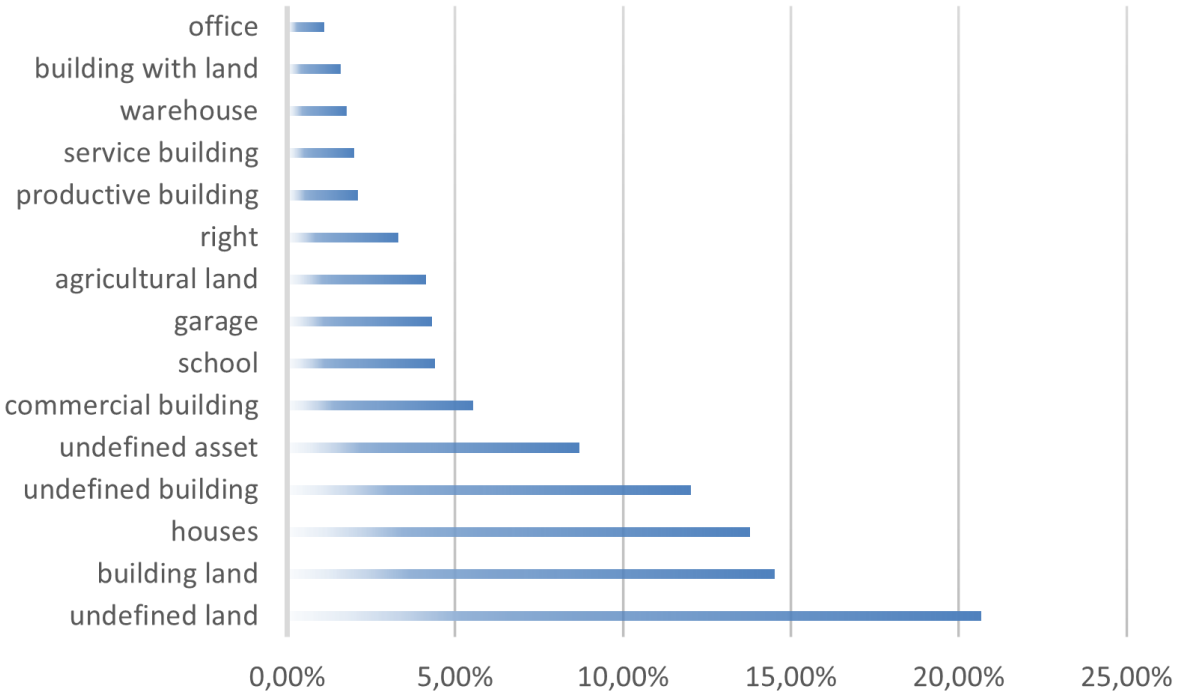


Notes: Average composition of real estate owned by Italian municipalities in 2015. Service buildings are collective residential structures, barracks, libraries, museums, galleries, hospitals, and prisons. Commercial buildings are stores, theatres, cinemas, sports centres, hotels, hostels, indoor markets, and bathing establishments. Productive buildings are factories (industrial, artisanal, or agricultural). Land includes big parking lots. "Other land" includes parks, public gardens, forests, and natural reserves. The classification "Other" includes fortifications, buildings of worship, castles, scientific laboratories, roadmen's houses, and lighthouses. Garage includes basements and lofts. Own calculations with data provided by the Ministry of Economics and Finance (MEF (2015a)).

Municipalities lack a standardized procedure for the management of such a portfolio, and smaller ones often lack the training and resources (Carbonara and Stefano (2020)). In an interview, a representative of the State Property Agency[28] suggested that local governments hesitate to acquire properties offered by the State as they would require substantial investments to be serviceable (Segala (2012)). While real estate can generate an income flow through rents or the sale of goods and services, it demands significant

[28] Agenzia del Demanio, 15 November 2012, Corso Monforte, Milano, (Segala (2012)).

Figure 2.2: Municipal real estate publicly auctioned by category (Italy 1999-2012)



Notes: Composition of real estate publicly auctioned by Italian municipalities in 1999-2012 by category. The categories reflect a personal classification based on the description of auction notices. I do not report pharmacies as I consider them firms. The rights refer to property rights, mainly surface rights. Building with land primarily captures real estate in rural areas. Service buildings are real estate usually owned by municipalities to offer public services. Productive buildings are factories. Garage also includes single parking lots. The auction notices cover 1,030 municipalities and 7,553 assets. Source: Official Gazette of the Italian Republic.

expenditures related to management, operation, and maintenance. Failure to meet these obligations can shorten its operational life by as much as 33% and lead to safety risks and poor service quality (Campanaro and Masic (2018)). The public sector incurs high operating costs for real estate (around 3%), two or three times the costs in the private sector. Conversely, real estate allocated to other organizations generates a comparatively low income of around 0.5% (IFEL SSPAL (2009)[29]). The municipal council can otherwise opt for the sale of the real estate, commonly through auctions or direct deals with buyers.[30] The payment instalments are mainly spread over 1 or 3 years (IFEL (2015)). The reason to sell an asset is usually one of the following: low-income generation, high recovery costs, use as a source of finance, or lack of institutional uses. Additionally, the advertising needs to be broader, the higher the value of the real estate asset. Importantly, the revenues from real estate sales can only be used for investments or to reduce

[29]Citing data reported by Fondazione Magna Carta in June 2008.

[30]This information is coming from the regulations enacted by a sample of municipalities during the period 1998-2012 (Ferrara n.19 21/07/2011, Este n.67 29/11/2011, Alpignano n.46 15/06/2005, Udine n.176 11/12/2000, Pontedera n.58 31/05/2005,n.144 Potenza 05/12/2008 and Castellaneta n.52 04/04/2007).

municipal debt.[31]

Carbonara and Stefano (2020) provide some concrete examples of real estate asset allocation. One case involved a former school building, mostly used by neighbouring schools for kitchen facilities. They suggested legalizing the occupancy and repurposing additional spaces for needed play areas and after-school programs. The other example is partially occupied offices belonging to a company, which they advised to sell. On average[32], nearly half of municipal real estate is used directly, while 25% is allocated to other private or public organizations (Figure A.1 in Appendix A). Approximately 20% of the real estate is considered unusable and left unallocated. These properties are likely unsuitable for public purposes because of their inherent characteristics, physical conditions, or financial and legal requirements. They primarily include houses, agricultural land, or other kinds of land. Figure 2.2 illustrates the categories of real estate put up for auction between 1999 and 2012.[33] As the figure indicates, the real estate auctioned is primarily land and residential properties. Property rights (e.g., surface rights) constitute a small portion of the total. Although municipal financial reports aggregate the revenues from real estate sales with those from the sales of property rights, Figure 2.2 demonstrates that the latter contributes only a minor portion to total sales.

2.2.3 The Italian municipal electoral system

The municipal mandate lasts five years.[34] For the period examined, re-election is only possible for two consecutive mandates.[35] Italian municipal elections follow a combination of majoritarian and proportional rules.[36]

Parties support a candidate for mayor and the attached list of candidates for councillors. Below 15.000 inhabitants, electors can vote for the mayor and the list, but not a mayor attached to a different list. The candidate with the most votes is elected mayor.

[31] Decreto Legislativo 267/2000 TUEL art. 162 c. 6 restricts the source of financing for current expenditure and debt installments, in accordance, Legge 228/2012 art. 1 c. 443 then explicitly restricts the revenues from the sale of available assets to only finance investment and reduce municipal debt.

[32] Own calculation with data provided by the Ministry of Economics of Finance for the year 2015.

[33] The categories reflect a personal classification based on the description of auction notices. I do not report pharmacies as I consider them firms.

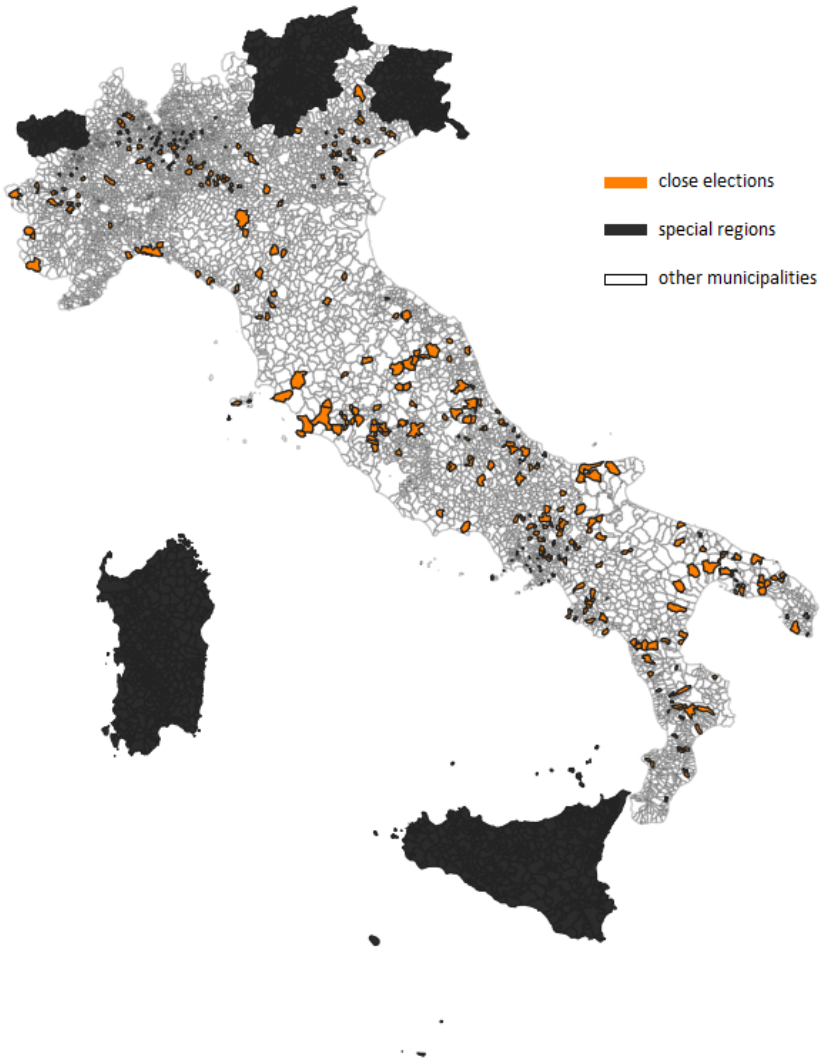
[34] Legge 81/1993 art. 2, Legge 120/1999 art. 7, and Decreto Legislativo 287/2000 art. 51 (TUEL).

[35] There is an exception if the total consecutive mandates amount to less than two years and six months, not accounting for voluntary resignation, Decreto Legislativo 287/2000 art. 51 (TUEL).

[36] Municipal elections were regulated by Legge 81/1993, in particular art. 5-7, and Decreto Legislativo 287/2000, in particular art. 71-73 (TUEL). Both of them should be considered along with their modifications.

The list attached to the mayor with the most votes gets two-thirds of the seats of the council; the remaining seats are assigned with a proportional mechanism.[37]

Figure 2.3: Italian municipal close elections (Right versus Left, 1999-2012)



Notes: In orange, Italian municipal close elections of right versus left-leaning coalitions during the period 1998-2012, within a 12.5 percentage points margin. The special regions are excluded and coloured in black. See Section 2.3 for further sample restrictions. Other municipalities are in white. The interval counts 377 close elections. Data on municipal elections is provided by the Ministry of the Interior. The Italian map is provided by ISTAT (2025a).

Above 15.000 inhabitants, there might be lists from different parties supporting the same mayor. Electors can vote for a mayor and a list not attached to one another. The mayor with the absolute majority of valid votes is elected. The seats of the council are allocated proportionally, as above, to the coalitions of lists. However, if the number of seats obtained by the coalition associated with the winning candidate has not gained at

[37]The seats are allocated sequentially, each list/coalition divides the number of votes obtained by the number of seats received so far plus one. The seat is won with the highest number.

least 60% of the seats but obtained at least 40% of the votes, and no other list or coalition exceeded 50% of the votes, then it automatically reaches 60% of the seats of the council. The seats within the coalition are then also allocated in the same proportional fashion. If no mayoral candidate secures the majority of votes, a run-off election is held in the second round.

Overall, the law envisions a majoritarian system allocating at least 60% of the seats except in very particular cases. In the period 1999-2012 and excluding special regions, the percentage of elections that ended in the first round in which the lists attached to the winning candidate obtained less than 50% (60%) of the seats in the council was 0.08% (0.14%).[38] Given the low number, I exclude such elections from the estimation sample. Moreover, I restrict the analysis to elections that end in the first round to avoid further mixing of electoral rules and conditions. I present in Figure 2.3 the 377 municipal close elections within a 12.5 percentage points vote margin between right and left-leaning mayoral candidates. The vote margin is the difference in the share of votes between the winning candidate and the second-highest-scoring candidate. These elections include only cases where the winner was left-leaning and the strongest rival right-leaning, and vice versa.

2.3 Data

This section presents the data for municipal elections and finances. It then proceeds to describe the samples and relevant statistics.

2.3.1 Municipal electoral and financial data

I use municipal elections data from the Ministry of the Interior covering the period from 1989 to 2022 (MI (2022)). As the data lacks information about party leanings, I adopt the political leaning classification presented by Gamalerio (2020) and Bracco et al. (2015); the complete list is in Table A.1 in Appendix A. Despite this classification, the presence of local parties, inherently difficult to identify, has increased throughout time. Given that local elections often involve more than two parties and frequently use coalitions, I assign

[38] Own calculations from the elections data provided by the Ministry of the Interior. The raw data has some differences from other official numbers or expected ones. The numbers shown reflect a correction attempt on my part.

the political leaning of the coalition based on the most voted list supporting the mayoral candidate. This approach attributes the overall political alignment to the list providing the most support, reflecting the primary list to which the mayor is accountable.

I use financial reports[39] detailing the revenues and expenditures of Italian municipalities covering the period from 1999 to 2012 (MI (2023a)). These financial reports are provided by the Ministry of the Interior and follow the accounting framework established by Decreto del Presidente della Repubblica 194/1996. However, from 2013 to 2016, there was a gradual transition to a new accounting form (IFEL (2012)). Since the majority of the identified close elections were before this transition, I restrict the analysis to the period 1999-2012. I focus on revenues and expenditures expressed in accrual amounts as they would capture the intentionality of the economic activity, rather than the actual cash transaction.[40] Specifically, a value under accrual accounting represents the amount that the municipality is entitled to collect or required to pay, independently of any cash movement (e.g., the amount the municipality will receive or pay as specified by the contract). The main outcome is the revenue from the sale of real estate and property rights (e.g., surface rights). The financial reports aggregate the two revenues; however, as shown in Figure 2.2, the latter constitutes only a minor portion of real estate sales.

Moreover, I construct a binary version of the outcome variable to capture the extensive margin of real estate sales (coded as 1 if there were any accrual revenues from real estate sales, and 0 otherwise). Italy adopted the Euro only in 2002; the years 1998-2001 are adjusted for the 1998 exchange rate of 1,936.27 Italian Lira per Euro. All the monetary amounts are adjusted to 2022 Euros following the inflation rates provided by FRED St. Louis for Italy (FRED (2023)). To give information on the type of real estate that municipalities sell, I collected public auction notices published in the Official Gazette of the Italian Republic for the period 1999-2012 to further characterize the sales of real estate. The collection amounted to 1,030 municipalities and 7,553 assets. However, the data are limited, as not all real estate is sold through public auctions or reported on the national gazette, but instead is advertised locally. Other data used in this study include local administrators in charge, obtained from the Ministry of the Interior (MI (2023b)). Complementary statistics about municipality codes, surface area, regions, and

[39] I present a financial report extract in Figure A.11 in Appendix A.

[40] Accrual is in reference to the Italian *impegni* and *accertamenti*. See Appendix C for more formal definitions.

demographics were sourced from the National Institute of Statistics (ISTAT (2025b)). Municipal taxes (MEF (2022)) and municipal property data are provided by the Ministry of Economics and Finance (MEF (2015a)). Records of municipalities infiltrated by the mafia are reported in the Official Gazette of the Italian Republic (OGIR (2025a)). Finally, IFEL (2024) provides the data on municipal property tax rates.

2.3.2 Descriptive statistics

The analysis employs two primary samples, one for regression discontinuity estimations and one for the investigation of political backlash and real estate revenue allocation. The regression discontinuity sample excludes: i) elections for which I do not observe the full five-year mandate, to maintain sample balance, ii) municipalities infiltrated by mafia during the period, as they were subject to a mafia shock and the administration of a nominated commission, iii) municipalities without at least one observation for the relevant variables in the mandate before the close election, to perform the balance test and covariate adjustments, iv) municipalities in special regions, as they present a high percentage of missing elections, and v) for municipalities above 15,000 inhabitants, elections in which the winning mayor did not acquire at least 50% of council seats or was not elected in the first round. A sample ignoring these exclusions would result in 700 elections within a 12.5 percentage points vote margin[41], with most of the exclusions coming from points i and iii. The second sample similarly excludes municipalities infiltrated by the mafia or located in special regions, thereby increasing comparability with the regression discontinuity sample.

In Table 2.1 I present the yearly numbers for the RDD sample. Real estate sales revenue averaged 26.85 euros per capita, the median is 0.43 euros, and the third quartile is 18.33 euros. The standard error is high relative to the mean. This could be explained by sales being an uncommon event or the majority of municipalities being small and therefore with a smaller real estate stock. These numbers give a sense of its data-generating process and difficulties in estimation. This variable captures the revenues from realized real estate sales, but not failed attempts or the quantity of real estate sold. Failure to market the real estate and the ability to better market it with a higher price are therefore confounders. I will present some estimation adjustments in the next section. To measure change in the

[41] The final interpretation does not change if these observations are left in the sample.

Table 2.1: Regression discontinuity sample (1999-2012)

Variable	Mean	SD	Min	Max	Median
Revenues					
Current grants / Current revenues	0.31	0.18	0.01	0.94	0.30
Capital grants	439.12	1067.77	0.00	28472.73	183.25
Loans taken out	193.79	360.72	0.00	9546.74	87.47
Real estate sales (binary)	0.53	0.50	0.00	1.00	1.00
Real estate sales	26.85	104.41	0.00	5062.59	0.43
Expenditures					
Loan repayments	105.93	188.51	0.72	3349.68	56.75
Real estate purchases	535.62	1002.72	0.00	22144.90	298.78
Interest expenses / Current revenues	0.06	0.03	0.00	0.21	0.05
Net purchase	508.77	1000.63	-404.36	22144.90	272.72
Municipal characteristics					
Population	13608	33699	128	608185	6156
Share below 18	0.17	0.03	0.07	0.27	0.16
Share above 65	0.21	0.05	0.07	0.47	0.20
Superficies Km^2	48.98	57.77	1.53	473.91	29.07
Degree (Mayor)	0.51	0.50	0.00	1.00	1.00
North	0.39				
Centre	0.23				
South	0.38				

Notes: The table presents the main economic and socio-geographic variables describing Italian municipalities during mayoral mandates following close elections, between right and left-leaning coalitions, in the period 1999-2012. All the monetary variables are expressed in per capita cash amounts in 2022 euros unless indicated otherwise. The columns are, respectively, the average, standard deviation, minimum, maximum, and median. Real estate sales (binary) is the proportion of municipalities with real estate sales revenue (1 if any accrual revenue from real estate sales, 0 otherwise). Capital grants are generally earmarked for investments, while current grants are not. Current revenues are those from taxes, fees, and current grants (ISTAT (2012)). See Section 2.3 for restrictions on the sample and Appendix C for accounting definitions.

size of local real estate portfolios, I use the difference between expenditure in real estate purchases and the revenues from real estate sales in a given year. This amount may not be a good proxy as the two prices might significantly differ. Similar to real estate sales, this variable has high variability, with a standard error of 1,000.63 euros and a mean of 508.77 euros per capita. Among the general population of Italian municipalities[42], real estate sales revenues amount on average to around 5% of tax revenues, 14% of the average loan taken out, and 3% of the average capital expenditure. The ratio of passive interest to current revenues[43] is the interest ratio, and it is constructed to follow the index used by the legislation to measure the sustainability of municipal debt. Over the 1998-2012 period, real estate purchases and sales show some interesting patterns. Per capita real estate purchases declined from 2004 (Figure A.3 in Appendix A), plausibly due to the DSP's constraint on investments, while real estate sales revenues remained stable. The decline in expenditure for these purchases is also noticeable between municipalities below and above the DSP threshold of 5.000 inhabitants (Figure A.5 in Appendix A).

2.4 Empirical analysis

In this section, I study the difference in real estate portfolios between right and left-leaning mayors for Italian municipalities during the period 1999-2012. I proceed in multiple steps. I first present the identification strategy and test the required assumptions. I then present and comment on the regression discontinuity estimates. I then test the robustness of the results by using higher-order polynomials and including fixed effects and covariates. Finally, I investigate possible explanations for the results found.

2.4.1 Empirical strategy

A direct comparison of real estate purchases and sales across municipalities ruled by the two political parties would not have a clear interpretation, as these municipalities might differ on other dimensions. Therefore, I focus on cases where a candidate mayor supported by the left narrowly won and the strongest rival was supported by the right, and vice

[42]The sample used is the one for the estimation of political backlash and the allocation of real estate sales revenues.

[43]Current revenues come from taxes, government grants not earmarked for investments, and extra-tributary revenues.

versa. Using a regression discontinuity design over close elections, I rely on the assumption that small random factors might influence the outcome, thereby locally randomizing the treatment. The running variable, $VoteMargin$, is the percentage point difference between the winning mayoral candidate and the second-highest scoring candidate. This variable describes how close the election was. For ease of interpretation, I set it negative for the right and positive for the left.

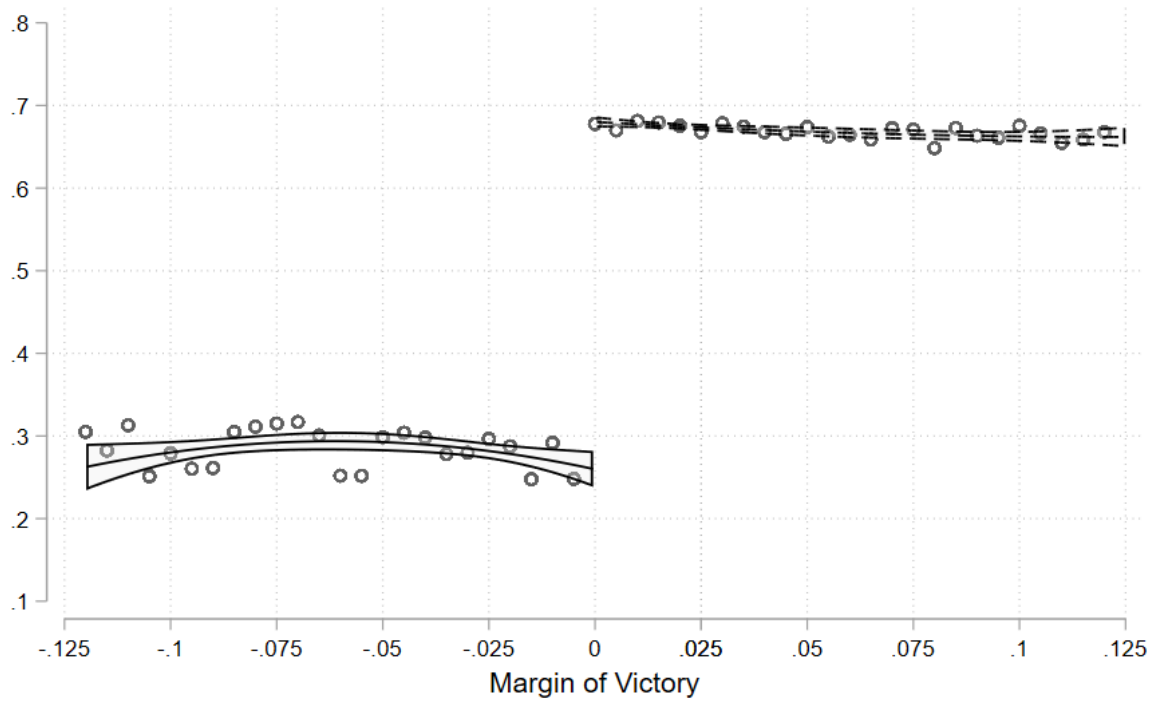
The RDD equation with a local first-order polynomial has the following form:

$$Y_{it} = \beta_0 + \beta_1 VoteMargin_{it} + \beta_2 Left_{it} + \beta_3 VoteMargin_{it} \times Left_{it} + \epsilon_{it} \tag{2.1}$$

The observations are averaged over the mayoral term of five years. This approach aims to reduce the amount of noise to improve the precision of the polynomial fit. In Equation (2.1), $Left_{it}$ is a dummy variable that takes the value of one if the election was won by a left-leaning mayor ($VoteMargin_{it} > 0$) in municipality i for the election t. Y_{it} is the outcome variable of real estate sales or net purchases. I measure the former as the intensive margin, through real estate sales revenues, and as the extensive margin, through the binary real estate sales variable. Specifically, this binary variable can be interpreted as the proportion of years in which the municipality had any revenues from real estate sales (e.g., 3/5 if a municipality had real estate sales for three years during the mandate). I estimate a robust regression discontinuity following Calonico, Cattaneo, and Farrell (2019, 2018, 2022), Calonico, Cattaneo, Farrell, and Titiunik (2017, 2019), and Calonico, Cattaneo, and Titiunik (2014a,b, 2015a,b). The coefficient of interest is β_2, capturing the difference in levels of the left over the right according to the linear control functions in the $VoteMargin$. According to the political economy hypothesis, β_2 should be negative for real estate sales and positive for net purchases. The coefficients β_1 and $\beta_1 + \beta_3$ represent the slope in the running variable around the cutoff for right and left-leaning municipalities, respectively. Since these slopes could play a major role in the estimation of β_2, I formulate a hypothesis about their signs. I hypothesize these slopes reflect more moderate policies as elections become closer, motivated by an attempt to appeal to the median voter. Specifically, I expect β_1 and $\beta_1 + \beta_3$ to be negative for the sales of real estate, and positive for net purchases.

The mayoral candidate's vote margin serves as the running variable due to the presence

Figure 2.4: Share of council seats



Notes: Regression discontinuity for the share of council seats in close elections between left and right-leaning coalitions. The estimation uses a second-order polynomial in the margin of victory and a triangular kernel. The margin of victory indicates the percentage point difference with respect to the strongest rival coalition; positive for winners and negative for losers. The bandwidth is 12.5 percentage points. The grey bands capture 95% confidence intervals. The observations considered are before the drop of winning coalitions that do not achieve at least 50% of council seats.

of a majority premium of council seats that may be awarded to the winner. Crossing the running variable threshold can therefore be interpreted as a shift in the mayor's political leaning. To ensure that the elected mayor holds sufficient support to implement policies, the sample excludes elections where the supporting coalition failed to secure the majority of council seats. However, for municipalities above 15,000 inhabitants, the counterfactual of an electoral outcome faces two key challenges. First, although rare, a candidate can be elected mayor even if the supporting coalition does not obtain the majority of council seats. Although the sample excludes such cases, this possibility implies that crossing the threshold does not necessarily bring a shift in council control. In practice, however, as shown in Figure 2.4, changes in council seat shares are evident even without excluding municipalities over 15,000 inhabitants or cases where the mayor lacks a council majority. The running variable, in this figure, is the percentage-point margin over the strongest rival mayor—positive for winners, negative for losers. The flatness of the polynomial to the right of the cutoff likely reflects the majority premium. Second, even though the

sample is restricted to elections that end in the first round, the appropriate counterfactual for a narrowly elected mayor may not be the rival's victory, but rather the election proceeding to a second round. These issues complicate the interpretation of the treatment effect. To address these concerns, I present in the robustness checks an estimation limited to municipalities below 15,000 inhabitants. In this sub-sample, crossing the threshold implies a shift in both the mayor's leaning and the majority of the council.

2.4.2 Identification tests

The identification requires that no other treatments occur at the cutoff, confounding the researched treatment, the inability of municipalities to manipulate the running variable, and the continuity of the outcome variable at the cutoff. The RDD also relies on the assumption that near the cutoff, small random factors can influence the location of the running variable, thereby randomizing the treatment of the observations and therefore getting closer to a benchmark experiment. In the following, I assess the credibility of the identification.

A random assignment would approach a balance of the predetermined characteristics between the two sides, if close enough to the cutoff. Despite being an observational study, I can test differences in variables belonging to the term preceding the close elections for which I observe at least one year.[44] I therefore estimate a robust regression discontinuity as in Equation (2.1) for a list of outcome variables presented in Table A.4 in Appendix A. Each dependent variable is averaged over the mayoral term, and I use the optimal bandwidth for each variable as a reference. Moreover, every estimation uses election year and the region as fixed effects[45], a first-order polynomial, a triangular kernel, and vote margin as running variable. I present the results in Table A.4 in Appendix A. The columns Right and Left indicate the average over their respective half-intervals.

The interest ratio has a small yet statistically significant difference; however, given the number of tests, such a result might arise by chance. The number of observations is not high, and failure to reject the null hypothesis of no difference might be the result of low power. More importantly, there are other relevant differences across municipalities, such as population, the share of municipalities below 5.000 inhabitants, and other economic

[44] Imposing observation of the full term would result in too many elections being dropped.
[45] Except for North, Centre, and South, which only use election year fixed effects.

variables. For this reason and to reduce the influence of other possible confounders, I include covariates in the robustness estimations. Revenues from real estate sales also show high variation, resulting in an exceptional point estimate compared to the much lower difference in means. Similarly, some other economic variables display a huge point estimate due to a few extreme observations; however, their exclusion does not change the test results. I estimate a seemingly unrelated regression to test the joint hypothesis of discontinuity in the variables (Lee and Lemieux (2010)), using Equation (2.1) and fixed effects for region and election year. For each variable, I use the optimal bandwidth as a reference, a first-order polynomial, and a triangular kernel. The test fails to reject the null hypothesis with an F statistic of 0.681.

Finally, an RDD requires the unit of observations to be unable to sort themselves into or out of treatment; otherwise, the selection would interfere with the randomization. The manipulation density test measures precisely a tendency of the units to select into treatment, thereby creating an abnormal mass in the distribution of the vote margin that defines the treatment. I perform the test following Cattaneo, Jansson, and Ma (2018, 2020, 2022, 2024). The test fails to reject the null hypothesis of no discontinuity (Figure A.6 in Appendix A).

2.4.3 Results

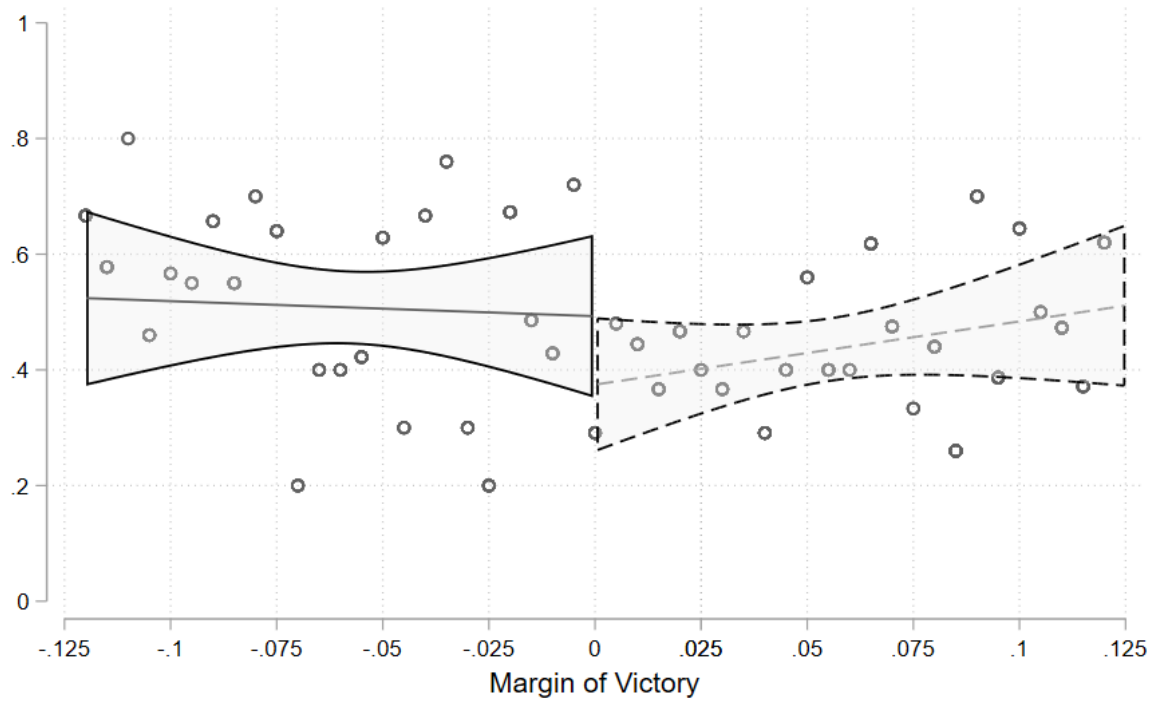
I begin by examining the impact on real estate sales, first as a binary variable and then in per capita terms. I then investigate net purchases. For each variable, I estimate the average outcome at the cutoff to assess the political difference at several bandwidths. Next, I present the regression discontinuity plots at a reference bandwidth and robust estimates across multiple bandwidths (Equation (2.1)). Finally, the following section tests the robustness of the results.

I estimate the mean difference in the binary real estate sales outcome between right and left-leaning municipalities using a simple regression that includes an intercept and an indicator for a right-leaning mayor winning (Table A.5 in Appendix A). Across all bandwidths, right-leaning mayors appear to have a higher proportion of years in which they sell real estate, with differences ranging from 3.9 to 20 percentage points. However, these differences are statistically imprecise, and the largest discontinuity is found right at the cutoff. Similarly, the RDD plot in Figure 2.5 also exhibits a generally higher level

for right-leaning municipalities. To avoid overfitting noise with higher-order polynomials, I rely on a first-order model (Equation (2.1)); however, this approach does not provide a good fit. Notably, the right-leaning side of the figure displays higher variation, possibly due to the lower number of observations. Overall, the patterns are not strong, and the high variation could be indicative of heterogeneity in investment and divestment opportunities not captured by a political component simply estimated through the victory margin. The plot of an RDD is, however, useful for inference. Figure 2.5 does not show a strong pattern suggestive of an effect. The plot aligns with the mean estimations; nevertheless, the uncertainty is high enough to hide a potentially small effect. Furthermore, β_1 displays a negative slope towards the cutoff. This slope is consistent with the hypothesis that a closer election might call for fewer real estate sales, as they might not be seen with a good eye by the median voter. For this reason, I investigate in another section the possibility of backlash following the sale of real estate. However, $\beta_1 + \beta_3$ is positive and against the slope hypothesis. Importantly, these slopes are dangerous for inference when a strong pattern is not present, as they might exacerbate the discontinuity artificially and lead to wrong conclusions. I report the RD robust estimates (β_2) in Table 2.2 using a linear polynomial and a triangular kernel (Equation (2.1)). The table presents the estimates for several bandwidths, with the optimal bandwidth in the first column. I focus on the robust rows, indicating point estimates and standard errors that account for bias correction. At the optimal bandwidth, left-leaning municipalities have 12 percentage points (CI: -28 to 4) fewer years in which they sell real estate. This difference is not statistically significant, and the magnitude varies substantially across bandwidths, while the sign remains consistent.

Investigating the intensity of real estate sales through revenues per capita yields similar conclusions. The mean differences in Table A.5 in Appendix A suggest that municipalities under right-leaning mayors tend to have higher revenues from real estate sales, ranging from -1.03 to 8.11 euros per capita. Similarly, these differences are statistically imprecise and present a surge around the 5% bandwidth. The RDD plot in Figure 2.6 again exhibits a poor fit and higher variation in the right-leaning side of the figure. Moreover, the patterns are not suggestive of a clear discontinuity and present a high level of variability capable of hiding a small effect. As in the binary case, both sides (β_1, $\beta_1 + \beta_3$) display a negative slope towards the cutoff. Given the high variability and the poor fit,

Figure 2.5: Real estate sales revenues (binary)



Notes: Linear polynomial fitted on both sides of the cutoff using the percentage point difference of the winning coalition over the rival coalition as running variable (negative for right-wing and positive for left-wing). The estimation uses a bandwidth of 12.5 percentage points and a triangular kernel. The outcome is the proportion of years over the mayoral term in which the municipality has any accrual real estate sales revenue. See Section 2.3 and Appendix C for accounting definitions. The bands represent a 95% confidence interval. The points represent bins of 0.5%.

the right-leaning slope is likely unreliable. Finally, the point estimates (β_2) presented in Table 2.2 suggest an overall negative effect, yet not statistically significant. At the optimal bandwidth, left-leaning municipalities appear to have 6.18 euros per capita (CI: -21.12 to 8.76) less in real estate sales revenues.

The analysis involving net purchases also leads to a similar interpretation. The mean differences in Table A.5 in Appendix A show that municipalities under right-leaning mayors have higher net purchases, ranging from 5.61 to 244.87 euros per capita. Contrary to the previous results, this is not consistent with the political economy hypothesis that right-leaning municipalities would shrink their local real estate portfolios. These differences are still statistically imprecise, and there is a large increase between the 1% and 5% bandwidths. The RDD plot in Figure 2.7 displays an unclear pattern that the control functions struggle to fit. This time, the variation is comparable between the right and left-leaning sides of the graph. The patterns are again not suggestive of a clear discontinuity, and the high variability renders detecting a small effect very challenging. Both

Table 2.2: RDD left-leaning difference in real estate sales revenue (binary)

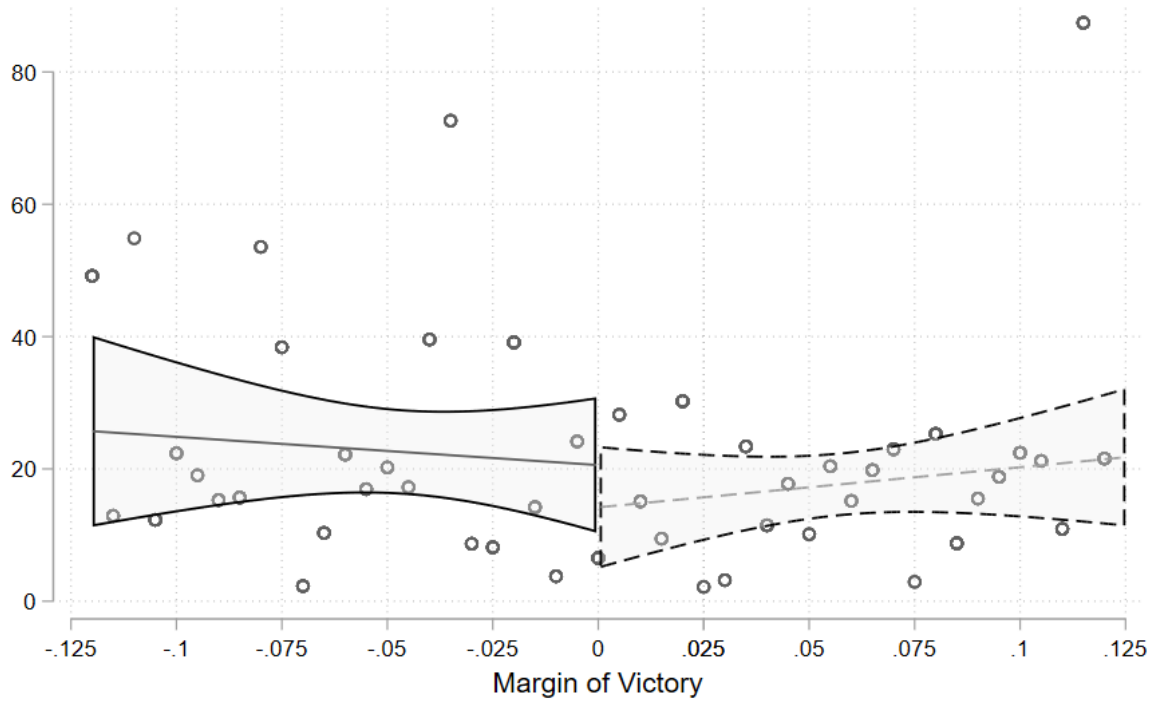
	Bandwidths						
	optimal	0.05	0.075	0.1	0.125	0.15	0.2
Binary							
opt: 0.244 N: 642							
Conventional	-0.118*	-0.194	-0.175	-0.140	-0.118	-0.103	-0.111
	(0.068)	(0.162)	(0.126)	(0.107)	(0.094)	(0.086)	(0.075)
Robust	-0.120	-0.372	-0.216	-0.224	-0.196	-0.175	-0.110
	(0.082)	(0.230)	(0.193)	(0.165)	(0.144)	(0.131)	(0.111)
Real estate sales							
opt: 0.134 N: 407							
Conventional	-6.711	1.012	-4.549	-5.358	-6.387	-6.592	-6.550
	(6.513)	(8.874)	(7.218)	(6.930)	(6.558)	(6.438)	(5.870)
Robust	-6.183	-6.348	3.238	-0.914	-2.882	-4.627	-5.648
	(7.622)	(13.924)	(10.995)	(9.118)	(8.314)	(7.966)	(7.465)
Net purchase							
opt: 0.141 N: 422							
Conventional	-229.825**	-125.919	-235.587**	-258.561**	-253.968**	-216.558**	-154.056
	(101.109)	(104.187)	(104.098)	(105.432)	(103.969)	(100.180)	(94.682)
Robust	-265.255**	198.648	-52.483	-145.025	-228.484**	-286.919**	-286.705**
	(114.440)	(130.917)	(120.795)	(112.582)	(112.763)	(114.383)	(113.665)
N		150	227	300	377	442	553

Notes: Robust RDD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. The estimations use a linear polynomial and a triangular kernel. See Section 2.3 and Appendix C for accounting definitions. The optimal bandwidths along with their number of observations are displayed below the respective outcome variables. *** 1%, ** 5% and * 10%.

leanings display a positive slope (β_1, $\beta_1 + \beta_3$) compatible with the slope hypothesis. As before, the high variability and the poor fit make the slopes not credible. Moreover, these slopes could be driven by the jumps found in the mean estimates and invite caution in the interpretation of the final results. The robust estimates (β_2) suggest a negative effect, which becomes statistically significant only at larger intervals (Table 2.2). At the optimal bandwidth, left-leaning municipalities appear to have a statistically significant difference of -265.26 euros per capita.

At face value, these estimates support that right-leaning municipalities have a higher tendency towards selling real estate. At the same time, they also possibly renovate their real estate portfolios with new purchases. Many estimates are not distinguishable from noise, and the graphical depictions do not support clear discontinuities. Overall, the polynomial fits are too poor to render the statistically significant results believable.

Figure 2.6: Real estate sales revenues (per capita)



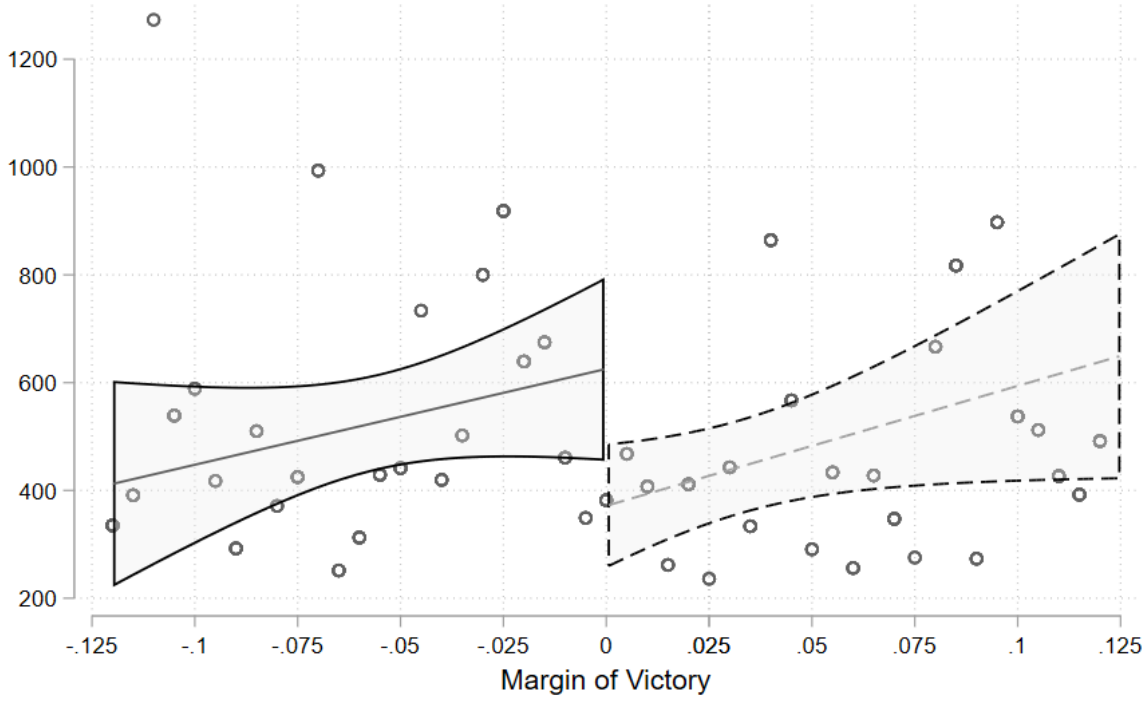
Notes: Linear polynomial fitted on both sides of the cutoff using the percentage point difference of the winning coalition over the rival coalition as running variable (negative for right-wing and positive for left-wing). The estimation uses a bandwidth of 12.5 percentage points and a triangular kernel. The outcome is the accrual real estate sales revenue averaged over the mayoral term. See Section 2.3 and Appendix C for accounting definitions. The bands represent a 95% confidence interval. The points represent bins of 0.5%.

2.4.4 Robustness checks

This section tests the robustness of the findings by estimating different RDD specifications, employing a donut hole RDD, and assessing placebo effects at random cutoffs.

The results have a similar interpretation when using a quadratic polynomial (Table A.6 in Appendix A) or adjusting for region and election year fixed effects, population, and surface area (Table A.7 in Appendix A). Being an observational study, covariate adjustments are necessary to attempt a better comparison and reduce statistical uncertainty. Importantly, the inclusion of covariates in a robust RDD might not retain consistency if the covariates do not have the same conditional expectation limits from above and below the cutoff (Calonico, Cattaneo, Farrell, and Titiunik (2019)). I present in Table A.8 in Appendix A the estimates, including linear covariates adjustment from the previous mandate. The net purchase specification now shows a consistently negative sign with statistical significance at most bandwidths. Moreover, the binary specification exhibits

Figure 2.7: Real estate net purchase (per capita)



Notes: Linear polynomial fitted on both sides of the cutoff using the percentage point difference of the winning coalition over the rival coalition as running variable (negative for right-wing and positive for left-wing). The estimation uses a bandwidth of 12.5 percentage points and a triangular kernel. The outcome is the accrual real estate net purchase, expressed as the money amount difference between purchase and revenues of real estate, averaged over the mayoral term. See Section 2.3 and Appendix C for accounting definitions. The bands represent a 95% confidence interval. The points represent bins of 0.5%.

large estimates along with reduced standard errors with respect to previous specifications. This could be the result of a bias introduced by unbalanced covariates, possible misspecification, and the means around the cutoff inducing a slope. To test the latter hypothesis, I estimate donut-hole regression discontinuities for the reference bandwidth of 12.5% and considering a drop of up to 0.3% (Table A.9 in Appendix A). The removal of a few observations around the cutoff halves the estimates for binary real estate sales. This gives more support for the unreliability of the previous estimates. The net purchase specification maintains magnitude and statistical significance across the donut-holes, yet this is likely due to its higher means being located farther away from the cutoff.

As it is apparent from the RDD plots, there is a considerable amount of noise. This introduces statistical uncertainty and the possibility of finding discontinuities where there are none. To better investigate the phenomenon, I perform a placebo test using different cutoffs in the range -10% and +10% and compare the robust estimates with the ones at

0%.[46] I plot in Figure A.7 in Appendix A the distributions of the absolute value of the robust estimates using linear covariate adjustments, the optimal bandwidth, a triangular kernel, and a linear polynomial. The estimates at the 0% cutoff are towards the tail of the distribution. Importantly, the placebo estimates are of considerable size. Considering all the specifications, the estimates found are consistent with being the result of noise. It is possible to have a political effect on the size of municipal real estate portfolios; however, it is likely small enough to disappear in the amount of noise.

2.4.5 Further results

The political component doesn't seem to stand out, given the amount of uncertainty around the variable. Multiple factors could be at play, confounding a possibly identifiable pattern. In this section, I investigate possible explanations for the results found. An electoral backlash from real estate sales, portrayed by the opposition as mismanagement, financial trouble, or *selling off people's properties*, might influence the mayor and prevent her from adhering to her political ideologies. I therefore estimate the relationship between real estate sales during the mayoral mandate and a number of re-election outcomes. More specifically, a linear model on the incumbent margin in the second election (Equation (2.2) in Appendix B), a Logit model for whether the incumbent is running or winning, and for the latter, also restrict the sample to incumbents with a previous victory margin less than 5 percentage points (Table A.3 and Equation (2.3) in Appendix B). The observations are averaged over the mayoral mandate. I do not find evidence of electoral backlash from real estate sales. This finding could be explained by the high amount of unusable real estate and the heterogeneity of the real estate sold. Land, for example, can bring more houses and jobs.

The allocation of real estate sales revenues might also be a factor. I exhibit in Table A.2 in Appendix A the results of a pooled OLS to highlight the relationship of real estate sales with capital expenditure[47], real estate purchases, loan repayments, and loans taken out (Equation (2.2) in Appendix B). The model assumes that the outcome variables depend on current demographic factors, past economic results, and current real estate sales revenues. I find a positive and significant relationship between real estate sales and

[46] I preferred this interval since the observations become more scarce farther away.

[47] Expenditure related to public asset accumulation (ISTAT (2012)), such as the purchase of real estate or road construction.

both capital expenditure and real estate purchases. This suggests a use for investment financing and restructuring of the real estate portfolio.

I continue by presenting the estimates for different kinds of samples and specifications in Figures A.8 to A.10 in Appendix A. Importantly, these estimations do not use any covariate adjustments, and their sample sizes might be greatly reduced due to their characteristics. The specifications follow one of the following restrictions: i) sample period, ii) previous municipal leaning, iii) population size, or iv) use cash values or other transformations. Two periods are particularly relevant for this research. The first is 2005-2012, when investment was constrained by the DSP and decreased overall. The second is 1999-2007, which excludes the Financial Crisis. The latter is the only statistically significant specification and solely for net purchases; however, the estimate aligns with the baseline model. In addition, restricting the sample to municipalities below 5,000[48] inhabitants, those subject to the DSP's constraints, results in estimates not statistically distinguishable from zero; however, the sample size is particularly small. Another relevant factor influencing municipalities is the conditions they face at the start of the mandate. I therefore consider three different samples. The switcher sample includes only municipalities for which the leaning changed in the close election. The ATT left sample considers only the elections that used to have a left-leaning local government. The cutoff, therefore, defines a treatment to either elect a right-leaning candidate or re-elect a left-leaning one; similarly for the ATT right sample. The only statistically significant results are observed for net purchases in the ATT left sample, though aligned with the baseline estimates, and in the Switchers sample for real estate sales per capita. Furthermore, I repeat the estimation by focusing on municipalities with fewer than 15.000 inhabitants to have a better balance and a simpler treatment interpretation. The estimates are consistent with the baseline sample. I reach a similar conclusion, estimating the discontinuity using cash revenues. Overall, the discontinuities for both real estate sales variables are not distinguishable from zero, with few exceptions. Net purchases are largely consistent with the baseline findings, with only some specifications resulting in null results. All the specifications have a poor polynomial fit or lack a strong pattern to lend credibility to the point estimates.

[48] I also exclude mandates over the years 1999-2000, as in that year the DSP was applied to every municipality and revenues from real estate sales were included in the objective.

2.5 Conclusion

I examine the influence that left and right-leaning Italian municipal parties had on local real estate portfolios during the period 1998-2012 through the purchase and sales of real estate. The economic literature studied the two ideologies in local governments around the world and presented evidence supporting influences on local taxes, expenditure, employment, and outsourcing (Pettersson-Lidbom (2008), Freier and Odendahl (2015), and Elinder and Jordahl (2013)). I investigate the difference in the size of local real estate portfolios by looking at purchases and sales of real estate assets. To this end, I estimate regression discontinuities (RD) models over close elections, using as a running variable the vote margin of the winning mayoral candidate over the strongest rival.

Contrary to the differences found in the previous literature on fiscal outcomes, I do not find strong evidence for a political influence on real estate portfolios. The outcomes are subject to great statistical uncertainty capable of hiding a small political effect, and the RDs do not result in good polynomial fits. I find that left-leaning municipalities have a statistically significant difference, resulting in 265.26 euros lower net purchases per capita. These are defined as the monetary difference between purchases and sales of real estate. However, the poor polynomial fit undermines the credibility of this result. I investigate several explanations for the results found: i) the political backlash following real estate sales, ii) the allocation of the revenues, and iii) the heterogeneity of the real estate sold. While I do not find a strong relationship between electoral outcomes and real estate sales, the revenues generated are primarily correlated with expenditure contributing to asset formation[49] (e.g., road construction, purchase of machinery, etc.), and real estate purchases in particular. However, restricting the sample to a period of constrained investment does not change the overall interpretation. Furthermore, the heterogeneity of the real estate auctioned, ranging from agricultural land to ambulatories, provides insights into local economic conditions and opportunities, likely being stronger drivers of real estate sales. Overall, the lack of political backlash and the variation in local conditions and opportunities seem to prevail over a political component. Moreover, adjusting the sample to fiscal rules constraints introduced by the Domestic Stability Pact, population, different variable definitions, or the political leaning preceding the

[49] ISTAT (2012).

close elections, does not lead to a different interpretation.

Political influences on municipal real estate portfolios are of particular importance when it comes to public service, the use of public resources, and the local electoral cycle. Furthermore, the presence of this political influence may distort the effect of real estate management policies, such as the transfers of real estate to lower levels of government. While this research does not find strong evidence for the presence of this effect, further research could be done leveraging data from other countries and better outcome measures.

Appendix A: Figures and Tables

Table A.1: Leanings of Italian local parties

Right leaning parties	Left leaning parties
CEN-DES(LS.CIVICHE)	CEN-SIN(LS.CIVICHE)
CENTRO DESTRA	CENTRO SINISTRA
FORZA ITALIA	DEMOCRATICI SINISTRA
LEGA NORD	PDS
CENTRO	SINISTRA
ALLEANZA NAZIONALE	P.POPOLARE ITALIANO
POLO PER LE LIBERTA'	PPI (POP)
CENTRO CRIST.DEM	DL.LA MARGHERITA
CASA DELLE LIBETA'	RIFONDAZIONE COMUNISTA
CDU	LA MARGHERITA
IL POPOLO DELLA LIBERTA'	PROGRESSISTI
LEGA LOMB-LEGA NORD	CEN-SIN(CONTR.UFF)
LG.NORD-LG.VENETA	PARTITO DEMOCRATICO
L.VEN-L.NORD	POPOLARI
PDL-UNIONE DI CENTRO	SINISTRA IND.
UNIONE DI CENTRO	PER VERONA
CCD-CDU	PROGRESSISTI SALERNO
DESTRA	SDI-ALTRI
FI-CCD.	FED.DEI VERDI
FI-CCD-AN	UNITI NELL'ULIVO
NUOVO PSI	ALL. DI PROGRESSO
CDL	CENTROSINISTRA
CENTRODESTRA	I DEMOCRATICI
LG.VENETA REPUBBLICA	LA MARG.
FI-CCD-CDU	SDI
FORZA IT-POLO POP.	I SOCIALISTI-ALTRI
AN-P.SEGNI	P.DEM
CEN-DES(CONTR.UFF.)	PATTO DEMOCRATICI
IL POPOLO DELLA	POPOLARI-CIVICA
LIBERTA'-ALTRI	
IL POPOLO DELLA LIBERTA'-LEGA	VERDI
NORD	
LEGA NORD-ALTRE	CEN-SIN(CONTR.UFF.)
L.NORD-CIVICHE	CIVICA MARGHERITA
LEGA PADANA LOMBARDIA -	L'ULIVO
ALTRI	
NO EURO	SINISTRA DEMOCRATICA
	L'UNIONE
	LA MARG.
	PARTITO DEMOCRATICO-CIVICA
	PARTITO SOCIALISTA
	SINISTRA ECOLOGIA LIBERTA'

Notes: Leaning identification of municipal Italian parties following Bracco et al. (2015) and Gamalerio (2020).

Table A.2: Linear model: allocation of real estate sales revenues (per capita)

	Capital expenditure	Real estate purchase	Loans payment	Loans taken out
real estate sales (binary)	6.106	45.255***	2.541	6.336
	(13.080)	(13.470)	(1.725)	(4.156)
real estate sales revenues	1.030***	0.248	-0.012	-0.011
	(0.051)	(0.162)	(0.008)	(0.030)
sales × left	-0.054	0.580***	0.044**	-0.030
	(0.096)	(0.186)	(0.021)	(0.053)
sales × right	0.103	0.693***	0.039	0.010
	(0.160)	(0.210)	(0.026)	(0.061)
share below 18	-2017.164*	-2874.246**	-142.297**	-100.566
	(1227.770)	(1225.660)	(63.005)	(180.560)
right	-16.068	-45.719**	-2.326	13.567*
	(21.629)	(21.149)	(2.975)	(7.269)
left	8.380	-56.841**	0.847	20.927***
	(21.767)	(22.549)	(2.656)	(6.345)
lag cumulative sales	0.048*	0.069*	0.006	-0.021
	(0.026)	(0.040)	(0.008)	(0.019)
lag cumulative purchases	-0.084***	-0.074***	0.002***	-0.006***
	(0.009)	(0.008)	(0.000)	(0.002)
lag interest ratio	-3599.750***	-4211.173***	408.911***	-1910.264***
	(647.026)	(621.297)	(77.641)	(259.545)
lag grants/curr. rev.	209.945	-225.925***	-49.259***	-68.337**
	(149.532)	(70.995)	(10.426)	(27.241)
lag pers. exp./curr. exp.	-1049.721***	-1068.350***	-29.672	13.273
	(214.217)	(175.017)	(23.145)	(47.237)
Municipality FE				
Year FE				
Adj R2	0.395	0.366	0.565	0.296
Municipalities	5317			
Observations	63804			

Notes: Pooled OLS models for the period 2000-2011 (Equation (2.2) in Appendix B). The observations are at the municipal-year level. All the variables are at time t unless indicated otherwise. The economic variables are in accrual per capita terms expressed in 2022 euros. Sales stands for real estate sales revenues, while purchase stands for real estate purchases. Real estate sales binary is a dummy equal to 1 if the municipality has any accrual real estate sales revenues in that year, zero otherwise. The ratios are in order: current interest expenditure over current revenues, current grants over current revenues, and personnel expenditure over current expenditure. Capital grants are generally earmarked for investments, while current grants are not. Current revenues are those from taxes, fees, and current grants (ISTAT (2012)). For spacing reasons, I omitted the intercept, the share of population above 65, municipalities aligned with the national government, capital grants, surplus, capital expenditure, loans taken out, and loan repayments. Standard errors in parentheses and clustered at the municipal level. See Section 2.3 and Appendix C for accounting definitions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table A.3: Relationship between real estate sales and incumbent re-election

	Incumbent re-election	Margin $< 5\%$	Incumbent margin	Incumbent run
first margin	3.737611***	12.590101***	0.047536***	-0.751831***
	(0.318755)	(4.413824)	(0.005124)	(0.147642)
real estate sales binary	0.004646	0.021055	0.003403	-0.000379
	(0.086358)	(0.180563)	(0.002113)	(0.060327)
real estate sales revenues	0.000313	0.000535	0.000004	-0.000101
	(0.000361)	(0.001098)	(0.000006)	(0.000149)
loans taken out	0.000354*	0.000996**	0.000005	0.000270**
	(0.000196)	(0.000418)	(0.000004)	(0.000124)
loan repayments	-0.000657**	-0.001373**	-0.000016**	-0.000290
	(0.000322)	(0.000655)	(0.000008)	(0.000206)
interest ratio	-1.393303	-5.052017*	-0.023273	-2.463097***
	(1.226472)	(2.632676)	(0.029940)	(0.898794)
share higher 65	-1.769331	-0.407707	-0.028617	-1.418675*
	(1.137728)	(2.570524)	(0.026775)	(0.740957)
grants/curr. rev.	1.229410***	0.605505	0.025025***	0.218231
	(0.321616)	(0.684215)	(0.007618)	(0.230664)
Year FE				
Region FE				
Adj R2			0.023	
Municipalities	4696	1200	4696	5506
Observations	6358	1200	6358	9453

Notes: The first column is a Logit estimation for the re-election of the incumbent. The second column reduces the sample to the incumbent that won with a margin of 5% or less in the previous election. The third column estimates an OLS for the margin of victory in the re-election (Equation (2.2) in Appendix B). The fourth column examines the decision to run. The ratios are in order: current interest expenditure over current revenues and current grants over current revenues. Capital grants are generally earmarked for investments, while current grants are not. Current revenues are those from taxes, fees, and current grants (ISTAT (2012)). The economic variables are previous mandate averages in accrual per capita terms expressed in 2022 euros. For spacing reasons, I omitted the intercept, property tax, capital expenditure, real estate purchase, a dummy for whether the mayor has a college degree, whether the municipality is aligned with the national government, population, surplus, personnel exp over current expenditure, and share of population below 18. See Section 2.3 and Appendix C for accounting definitions. Standard errors in parentheses and clustered at the municipal level. The Logit models follow Equation (2.3) in Appendix B. The fixed effects are estimated as linear dummies. The use of the region fixed effect level is motivated by the low number of time periods (elections) per municipality. Logit models estimated with conditional fixed effects at the municipal level yield similar results. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table A.4: Balance test

Variable	Right	Left	Estimate	SE	P-value
Population	9492.595	12588.932	3925.330	3214.789	0.22
Population <5.000	0.541	0.409	-0.080	0.111	0.47
Share above 65	0.196	0.188	-0.007	0.012	0.55
Share below 18	0.179	0.176	-0.001	0.005	0.82
Degree (Mayor)	0.520	0.549	-0.005	0.108	0.97
Surface Km^2	46.005	41.953	-7.842	7.256	0.28
Altitude	307.527	273.544	16.928	39.200	0.67
North	0.325	0.396	0.137	0.101	0.17
Centre	0.166	0.187	-0.051	0.075	0.50
South	0.483	0.401	-0.113	0.097	0.24
Property tax	0.522	0.519	0.007	0.013	0.62
Capital grants	475.589	316.020	-382.530	540.178	0.48
Loan taken out	191.439	189.827	-4.400	38.333	0.91
Real estate sales (binary)	0.462	0.467	0.048	0.090	0.60
Real estate sales	27.296	21.351	-16.914	14.754	0.25
Surplus	629.647	110.545	-3034.006	2938.415	0.30
Curr. grants/curr. rev.	0.413	0.386	-0.013	0.026	0.61
Loan repayment	72.645	76.052	-6.800	16.251	0.68
Real estate purchase	543.930	471.570	-191.673	191.825	0.32
Net purchase	522.838	454.949	-185.467	189.996	0.33
Interest ratio	0.065	0.065	-0.013	0.006	0.03
Personnel exp./curr. exp.	0.362	0.341	0.000	0.015	0.99
Number of elections within 12.5%	171	206			

Notes: Balance test for variables averaged over the previous term of the close elections. The RDD is estimated using the robust estimator, the optimal bandwidth, election year, and region fixed effects, a first-order polynomial, and a triangular kernel. The Right/Left columns, representing the leaning in the future close election, display the mean across the observations in their respective half-intervals. Capital grants are generally earmarked for investments, while current grants are not. Current revenues are those from taxes, fees, and current grants (ISTAT (2012)). The economic variables are expressed in accrual per capita terms in 2022 euros. The interest ratio is current interest expenditure over current revenues. See Section 2.3 and Appendix C for accounting definitions.

Table A.5: Mean differences between right and left-leaning coalitions

	Bandwidths						
Variable	0.01	0.025	0.05	0.10	0.125	0.15	0.2
Binary							
	0.200	0.095	0.119*	0.086*	0.080**	0.081**	0.039
	(0.165)	(0.088)	(0.063)	(0.044)	(0.039)	(0.036)	(0.033)
Real estate sales							
	-1.033	1.672	8.107	5.866	4.265	4.766	3.414
	(8.042)	(7.580)	(5.794)	(4.031)	(4.488)	(4.002)	(3.431)
Net purchase							
	5.605	244.867**	148.141	25.047	21.223	45.323	50.004
	(92.891)	(99.513)	(96.761)	(75.601)	(62.458)	(55.285)	(45.915)
N	28	81	150	300	377	442	553

Notes: Coefficient estimates of right-wing coalitions winning in a linear model including an intercept. The bandwidth defines the interval of observation used. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. See Section 2.3 and Appendix C for accounting definitions. *** 1%, ** 5% and * 10%.

Table A.6: RDD left-leaning difference (quadratic)

	Bandwidths						
	optimal	0.05	0.075	0.1	0.125	0.15	0.2
Binary							
opt: 0.321 N: 782							
Conventional	-0.111	-0.372	-0.216	-0.224	-0.196	-0.175	-0.110
	(0.088)	(0.231)	(0.194)	(0.166)	(0.144)	(0.131)	(0.111)
Robust	-0.100	-0.409	-0.393	-0.261	-0.248	-0.243	-0.223
	(0.099)	(0.278)	(0.242)	(0.219)	(0.195)	(0.179)	(0.152)
Real estate sales							
opt: 0.182 N: 517							
Conventional	-5.821	-6.348	3.238	-0.914	-2.882	-4.627	-5.648
	(7.567)	(14.028)	(11.047)	(9.151)	(8.338)	(7.985)	(7.479)
Robust	-6.393	-18.974	-6.854	1.615	0.947	0.824	-3.689
	(8.308)	(21.284)	(15.266)	(13.106)	(11.367)	(10.061)	(8.972)
Net purchase							
opt: 0.197 N: 547							
Conventional	-289.640**	198.648	-52.483	-145.025	-228.484**	-286.919**	-286.705**
	(114.021)	(131.862)	(121.347)	(112.973)	(113.082)	(114.663)	(113.889)
Robust	-305.894**	159.604	263.099*	48.212	-42.088	-101.401	-263.441**
	(123.019)	(155.539)	(142.785)	(136.046)	(125.391)	(119.937)	(117.702)
N		150	227	300	377	442	553

Notes: Notes: Robust RDD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. The estimations use a quadratic polynomial and a triangular kernel. See Section 2.3 and Appendix C for accounting definitions. The optimal bandwidths along with their number of observations are displayed below the respective outcome variables. *** 1%, ** 5% and * 10%.

Table A.7: RDD left-leaning difference (fixed effects)

	Bandwidths						
	optimal	0.05	0.075	0.1	0.125	0.15	0.2
Binary							
opt: 0.206 N: 564							
Conventional	-0.124*	-0.155	-0.143	-0.128	-0.114	-0.104	-0.120*
	(0.064)	(0.130)	(0.106)	(0.092)	(0.081)	(0.074)	(0.065)
Robust	-0.118	-0.274	-0.129	-0.146	-0.152	-0.147	-0.104
	(0.076)	(0.193)	(0.164)	(0.142)	(0.124)	(0.113)	(0.097)
Real estate sales							
opt: 0.125 N: 377							
Conventional	-6.742	-3.133	-7.305	-6.309	-6.747	-7.147	-7.745
	(6.356)	(8.958)	(7.301)	(6.795)	(6.365)	(6.231)	(5.628)
Robust	-5.586	-8.690	-1.342	-3.093	-3.170	-3.613	-4.505
	(7.509)	(14.273)	(11.302)	(9.283)	(8.295)	(7.883)	(7.352)
Net purchase							
opt: 0.122 N: 370							
Conventional	-229.775**	-259.784***	-301.103***	-260.337***	-224.231**	-180.350**	-116.978
	(91.907)	(94.113)	(93.106)	(94.295)	(91.550)	(87.474)	(82.109)
Robust	-268.626***	-89.773	-314.848***	-323.209***	-316.631***	-309.041***	-262.060***
	(103.656)	(128.279)	(121.632)	(111.893)	(109.693)	(107.415)	(100.682)
N		150	227	300	377	442	553

Notes: Notes: Robust RDD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. The estimations use a linear polynomial, a triangular kernel, and covariates: election year and region fixed effects, population, and surface area. See Section 2.3 and Appendix C for accounting definitions. The optimal bandwidths along with their number of observations are displayed below the respective outcome variables. *** 1%, ** 5% and * 10%.

Table A.8: RDD left-leaning difference (linear covariates)

	Bandwidths						
	optimal	0.05	0.075	0.1	0.125	0.15	0.2
Binary							
opt: 0.145 N: 429							
Conventional	-0.104	-0.201*	-0.185**	-0.141*	-0.115	-0.104	-0.117*
	(0.069)	(0.110)	(0.093)	(0.083)	(0.074)	(0.068)	(0.061)
Robust	-0.091	-0.333**	-0.210	-0.194	-0.179	-0.161	-0.110
	(0.082)	(0.165)	(0.144)	(0.129)	(0.114)	(0.104)	(0.089)
Real estate sales							
opt: 0.122 N: 370							
Conventional	-4.050	-5.954	-6.678	-4.286	-4.098	-4.187	-4.714
	(6.334)	(8.711)	(7.422)	(6.861)	(6.315)	(6.088)	(5.400)
Robust	-3.551	-14.658	-7.711	-6.289	-4.041	-2.985	-2.437
	(7.551)	(14.154)	(11.304)	(9.434)	(8.541)	(8.051)	(7.352)
Net purchase							
opt: 0.127 N: 387							
Conventional	-163.837**	-189.723***	-179.763**	-183.585**	-167.555**	-127.857*	-79.836
	(71.577)	(70.068)	(71.531)	(74.246)	(72.083)	(68.443)	(64.107)
Robust	-196.410**	-65.317	-203.157**	-181.954**	-209.081**	-229.571***	-193.931**
	(82.375)	(109.834)	(94.587)	(81.285)	(82.180)	(83.110)	(80.035)
N		150	227	300	377	442	553

Notes: Notes: Robust RDD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. The estimations uses a linear polynomial, a triangular kernel and covariates: region and election year fixed effects, surface area, population, a dummy for whether the municipality is below 5.000 inhabitants, the share of population below 18 and above 65, a dummy for whether the mayor has a college degree, and economic variables averaged for the previous mandate, capital grants, interest ratio, real estate sales revenue, real estate purchase, surplus, the ratio between current grants and current revenues and the ratio between personnel expenditure and current expenditure. See Section 2.3 and Appendix C for accounting definitions. The optimal bandwidths along with their number of observations are displayed below the respective outcome variables. *** 1%, ** 5% and * 10%.

Table A.9: Donut Hole RD estimates

	Donut Hole bandwidth						
	0%	0.05%	0.10%	0.15%	0.20%	0.25%	0.30%
Binary							
Conventional	-0.115	-0.114	-0.106	-0.064	-0.045	-0.058	-0.058
	(0.074)	(0.075)	(0.077)	(0.077)	(0.076)	(0.076)	(0.076)
Robust	-0.179	-0.180	-0.167	-0.093	-0.022	-0.078	-0.078
	(0.114)	(0.118)	(0.122)	(0.124)	(0.089)	(0.126)	(0.126)
Real estate sales							
Conventional	-4.098	-4.804	-4.480	-3.557	-0.036	0.010	0.010
	(6.315)	(6.424)	(6.579)	(6.766)	(6.458)	(6.762)	(6.762)
Robust	-4.041	-5.288	-4.866	-3.414	3.836	3.986	3.986
	(8.541)	(8.915)	(9.216)	(9.614)	(8.627)	(9.469)	(9.469)
Net purchase							
Conventional	-167.555**	-174.648**	-197.245***	-192.126**	-178.077**	-192.602**	-192.602**
	(72.083)	(73.452)	(73.101)	(74.629)	(76.938)	(79.208)	(79.208)
Robust	-209.081**	-225.072***	-266.561***	-261.959***	-239.788***	-274.124***	-274.124***
	(82.180)	(84.653)	(83.917)	(87.730)	(92.683)	(96.991)	(96.991)
N	377	376	374	372	369	366	366

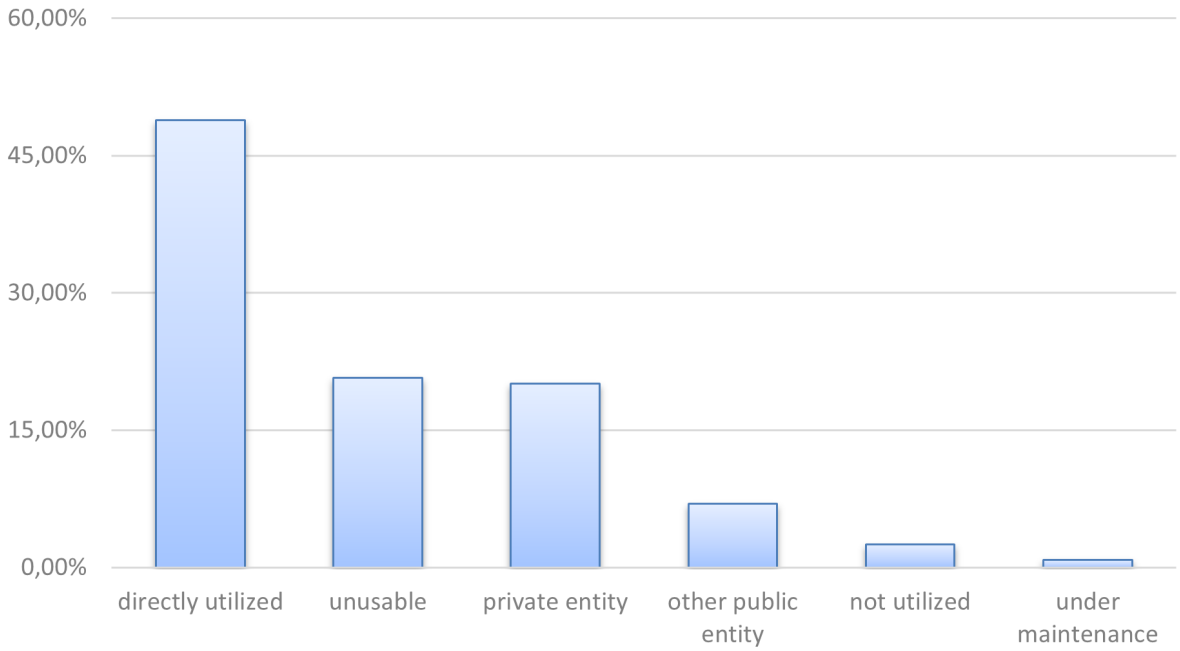
Notes: Donut hole robust RD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The bandwidth is 12.5 percentage points. Each column represents an estimation in which a percentage bandwidth is first removed from around the cutoff. The outcomes are a binary variable for whether the municipality has any real estate sales revenue in a given year, the per capita real estate sales revenue, and the per capita net purchase of real estate, expressed as the money amount difference between purchase and sales of real estate. All the outcomes are averaged over the mayoral terms and in accrual accounting amounts. The estimations uses a linear polynomial, a triangular kernel and covariates: region and election year fixed effects, surface area, population, a dummy for whether the municipality is below 5.000 inhabitants, the share of population below 18 and above 65, a dummy for whether the mayor has a college degree, and economic variables averaged for the previous mandate, capital grants, interest ratio, real estate sales revenue, real estate purchase, surplus, the ratio between current grants and current revenues and the ratio between personnel expenditure and current expenditure. See Section 2.3 and Appendix C for accounting definitions. The optimal bandwidths along with their number of observations are displayed below the respective outcome variables. *** 1%, ** 5% and * 10%.

Table A.10: Data sources

Data	Source
Financial reports	MI (2023a)
Inflation rates for Italy	FRED (2023)
Real estate prices	Agenzia delle Entrate (2024)
Real estate stock composition	MEF (2015a)
Real estate auction notices	OGIR (2025b)
Electoral data	MI (2022)
Local administrators data	MI (2023b)
Demographic and other municipal level information	ISTAT (2025c)
Italian map	ISTAT (2025a)
Municipalities infiltrated by mafia	OGIR (2025a)

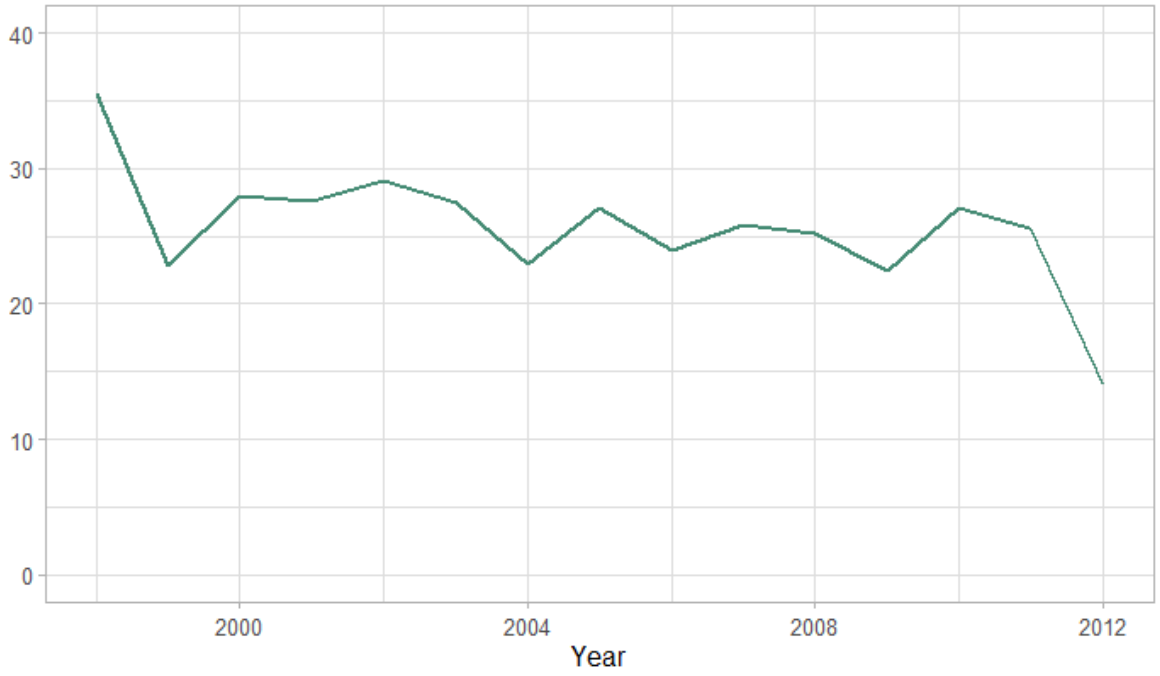
Notes: Lists the data sources.

Figure A.1: Municipal allocation of real estate (Italy)



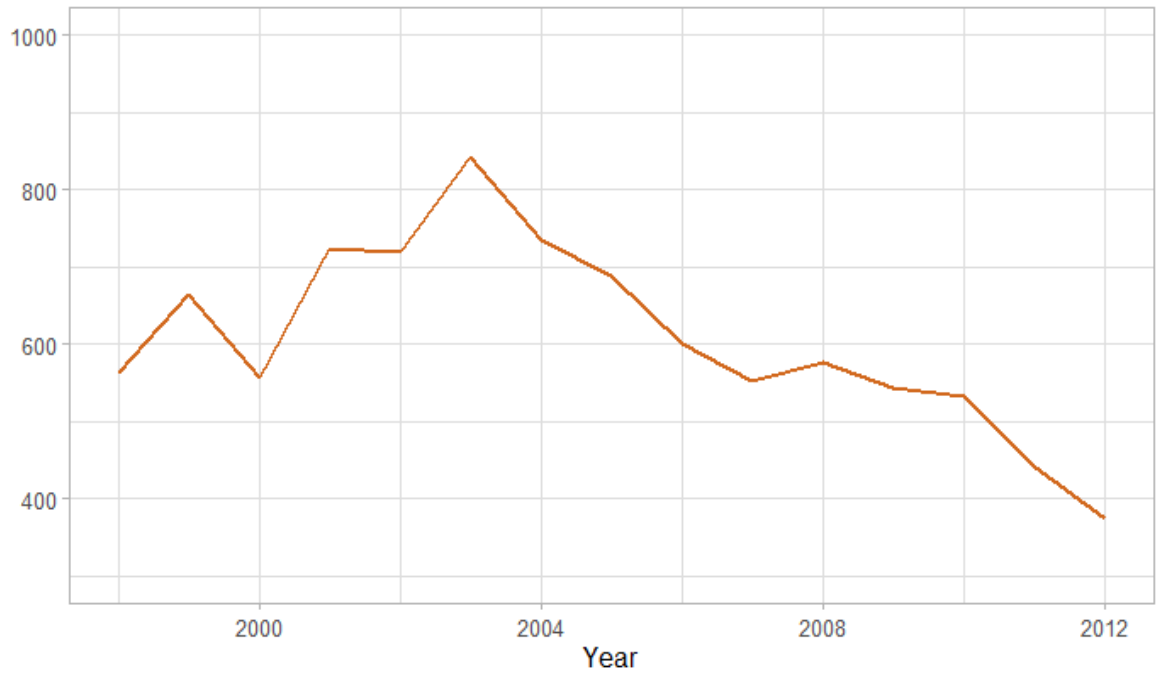
Notes: Average allocation of Italian municipal real estate assets in 2015. Properties deemed unusable are likely unsuitable for public purposes due to their inherent characteristics, physical conditions, or financial or legal requirements. Own calculation with data provided by the Ministry of Economics and Finance (MEF (2015a)).

Figure A.2: Real estate sales revenues (per capita)



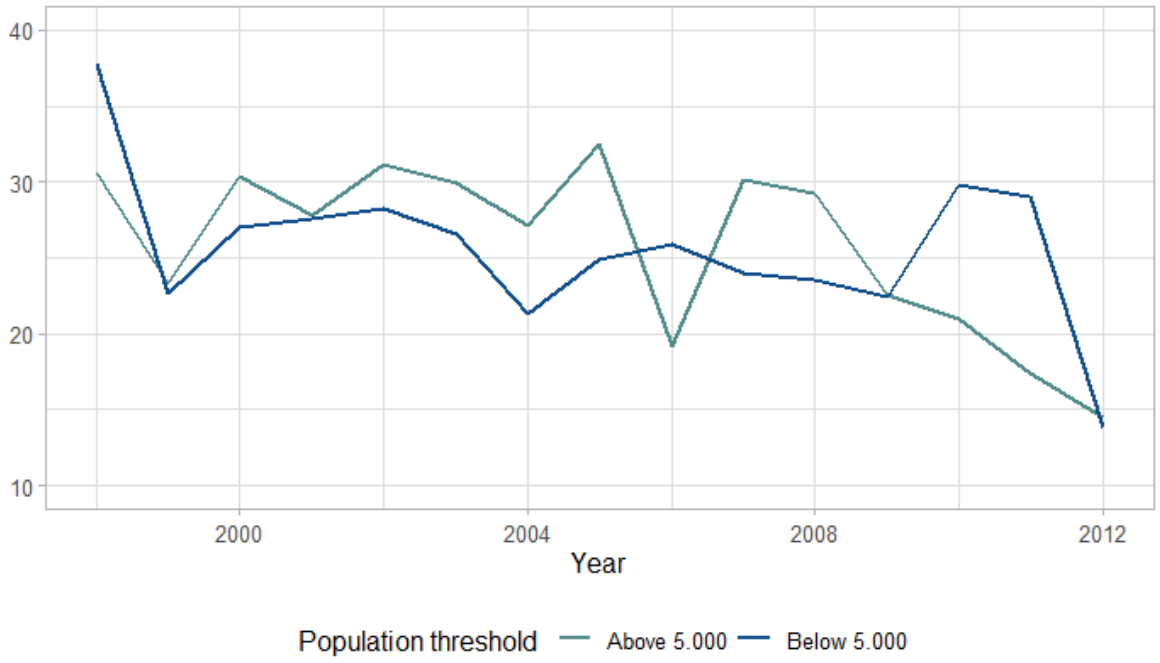
Notes: Average municipal per capita revenues from real estate sales during the period 1998-2012. These are accrual values expressed in 2022 Euro. See Section 2.3 and Appendix C for accounting definitions.

Figure A.3: Real estate purchase expenditure (per capita)



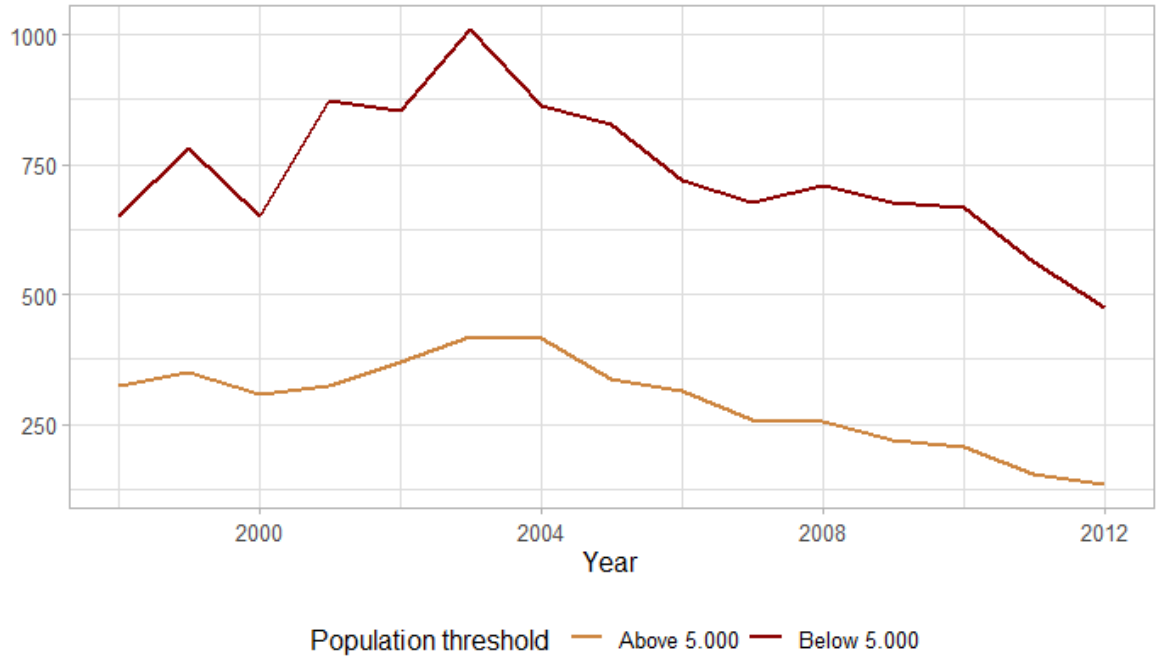
Notes: Average municipal per capita expenditure for real estate purchase during the period 1998-2012. The values are accrual in terms of 2022 Euro terms. See Section 2.3 and Appendix C for accounting definitions.

Figure A.4: Real estate sales revenues by population (per capita)



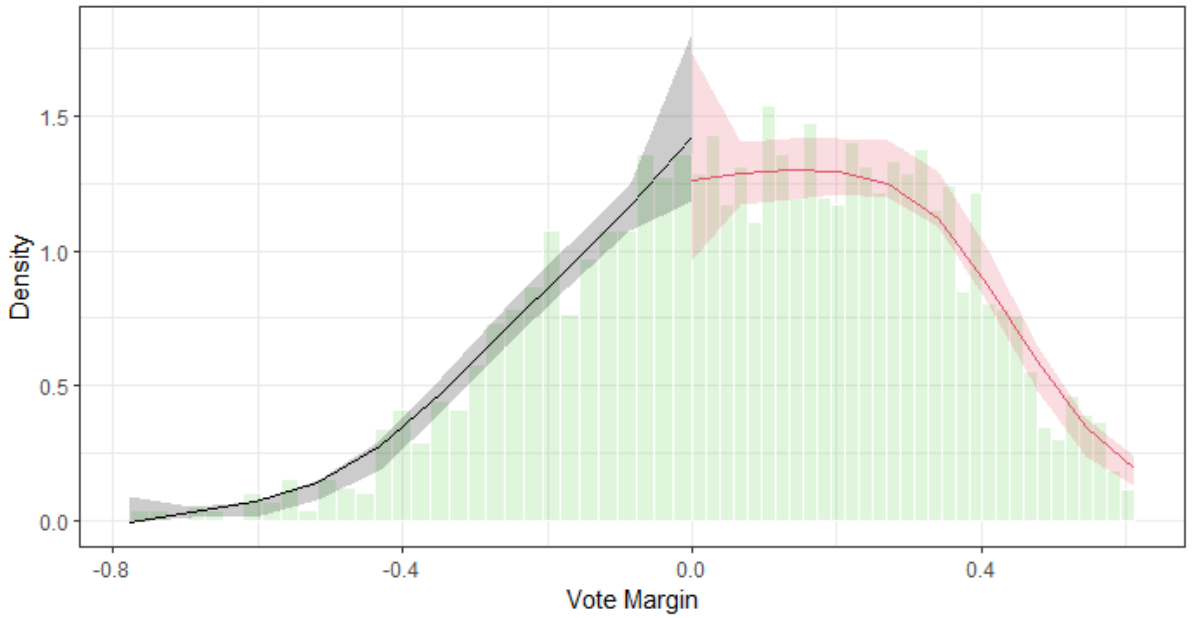
Notes: Average municipal per capita revenues from real estate sales for the period 1998-2012. The darker line is for municipalities below 5.000 inhabitants and the lighter one above. These are accrual values expressed in 2022 Euro. See Section 2.3 and Appendix C for accounting definitions.

Figure A.5: Real estate purchase by population (per capita)



Notes: Average municipal per capita expenditure from real estate purchase for the period 1998-2012. The darker line is for municipalities below 5.000 inhabitants and the lighter one above. These are accrual values expressed in 2022 Euro. See Section 2.3 and Appendix C for accounting definitions.

Figure A.6: Election margin density test

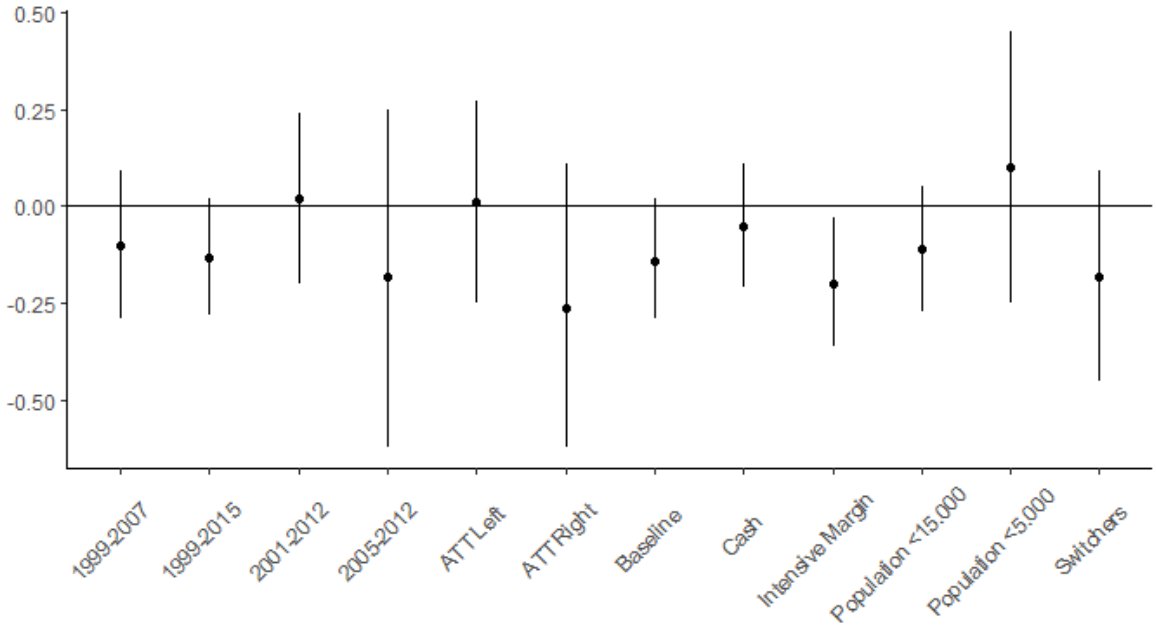


Notes: Manipulation density test using vote margin for the municipal elections right versus left-leaning coalition in Italy in 1999-2012. The running variable is the vote margin, the percentage point difference between the winning coalition and the second-highest-scoring coalition (negative for right-wing and positive for left-wing).

Figure A.7: Placebo RD (linear adjustment)

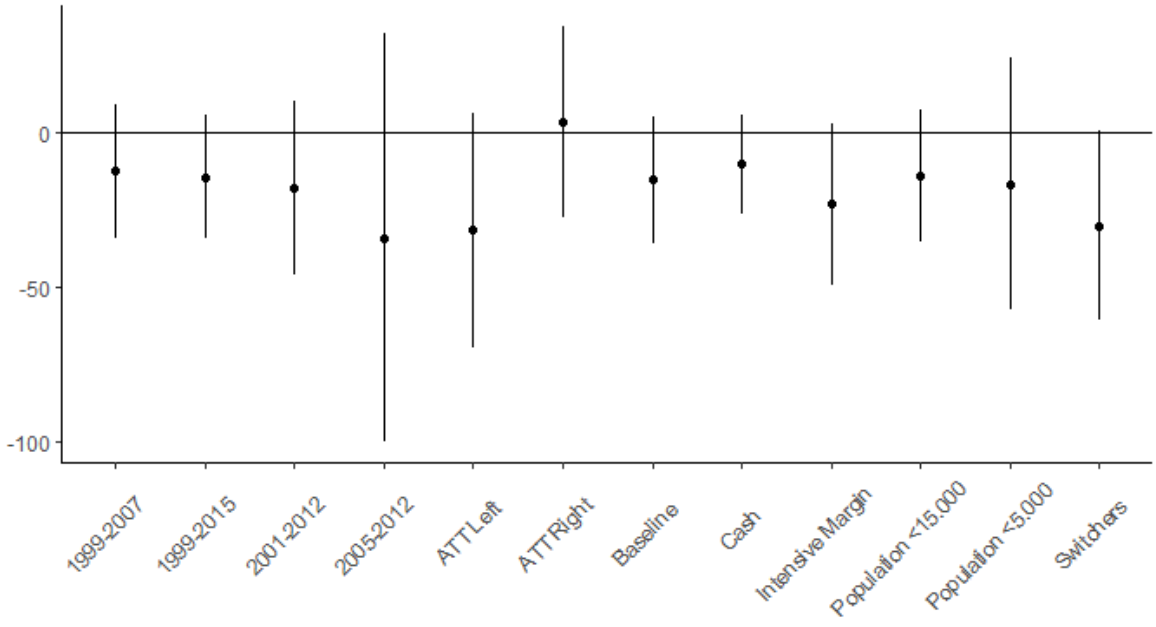
Notes: Notes: RD estimation for the difference between left and right leaning coalition in municipal elections using the vote margin as a running variable. The outcomes are: i) the proportion of years over the mayoral term in which the municipality has any accrual real estate sales revenue; ii) accrual per capita real estate sales revenue; and iii) accrual per capita net purchase, expressed as the money amount difference between purchase and sales of real estate. The estimations uses a linear polynomial, a triangular kernel and linear covariates adjustment from the previous term (region and election year fixed effects, surface area, population, a dummy for whether the municipality is below 5.000 inhabitants, the share of population below 18 and above 65, a dummy for whether the mayor has a college degree, and economic variables averaged for the previous mandate, capital grants, interest ratio, real estate sales revenue, real estate purchase, surplus, the ratio between current grants and current revenues and the ratio between personnel expenditure and current expenditure). The placebo cutoffs are between -10% and +10%. The x-axis shows the absolute value of the coefficient in the estimation using the optimal bandwidth. The vertical red line represents the 0% cutoff estimates. The x-axis is the absolute value of the estimated effect. See Section 2.3 and Appendix C for accounting definitions.

Figure A.8: Further estimations of real estate sales (binary)



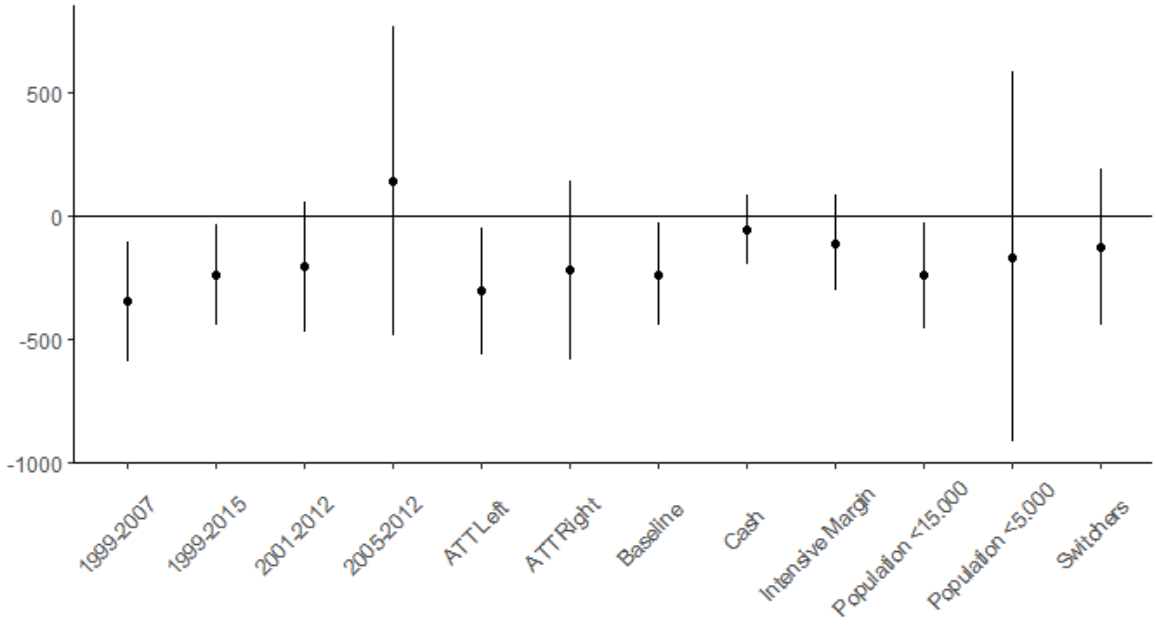
Notes: RD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcome is the proportion of years over the mayoral term in which the municipality has any accrual real estate sales revenue. Regression discontinuity estimates and 95% intervals using different samples (x-axis), linear polynomials, triangular kernels, the optimal bandwidths, and no covariate adjustments. See Section 2.3 and Appendix C for accounting definitions.

Figure A.9: Further estimations of real estate sales revenues (per capita)



Notes: RD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcome is the accrual per capita real estate sales revenues. Regression discontinuity estimates and 95% intervals using different samples (x-axis), linear polynomials, triangular kernels, the optimal bandwidths, and no covariate adjustments. See Section 2.3 and Appendix C for accounting definitions.

Figure A.10: Further estimations of real estate net purchase (per capita)



Notes: RD estimation for the difference between left and right-leaning coalitions in municipal elections using the vote margin as running variable. The outcome is the accrual per capita net purchase, expressed as the money amount difference between purchases and sales of real estate. Regression discontinuity estimates and 95% intervals using different samples (x-axis), linear polynomials, triangular kernels, the optimal bandwidths, and no covariate adjustments. See Section 2.3 and Appendix C for accounting definitions.

Figure A.11: Financial report, Rome in 2005 (extract)

Titolo IV - ENTRATE DERIVANTI DA ALIENAZIONE, DA TRASFERIMENTI DI CAPITALEI E DA RISCOSSIONI DI CREDITI — Group 4 (Capital revenues): Revenues from sales, capital transfers, and debt collections

VOCI — Items	Accertamenti — Accrual	Riscossioni in conto competenza — Cash collections (ex. residuals)	Riscossioni in conto residui — Cash collections (residuals)
Categoria 1° - Alienazione di beni patrimoniali	75.592.363,00	19.649.322,00	132.959.364,00
Alienazione beni mobili e diritti reali su beni immobili	33.424,00	26.164,00	0,00
Alienazione beni immobili e diritti reali su beni immobili — Sales of real estate and property rights	75.558.939,00	19.623.158,00	123.933.045,00
di cui : - aree	1.994.095,00	1.601.631,00	2.433,00
Concessione di beni demaniali	0,00	0,00	0,00
Alienazione di beni patrimoniali diversi	0,00	0,00	9.026.319,00
Categoria 2° - Trasferimenti di capitali dallo Stato	33.595.458,00	3.163.860,00	171.821.761,00
Categoria 3° - Trasferimenti di capitali dalla Regione	44.384.955,00	35.000,00	1.261.776,00
Categoria 4° - Trasferimenti di capitali da altri enti del settore pubblico	5.452.150,00	5.000.000,00	1.465.975,00
di cui : - dalle Province	5.452.150,00	5.000.000,00	1.465.975,00
Categoria 5° - Trasferimenti di capitali da altri soggetti :	246.765.541,00	228.967.540,00	18.243.608,00
Proventi per concessioni edilizie e sanzioni urbanistiche	236.977.896,00	222.311.448,00	17.438.797,00
Trasferimenti di capitale straordinari da altri soggetti	9.787.645,00	6.656.092,00	804.811,00
di cui : - da imprese	0,00	0,00	0,00
- da famiglie (eredita' e donazioni)	0,00	0,00	0,00
Categoria 6° - Riscossioni di crediti	380.430.860,00	120.992.498,00	3.473.069,00
TOTALE ENTRATE DERIVANTI DA ALIENAZIONE, TRASFERIMENTI DI CAPITALI E DA RISCOSSIONI DI CREDITI	786.221.327,00	377.808.220,00	329.225.553,00

Notes: Screenshot of the capital revenues from the financial report of the municipality of Rome in 2005. Screenshot taken from the website of the Ministry of the Interior for Certificati Consuntivi dpr 194/1996.

Appendix B: Equations

Equation (2.2) is estimated for the allocation of revenues and incumbent margin in re-elections. $X_{1,it}$ and $X_{2,it-1}$ represent explanatory variables observed in the current or previous period, respectively. ϕ_i is the municipality or region fixed effect and ϕ_t is the year or election-year fixed effect. Finally, ϵ_{it} is the error term.

$$y_{it} = \beta_0 + X'_{1,it}\beta_1 + X'_{2,it-1}\beta_2 + \phi_i + \phi_t + \epsilon_{it} \tag{2.2}$$

Similarly, Equation (2.3) represents Logistic regressions estimated for re-election outcomes. $g(.)$ is the logistic function. θ_r and θ_t represent dummies for region and election-year. Another specification is also estimated using a conditional fixed effects Logit model with municipal fixed effects, yielding similar interpretations.

$$P(y_{it} = 1|X_{1,it}, X_{2,it}, \theta_r, \theta_t) = g(\gamma_0 + X'_{1,it}\gamma_1 + X'_{2,it-1}\gamma_2 + \theta_r + \theta_t) \tag{2.3}$$

Appendix C: Accounting terms

In this section, I present more formal definitions and explanations for the Italian accounting terms, following ISTAT (2012), connecting them with the terminology used in the main text. The expressions in apostrophes are personal translations from ISTAT (2012).

- Accrual
  - *Impegni* - These are commitments of expenditure for specific amounts, legal obligations of payments taken by a municipality.
  - *Accertamenti* - These are recognized revenues, representing an established right for a municipality to collect specific amounts from defined sources.
- Cash
  - *Pagamenti in conto competenza* - Payments related to expenditure commitments (*Impegni*) belonging to the same fiscal year.
  - *Riscossioni in conto competenza* - Collections related to revenue commitments (*Accertamenti*) belonging to the same fiscal year.
  - *Pagamenti in conto residui* - Payments related to expenditure commitments (*Impegni*) from prior fiscal years.
  - *Riscossioni in conto residui* - Collections related to revenue commitments (*Accertamenti*) from prior fiscal years.

Further useful terms are:

- Current expenditure (*Spese correnti*) - "The expenditure intended for the production and functioning of public service and the redistribution of income outside of productive goals."
- Capital expenditure (*Spese in conto capitale*) - "The expenditure that affects directly or indirectly public assets formation."
- Current revenues (*Entrate correnti*) - Revenues from taxes, fees, and current grants.
- Capital revenues (*Entrate in conto capitale*) - "Capital revenues are from the sales of assets and capital grants."

Chapter 3

The role of municipal sales of real estate under fiscal rules

JEL: E62, H41, H71

Keywords: Municipal real estate, fiscal rules, public asset management, Difference-in-Differences

3.1 Introduction

Fiscal rules are restrictions on fiscal policy, aimed at improving fiscal discipline (Kopits and Symansky (1998)). Governments have adopted them to control rising debt by setting limits on deficits, expenditures, or revenues (Yared (2019)). Furthermore, governments often apply fiscal rules to lower levels of government, such as municipalities. The objective is to prevent local deficits from negatively influencing the deficit at the national level (Kopits and Symansky (1998)). Italy, for example, introduced the Domestic Stability Pact (DSP), a set of fiscal rules restricting municipal deficits or expenditures. Its objective was to reduce the municipal contribution to the national deficit (Camera dei Deputati (2017)).

For the fiscal rules to be effective, it is important to understand how municipalities use their resources to comply with these restrictions. In Italy, municipalities can sell real estate to raise revenues and finance investment (Bargero, Delfino, and Zanoni (2009)). This is relevant, as Italian municipalities account for nearly half of public investment (Chiades and Mengotto (2013)). However, the DSP faced criticism specifically for the

contraction of local investment (Camera dei Deputati (2017)).

Moreover, policymakers cannot design fiscal rules to account for every possible shock or circumstance (Yared (2019)). The possibility of increasing revenue by selling local real estate can then play a pivotal role. If the fiscal rules count the revenues from the sale of real estate toward compliance, municipalities with tight budgets can use them to finance investments. During economic downturns, the revenues from the sale of real estate can also ease the rigidity of fiscal rules by reducing deficits.

In this paper, I analyse the impact of two DSP reforms[1] on municipal sales of real estate. My analysis uses annual financial reports detailing municipal revenues and expenditures, provided by the Ministry of the Interior for the period 1999-2012 (MI (2023a)). From 2001, the DSP did not apply to municipalities with fewer than 5,000 inhabitants. I thus consider municipalities with a larger population as the treated group and the others as the control group. I thus estimate a dynamic Difference-in-Differences (DiD) model, assuming differences between the two groups to be constant over time. To improve the comparability of the two groups, I restrict the estimation to municipalities close to the 5,000-inhabitant threshold.

The pre-period is between 2001 and 2004, when the DSP targeted the budget balance—the difference between revenues and expenditures. Importantly, the budget balance formula was net of the revenues from the sales of real estate. After 2004, the role of revenues from the sales of real estate changed several times. To investigate the research question, I focus on two episodes when reforms to fiscal rules could affect municipal sales of real estate.

The first episode was in 2005, when the DSP capped the maximum expenditure. Policymakers allowed capital expenditures[2] above the expenditure cap if financed through the sale of real estate. Thus, the exception provided a way to maintain their investment level.

The second episode spans the years between 2007 and 2012, when the DSP again targeted the budget balance, counting the sales of real estate among the sources of revenue. The 2008 Financial Crisis tightened municipal budgets, which might have made the DSP too rigid. As a result, municipalities could then increase the revenues from the sale of

[1]For more information and the sources, see Appendix F.

[2]Expenditure that affects asset formation (ISTAT (2012)), such as real estate purchases, or road construction.

real estate to comply with the DSP, as allowed under its rules. Although the sale of real estate could have helped with DSP compliance in the whole 2007-2012 period, my analysis places more emphasis on 2008. This year marked the beginning of the Financial Crisis and captured the first response before policymakers adjusted the fiscal rules in reaction to the crisis. In this analysis, I hypothesize that municipalities under fiscal rules would increase revenues from the sale of real estate in 2005 and 2008.

Despite the exception allowed by the DSP in 2005, my analysis suggests that municipalities did not increase revenues from the sales of real estate in that year. This result aligns with a 2004 survey of mayors (SWG (2004)), which showed a preference for cutting expenditures. Therefore, the exception on the source of financing did not prevent the contraction of investment. In contrast, I observe a rise in the revenues from the sale of real estate in 2007 and 2008. In addition, more municipalities participated in the sales of real estate for the period 2007-2012, with a significant increase in participation only after 2007. These revenue increases run counter to the DSP's emphasis on expenditure reduction to contain local fiscal pressure (Camera dei Deputati (2017)). However, the estimates are statistically imprecise, possibly due to the heterogeneity in the type of real estate sold. Another explanation is that larger municipalities have more real estate available for sale. I investigate heterogeneity factors, such as mayors' college education and whether the municipality resides in a southern region. Although the statistical uncertainty is large, I find that municipalities in southern regions had substantially lower revenues from the sales of real estate. Importantly, these regions received large grants from the national government and the European Union (MEF (2010), Camera dei Deputati (2013)).

I test the robustness of the results by i) showing that the population threshold is not manipulated, ii) considering narrower bandwidths around the threshold, iii) conducting placebo tests, iv) assessing the influence of concurrent events or policies, and v) estimating different specifications. The tests suggest that the results found could be attributed to random variation. Moreover, revenues from the sales of real estate have a distribution with inherently many zeroes and a fat right tail. These characteristics increase the vulnerability of the estimation to random variation. For these reasons, the findings should be interpreted with caution.

I contribute to the literature on fiscal rules by studying how Italian municipalities used revenues from the sales of real estate to comply with budgetary constraints. Many

countries have set fiscal rules over the years. Wyplosz (2012) and Yared (2019) review common issues and historical experiences regarding fiscal rules. Specifically, they highlight political incentives, the need to adapt to unforeseeable events, and the need to have strong legislation around enforcement. Heinemann, Moessinger, and Yeter (2018) present a meta-regression analysis of over 30 fiscal rules studies from 2004 to 2014. The authors find a constraining effect of the rules. However, this result weakens when accounting for the endogeneity of fiscal rules.

Several empirical studies analysed the Italian DSP, focusing primarily on its effectiveness or unintentional consequences. I contribute to this literature by presenting some evidence of how municipalities sold real estate to comply with fiscal rules. Furthermore, I show how allowing for financing through the sales of real estate did not halt the contraction of capital expenditure. These results align with fiscal rules influencing municipal behaviour as supported by Grembi, Nannicini, and Troiano (2016). They find evidence that Italian municipalities would increase deficits and lower taxes when fiscal rules were relaxed for municipalities with fewer than 5,000 inhabitants. Alpino et al. (2022) report that mayors under fiscal rules, especially college-educated ones, increase the local income tax more progressively. The authors explain the results with educated mayors having more information about available policies. On the political side, Bonfatti and Forni (2019) find evidence for a weakened political budget cycle for municipalities subject to fiscal rules. The literature also found negative effects following the DSP's implementation. Gamalerio and Trombetta (2024) present evidence for the negative selection of educated mayoral candidates in municipalities subject to the DSP, as the restrictions might damage their performance. Pavese and Rubolino (2023) find evidence that austerity-related expenditure cuts lowered students' performance in standardized tests. Chiades and Mengotto (2013) report that municipalities subject to the DSP also had a stronger decrease in investments.

In Section 3.2, I summarize the information regarding municipal real estate in Italy and the Domestic Stability Pact. Section 3.3 presents the data used. In Section 3.4, I show the empirical analysis and interpret the results. Section 3.5 concludes.

3.2 Background

Italy is divided into twenty regions, five[3] of which possess special autonomy due to historical and geographical reasons (Camera dei Deputati (2021)). Between 2001 and 2011, Italy had approximately 8,100 municipalities (ISTAT (2025c)). According to art. 119 of the Italian Constitution, they possess financial autonomy of revenue and expenditure. They also own property and can only contract debt to finance investment.[4] The revenue autonomy permits municipalities to sell real estate and set local taxes within legal limits. Between 1999 and 2012, for instance, they could impose an income surcharge tax (Decreto Legislativo 360/1998) or adjust the local property tax (Decreto Legislativo 504/1992). However, both taxes had a maximum rate ceiling. Importantly, the Italian State bears no responsibility for municipal loans.[5]

3.2.1 Real estate

In 2015, in Italy, municipalities owned 67% of public buildings and 79% of public land (MEF (2015b)). Municipal properties mainly consisted of land (agricultural or urban), residential housing, and service or commercial buildings (Figure D.1 in Appendix D).

The municipal council can decide to sell real estate, usually through auctions or direct deals with buyers.[6] Importantly, municipalities can only use the revenues from the sales of real estate for investment or to reduce municipal debt.[7]

[3]Friuli-Venezia Giulia, Sardegna, Sicilia, Trentino-Alto Adige, and Valle d'Aosta (Italian Constitution art. 116).

[4]The article was introduced by Legge Costituzionale 3/2001 and formalized municipal autonomy. This was part of a process mostly carried out in 1997-2000 with the intent to decrease dependence on governmental grants and increase municipal revenues (Camera dei Deputati (2008)). Debt contraction being limited to investment purposes was, however, only introduced in 2001.

[5]The article was introduced by Legge Costituzionale 3/2001. The municipal default is handled by an extraordinary committee, and the Italian State played different roles during the years. Before 2001, municipalities unable to finance themselves could borrow from Cassa Depositi e Prestiti — a financial institution mainly owned by the Ministry of Economics and Finance — to cover the deficit and off-balance sheet debts, with the Italian State bearing the full costs. After November 2001, borrowing to restructure debt was subject to more restrictions, and the Italian State did not cover the costs; instead, it provided extraordinary contributions to aid the liquidation process (MEF (2010)). For more information, Turco (2015) explores the case study for the municipality of Taranto in 2006.

[6]This information is coming from the regulations enacted by a sample of municipalities during the period 1998-2012 (Ferrara n.19 21/07/2011, Este n.67 29/11/2011, Alpignano n.46 15/06/2005, Udine n.176 11/12/2000, Pontedera n.58 31/05/2005,n.144 Potenza 05/12/2008 and Castellaneta n.52 04/04/2007). See Appendix F for more information about asset types and sales.

[7]Decreto Legislativo 267/2000 TUEL art. 162 c. 6 restricts the source of financing for current expenditure and debt instalments, not including the sale of assets (e.g., real estate). In accordance, Legge 228/2012 art. 1 c. 443 then explicitly restricts the revenues from the sale of available assets to

Figure D.3 in Appendix D presents the types of real estate put up for auction between 1999 and 2012.[8] According to the graph, the majority of real estate is either land or residential properties. Rights, for example, surface rights, represent a small portion of the total. Importantly, municipal financial reports aggregate the revenues from the sales of real estate with those from the sales of property rights. However, Figure D.3 in Appendix D provides evidence that the latter has only a minor contribution.

3.2.2 The Domestic Stability Pact (DSP)

In 1997, the European Union approved the Stability and Growth Pact (SGP)[9], a collection of rules aimed at compelling member states to comply with the deficit-to-GDP ratio limit. In an attempt to reduce the contribution of local governments to the deficit and to increase their financial accountability, Italy introduced a set of fiscal rules constraining local governments, the Domestic Stability Pact (DSP) (Camera dei Deputati (2017)).

The DSP changed many times between 1999 and 2012. In this section, I provide a summary of the rules. Figure 3.1 depicts the main points, with more details and the references in Appendix F and the accounting terminology in Appendix G. In the years 1999-2000, the DSP applied to all municipalities, but starting in 2001, only to those with more than 5,000 inhabitants.

The DSP constrained the budget balance, expressed as the difference between revenues and expenditures. However, the DSP *budget balance* formula only counted certain sources of revenue (e.g., taxes, asset sales, etc) and categories of expenditure (e.g., salaries, asset purchases, etc). Which sources and categories policymakers left in or out of the formula were subject to annual revision. The only deviation from the budget balance target was in 2005-2006, when the DSP instead capped the *maximum expenditure* arising from a subset of categories. The intention behind the shift to an expenditure target was to prevent budget improvements through increased taxation (Camera dei Deputati (2017)). The decision to revert the target back to budget balance in 2007 arose from the desire to align the DSP objectives with those of the SGP.[10]

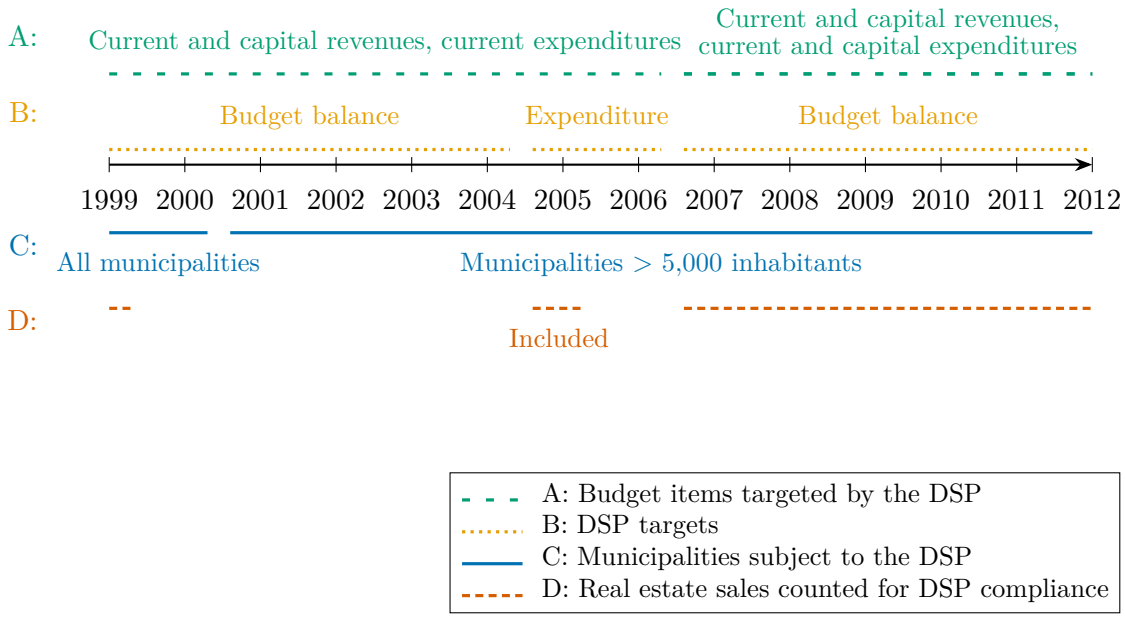
only finance investment and the reduction of municipal debt.

[8]The categories reflect a personal classification based on the description of auction notices. I do not report pharmacies as I consider them firms.

[9]Resolution of the European Council on the Stability and Growth Pact, Amsterdam, 17 June 1997.

[10]Circolare Ministero dell'Economia e delle Finanze n. 12, 22 febbraio 2007.

Figure 3.1: Timeline of DSP policies, 1999–2012



Notes: Summary of the Domestic Stability Pact (DSP) between 1999 and 2012. Line A indicates the budget items targeted by the DSP. Budget items are sources of revenue or categories of expenditure. Line B refers to the DSP targets. Specifically, whether the DSP was setting a limit to the budget balance or maximum expenditure. Line C indicates which municipalities were subject to the DSP. Line D refers to the years in which the DSP counted the revenues from the sale of real estate toward compliance. Only for the year 2005, the revenues from the sale of real estate were allowed to finance capital expenditure above the maximum expenditure limit prescribed by the DSP without violating it. In 2006, this exception was removed. While in 1999 and 2007-2012, the revenues from the sales of real estate were counted as part of the revenues in the budget balance formula. See Section 3.2 and Appendix F for more details.

From 1999 to 2004, the DSP focused on current expenditures[11] as well as current and capital revenues.[12] Starting from 2005, it also began to constrain capital expenditure.[13] The key difference between current and capital expenditure is that the former relates to routine public service costs, whereas the latter concerns long-term investments.

Over the years, the DSP counted the revenues from the sale of real estate in different ways when it came to compliance (Figure 3.1). In 1999 and 2007-2012, the budget balance formula monitored by the DSP counted the sale of real estate among the sources of revenue. In 2005, the DSP allowed municipalities to finance capital expenditure above the maximum expenditure cap through the sale of real estate. The DSP, however, removed this exception in 2006. Moreover, in 2009-2010, the budget balance formula monitored

[11]For instance, the expenditure for the functioning of public service (ISTAT (2012)), such as salaries, utilities, office supplies, or rental expenses.

[12]Current revenues come from taxes, fees, and grants that don't finance investment, while capital revenues come from the sale of assets and from grants that finance investment (ISTAT (2012)).

[13]This is the expenditure related to asset formation (ISTAT (2012)), for example, the purchase of real estate or the construction of roads.

by the DSP did not count revenues from asset sales (including real estate) as part of the revenues if the municipality approved the budget before March 10th.[14] However, these municipalities had the option to follow the same formula applied to the other municipalities if they preferred. Therefore, municipalities likely self-selected in the group for which compliance was easier.

Beyond the DSP features outlined so far, other factors influenced municipal budgets. The five special regions followed different DSP rules. Furthermore, municipalities in the South benefited from concurrent EU and national development grants.[15] In addition, all municipalities have a debt limit (Decreto Legislativo 267/2000 art. 204 (TUEL)) in place, defined by the ratio of debt payments to current revenues. Given the numerous modifications to the DSP, my research focuses on the years 2005 and 2008 specifically. The following subsections present the reasons and the context for each year.

3.2.2.1 2005

In 2005, the DSP target shifted from budget balance to a maximum expenditure cap. This reform marked a change in strategy, focusing on expenditure reduction. The main strategies available to comply with the fiscal rules were[16]: i) cutting expenditure[17], ii) selling assets (e.g., real estate), iii) deducting expenditure from specific revenues, and iv) transferring expenditure to third parties, such as unions of municipalities or public firms[18] (D'Iorio (2006) about municipalities in the region of Emilia-Romagna.). Overall, the DSP faced wide criticism for contracting local investment (Camera dei Deputati (2017) and

[14]This setting was the consequence of reforms during the ongoing year. On one side, policymakers did not want budget improvements to come from extraordinary revenues. On the other hand, municipalities were complaining about having already planned the asset sales. Moreover, if the asset sales revenues had financed capital expenditure, then only the expenditure would have been influencing DSP compliance (Grisolia (2010)).

[15]See MEF (2010) and Camera dei Deputati (2013) for an overview of the grants policies. The regions involved were Basilicata, Calabria, Campania, Puglia, Sardegna, and Sicilia.

[16]Investment above the imposed limit could also be paid in advance with a fund provided by Cassa Depositi e Prestiti for up to a total of 250 million euros. The amount had to be repaid in full by the end of 2006. In practice, however, municipalities had to figure out other strategies to comply with the fiscal rules, as the mechanism was not fully in place until November (D'Iorio (2006) for municipalities in Emilia-Romagna).

[17]Based on the SWG (2004) survey. At the time, the draft of the law already had the relevant points discussed, with the exception that it was applied to municipalities >3,000 inhabitants. Then changed to 5,000 by Decreto legge 31st March 44/2005, converted by Legge 88/2005.

[18]Using public firms would conceal the expenditure from municipal financial reports. According to Delfino and Zanoni (2008), municipalities in Piemonte did not leverage their real estate, whether it be through their use, rather than lease or management via a public firm, but they did slow down maintenance. The uncommon use of public firms is also reported by Bargero, Delfino, and Zanoni (2009) for 2008.

Grisolia (2010)).

I, therefore, focus on the year 2005, when the DSP capped maximum expenditure but allowed municipalities to exceed the cap for capital expenditure financed through the sale of real estate. This channel could have permitted municipalities to maintain their investment level. However, the DSP removed this possibility in 2006. Thus, I hypothesize that, in 2005, municipalities subject to the DSP would increase the revenues from the sale of real estate to finance investments above the maximum expenditure cap.

3.2.2.2 2008

In 2008, the DSP targeted the budget balance again, counting revenues from the sale of real estate as part of the overall revenue. At the same time, the sanctions for violating the fiscal rules became more severe. The most evident strategies available to municipalities concern a reduction in expenditure and an increase in revenue. However, the law did not allow local taxes to increase.

Concurrently, a reform compelled municipalities to list the real estate not relevant for institutional use, simplified the bureaucracy of the sale, and incentivised the contribution to real estate investment funds.[19] For all these reasons, the revenues from the sale of real estate offered a viable means for compliance with the fiscal rules.

During the 2008 Financial Crisis, tax bases shrank while the demand for welfare services increased (Barbera, Guarini, and Steccolini (2016)); furthermore, raising expenditure could have stimulated the local economy. I hypothesize that municipalities subject to fiscal rules would increase revenues from the sale of real estate to comply with fiscal rules in 2008. Although the sale of real estate could have helped with DSP compliance in the whole 2007-2012 period, I concentrate on 2008 for several reasons: i) the Financial Crisis started around that year (Figures D.2 and D.4 in Appendix D) and would highlight the first response before fiscal rules adjustments, ii) the period 2009-2010 limited the cases in which the budget balance formula monitored by the DSP counted the sale of real estate as part of the revenues, and iii) in the following years the DSP allowed more flexibility in the forms of compensations among municipalities or with the region.

[19] Art. 58 Decreto legge 112/2008, enacted in June, converted by Legge 133/2008.

3.3 Data

The data mainly consists of municipal financial reports[20] detailing the revenues and expenditures of Italian municipalities from 1999 to 2012 (MI (2023b)). These financial reports are provided by the Ministry of the Interior and follow the accounting framework established by Decreto del Presidente della Repubblica 194/1996. The period ends in 2012, as the year after policymakers extended the DSP to municipalities with more than 1,000 inhabitants. The financial reports present revenue and expenditure components (budget items) using both *accrual* and *cash* accounting.[21]

A value under *accrual* accounting represents the amount the municipality earns or owes during the year, regardless of whether the municipality received or paid cash. For instance, when a municipality sells real estate, accrual accounting records the revenue amount even if the buyer has not paid yet. *Cash* accounting records the cash actually received or paid during the year, including amounts related to past years' transactions (residuals). The DSP measured fiscal objectives using "accrual", "cash", or "mixed" amounts. The latter expresses current budget items on an accrual basis and capital budget items on a cash basis. The DSP set its targets in cash amounts for the years 1999-2002, cash and accrual for the years 2003-2007, and mixed for the years 2008-2012.

The main outcome in my empirical models consists of the *revenues from the sale of real estate* and those from the *sale of property rights* (e.g., surface rights). The two revenues are a single non-divisible budget item classified as *capital revenue*.

Following how the DSP measured its fiscal objectives, I estimate the outcome both as accrual and as cash values. Moreover, I construct a binary version of the variable to capture the extensive margin of selling real estate. This dummy is coded as 1 if there were any cash revenues from the sale of real estate, excluding those from previous years' economic activity (residuals), and 0 otherwise.

3.3.1 Other data sources

In addition to the municipal financial reports, I use several other data sources in this research. The Ministry of Economics and Finance provides data about municipal income

[20] I present a financial report extract in Figure D.20 in Appendix D.

[21] Accrual is in reference to the Italian *impegni* and *accertamenti*, and cash is in reference to *pagamenti in conto competenza e residui*. See Appendix G for more formal definitions.

surcharge taxes (MEF (2022)) and real estate stock composition (MEF (2015a)). Real estate auction notices (OGIR (2025b)) and the list of municipalities infiltrated by the mafia are from the Official Gazette of the Italian Republic (OGIR (2025a)). The Ministry of the Interior provides electoral (MI (2022)) and administrative municipal data (MI (2023b)). Demographic and municipal level information is from the National Statistical Office (ISTAT (2025b)), and data on municipalities in financial distress are from Fondazione Università Ca' Foscari (2025). Finally, Agenzia delle Entrate (2024) provides data on real estate prices.

3.3.2 Sample selection

Since Italy used the Italian Lira up to 2002, I convert previous years' amounts using the 1998 exchange rate of 1,936.27 Italian Lira per Euro. I adjust all the monetary values to 2022 euros per capita using inflation rates from the FRED St. Louis database for Italy (FRED (2023)).

I exclude several categories of municipalities: i) those infiltrated by mafia, given the governance of a nominated commission; ii) those undergoing bankruptcy procedures, as they might sell real estate to address severe financial distress; iii) those residing in special regions, because subject to different DSP rules; iv) municipalities that crossed the 5,000-inhabitants cutoff after 2003, since the reference population applied by the DSP is the ISTAT population on the 31st December of two years prior (e.g., 2003 for 2005); and v) those too farther away from said cutoff to improve comparability. Moreover, I drop further municipalities to have a balanced panel. The main estimation sample thus covers 1,560 municipalities that, in 2003, had between 3,000 and 10,000 inhabitants.

3.3.3 Summary statistics

Table 3.1 presents the per capita[22] cash amounts for Italian municipalities in 1999-2012. The percentage of municipalities engaging in the sale of real estate is around 44%. The average revenue from the sales of real estate is €22.02, corresponding to about 6.0% of the average capital expenditure and 16.8% of the average loans taken out. However, the revenues from the sale of real estate are quite volatile, with a large standard deviation

[22]The per capita values are obtained using the 2003 population.

Table 3.1: Overview of Italian municipalities (1999-2012)

Variable	Mean	SD	Min	Max	Median
Main outcomes					
Real estate sales (binary)	0.44	0.50	0.00	1.00	0.00
Real estate sales (cash)	22.02	66.10	0.00	1854.75	0.45
Real estate sales (accrual)	24.20	87.23	0.00	3583.28	0.00
Real estate prices					
Commercial	1153.23	509.72	356.98	8051.98	1048.24
Residential	1139.99	530.52	327.63	6355.51	1029.27
Productive	621.71	249.48	186.70	2582.95	582.78
Expenditures & revenues					
Capital expenditure	369.50	471.39	3.86	35565.10	284.36
Interest ratio	0.06	0.03	0.00	0.37	0.05
Loans taken out	131.35	213.43	0.00	5689.21	69.97
Municipal characteristics					
Population	5697	2028	2311	14209	5368

Notes: The table presents the main economic and socio-geographic variables describing Italian municipalities between 3,000-10,000 inhabitants in the period 1999-2012. All the monetary variables are expressed in per capita cash amounts in 2022 euros unless indicated otherwise. Moreover, since real estate prices are not available before 2004 and have a high amount of missing observations, I construct a different balanced sample for these variables. The columns are, respectively, the average, standard deviation, minimum, maximum, and median. Real estate sales (binary) is the proportion of municipalities with revenues from the sale of real estate (1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise). The interest ratio is interest expenditure over current revenues. See Sections 3.2 and 3.3 and Appendix G for accounting definitions. Real estate prices for residential, commercial, and productive assets are per square meter. These prices are averages between the minimum and maximum for each municipal zone, then averaged across all the zones.

relative to the mean. Importantly, the first two quartiles are near zero, while the third is €15.36 per capita. These numbers are similar for accrual values.

An important covariate is the ratio of interest payments to current revenues, hereafter referred to as the interest ratio. This variable tries to capture debt exposure and relates to the debt limit discussed in the previous section.

3.3.4 Graphical analysis

In Figure 3.2, I plot the extensive margin (Panel A) and the average cash revenue per capita from the sale of real estate (Panel B). These panels only include municipalities with a population between 3,000 and 10,000 inhabitants, separated by the DSP's 5,000-inhabitant threshold.

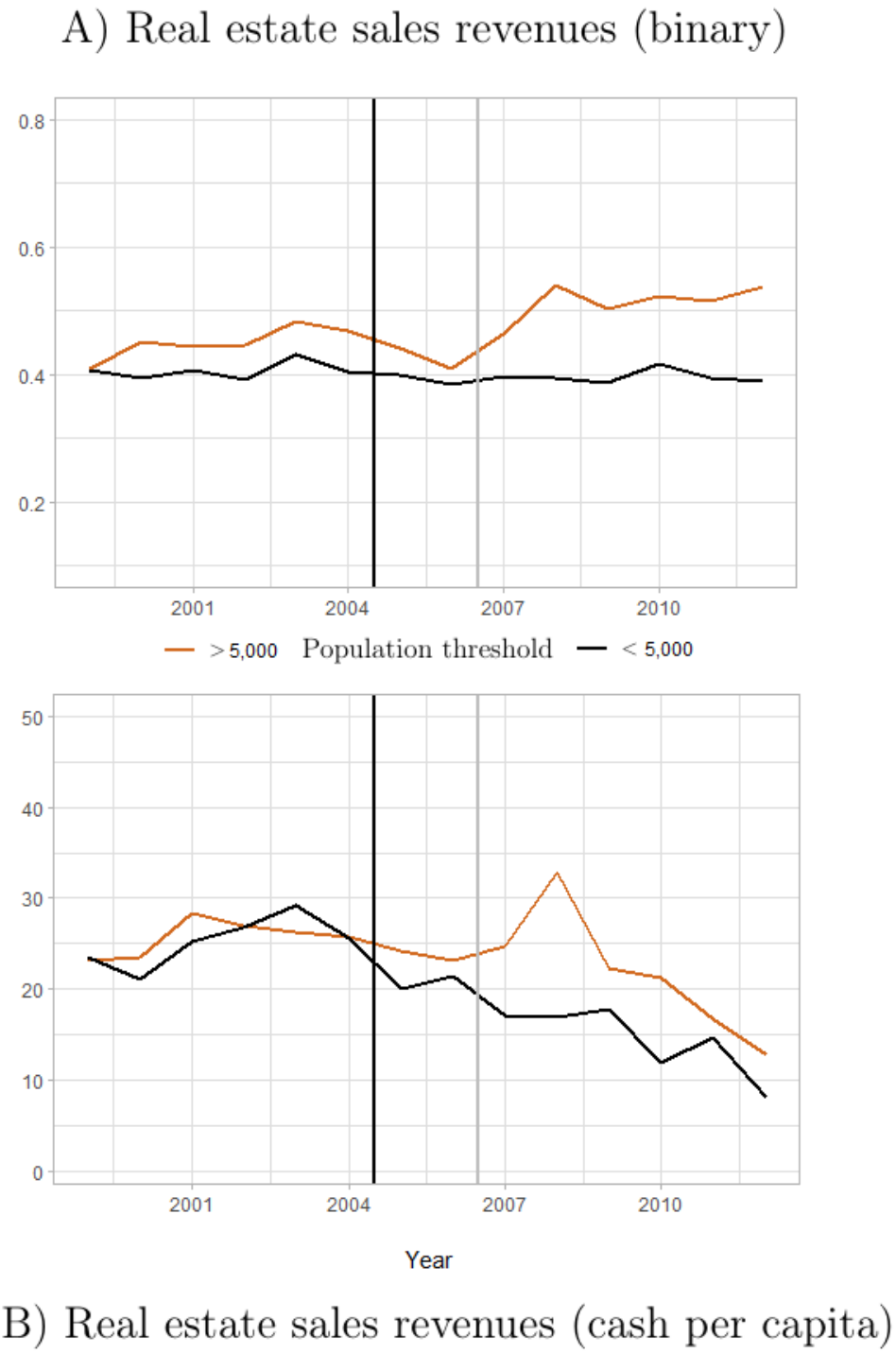
Following my hypothesis, I expect an increase in the revenues from the sale of real estate exclusively for municipalities subject to the DSP (those above 5,000 inhabitants) in 2005 and 2008. However, Figure 3.2 shows little observable difference in 2005, both in revenues (Panel B) and in the proportion of municipalities engaging in the sales of real estate (Panel A). This suggests that municipalities did not use this channel to finance capital expenditure above the imposed DSP expenditure cap.

A possible explanation for the lack of an effect is municipalities' preference for alternative strategies of compliance. Another explanation is that the fiscal rules' expenditure cap was not binding. However, the survey of mayors SWG (2004) portrayed compliance as difficult.

In contrast, municipalities under the DSP exhibited a noticeable surge in the revenues from the sale of real estate in 2007 and 2008. Furthermore, their extensive margin also rose for the entire 2007-2012 period. In addition, municipalities subject to the DSP are the only ones exhibiting these increases. This finding is compatible with the sale of real estate as a compliance tool. Nevertheless, it could also reflect that larger municipalities, subject to the DSP, had more real estate eligible for sale in the event of a recession. Specifically, in 2015, municipalities with populations between 5,000 and 10,000 inhabitants owned, on average, 18 (11.8%) more real estate eligible[23] for sale than the ones between 3,000 and 5,000 inhabitants (MEF (2015a), own calculations).

[23]Eligibility for sale only refers to the types of real estate being allowed for sale, not the individual needs of the municipality. See Appendix F for more information about the sale of real estate.

Figure 3.2: Revenues from the sales of real estate (Italy 1999-2012)



Notes: Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The vertical lines are jittered left to 2005 (Black) and 2007 (Gray). A) Average cash revenues per capita from the sale of real estate. B) Proportion of municipalities with revenues from the sale of real estate (binary variable: 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise).

Importantly, Italy uses many population thresholds to mark municipal administrative changes, for example, in the mayoral salary[24] or in the number of municipal auditors.

I, therefore, repeat the analysis using municipalities with populations below 100,000 inhabitants and grouping them into five demographic groups. I present the results in Figure D.18 (cash per capita) and Figure D.19 (binary) in Appendix D. While the two groups above 5,000 inhabitants, subject to the DSP, exhibit the same earlier surges, and two of the groups below 5,000 inhabitants remain flat, municipalities between 1,000 and 3,000 inhabitants also exhibit an increase after 2007. This emphasises the need to isolate confounders in the DiD estimation.

3.4 Empirical analysis

I study the revenues from the sale of real estate, expressed in accrual and cash amounts, by estimating a dynamic Difference-in-Differences model. This section first outlines the identification assumptions and validation tests. Then I present the treatment effect estimates, focusing on the years 2005 and 2008. I then examine the heterogeneous effects of southern regions, mayors' education, and municipal political leaning. Finally, I assess the robustness of these findings by testing alternative specifications and the influence of potential confounders.

3.4.1 Identification

In the dynamic Difference-in-Differences (DiD) model, I compare changes over time in municipalities above 5,000 inhabitants (treated group) with those below (control group).

The regression equation for the dynamic Difference-in-Differences model is as follows:

$$y_{it} = \sum_{j=2005}^{2012} b_j \mathbb{I}\{> 5,000\}_i \times \phi_j + \phi_i + \phi_t \times \phi_r + \epsilon_{it} \tag{3.1}$$

The models, as well as the other equations, use annual municipal-level observations clustered at the municipal level. The dependent variable y_{it} represents the revenue from the sale of real estate expressed in accrual or cash amount, while for the extensive margin,

[24] See Appendix F for more information on the salaries of local administrators.

it is in binary form. ϕ_i, ϕ_t, and ϕ_r denote municipal, year, and regional dummies, respectively, and the $\phi_j s$ are year dummies.

I hypothesize the coefficients b_{2005} and b_{2008} to be large and positive, reflecting increased sales of real estate to sustain investment in 2005 and to comply with the DSP in 2008. Since all the treated units receive the treatment in the same period, this estimation doesn't suffer from the staggered design bias.

Given the treatment assignment at the 5,000-inhabitant threshold, I restrict my estimation sample to municipalities between 3,000 and 10,000 inhabitants. This improves the comparability and mitigates confounding factors; however, it also makes the estimates inherently local to the cutoff.

A major concern is that the 5,000-inhabitant threshold also coincides with other administrative changes, such as an increase in the mayor's salary or in the number of auditors. I assume the effect of these administrative changes to be time-invariant and address the bias by estimating a dynamic Difference-in-Differences model following Angrist and Pischke (2009) and Autor (2003).

Specifically, this model compares the difference in conditional expectations between the treated and control group in the year of interest (2005 or 2008) with the difference in a reference period (2001-2004). These two differences are then subtracted, eliminating any difference between the two that is constant over time.

This identification strategy has four identifying assumptions. First, no other treatment interferes with the groups and timing of the research question's treatment. Second, the trend of the outcome variable for the treated group would have evolved on average as that of the control group had they not been treated. Third, there is no anticipation effect to the treatment. Fourth, the treatment is applied homogeneously to the treated group, and it does not affect the control group (i.e., no spillovers). If these conditions hold, the model identifies the average treatment effect on the treated (ATT).

To assess the parallel trend and no anticipation assumptions, I analyse the pre-treatment years by estimating an event study using 2004 as the reference year (Equation (3.3) in Appendix E). For the main estimation, I set 2001-2004 as the reference period since the DSP did not count the sale of real estate and capital expenditure towards compliance, and before 2001, the DSP targeted all municipalities. The period 2001-2004 is the baseline for both the 2005 and 2008 treatments, leaving the comparison to the last

period in which the sale of real estate was not included in the DSP. Although spillovers are possible, for example, through the prices of real estate on the market, I assume no substantial spillovers between treated and control municipalities.

To investigate heterogeneous behaviour, I estimate a triple-difference model (Equation (3.2)) to primarily study variation by mayors' college education, motivated by prior findings in the literature, and by geographical location, given the substantial transfers received by southern regions from the European Union and the national government (MEF (2010) and Camera dei Deputati (2013)).

$$y_{it} = \sum_{j=2005}^{2012} b_j \; het_i \times \phi_j + \sum_{j=2005}^{2012} b_j \; \mathbb{I}\{> 5,000\}_i \times \phi_j + \sum_{j=2005}^{2012} b_j \; het_i \times \mathbb{I}\{> 5,000\}_i \times \phi_j + \phi_i + \phi_t \times \phi_r + \epsilon_{it} \tag{3.2}$$

Where ϕ_i, ϕ_t, and ϕ_r are municipal, year, and regional dummies, respectively, $\phi_j s$ are year dummies, and y_{it} is the revenue from the sale of real estate expressed in different forms. Finally, het_i is a binary variable equal to 1 if the observation i belongs to the heterogeneous category and 0 otherwise; these categories are either a left-leaning municipal council, a right-leaning municipal council, the mayor has a college degree, or the municipality resides in a southern region.

Finally, I test the sorting of municipalities to check for potential manipulation around the population cutoff with a density test (Cattaneo, Jansson, and Ma (2018, 2020, 2022, 2024)). The results do not support the hypothesis of manipulation (Figure D.7 in Appendix D).

3.4.2 Empirical analysis

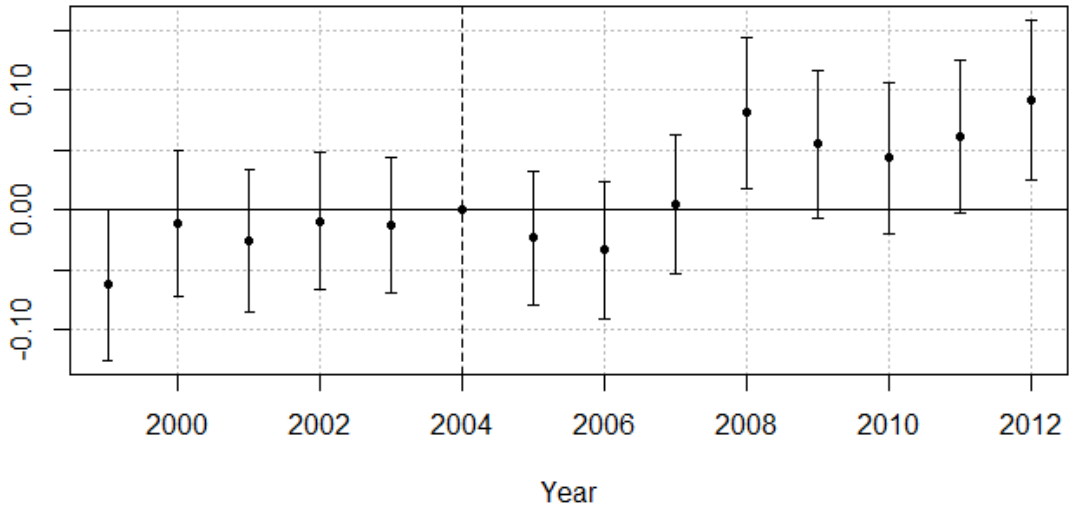
I start by examining the extensive margin to investigate whether municipalities participate in the sale of real estate following the reforms in fiscal rules. I then study the intensity of sales of real estate using revenues in accrual and cash amounts.

3.4.2.1 Binary

Figure 3.3 presents the event study estimates (Equation (3.3) in Appendix E), using the binary indicator as dependent variable, along with 95% confidence intervals. Column 1

of Table 3.2 shows the coefficients for the main estimation (Equation (3.1)). The pre-periods have point estimates near zero, except for 1999, a year in which all municipalities were subject to fiscal rules. Importantly, all the other pre-treatment estimates are not statistically different from zero and thus do not support the hypothesis of a trend.

Figure 3.3: Real estate sales revenues (binary)



Notes: Dynamic Difference-in-Differences model for the proportion of municipalities with revenues from the sale of real estate (binary variable: 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise). Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple testing.

The 2005 coefficient captures the willingness to sell real estate to sustain investment above the imposed DSP cap. Table 3.2 shows a modest, not statistically significant, decrease of 1.1 percentage points (CI: -5.7 to 3.5). In 2006, the financing exception on sales of real estate was removed, and the estimated difference decreased by 2.1 percentage points (CI: -6.8 to 2.6). This could be explained by the removal of the exception and the fiscal rules in the baseline years, which did not restrict capital expenditure. Specifically, a constraint on capital expenditure could imply a lower necessity of financing through the sale of real estate. Together, they are not suggestive of more municipalities engaging in the sale of real estate due to the fiscal rules' reforms.

From 2007, municipalities had the chance to sell real estate to improve budget balance as calculated by the DSP. I only find a small increase of 1.6 percentage points in 2007 (CI: -3.29 to 6.53, Table 3.2). However, this coefficient is still quite above the previous year's. In contrast, the 2008 coefficient presents a statistically significant surge of 9.3

percentage points (Table 3.2). This could be explained by the onset of the crisis, which damaged economic activity. Moreover, the estimates show a remarkably higher difference for all the following years compared to the pre-treatment period.

Table 3.2: Dynamic DiD of real estate sales revenues

	Baseline			**Covariate**			**Weighted**		
	Binary	Accrual	Cash	Binary	Accrual	Cash	Binary	Accrual	Cash
>5,000 × 2005	-0.011	9.419*	4.102	-0.013	9.462*	4.252	-0.012	10.592*	4.641
	(0.023)	(5.386)	(3.562)	(0.024)	(5.570)	(3.588)	(0.027)	(5.954)	(3.885)
>5,000 × 2006	-0.021	-3.327	2.470	-0.024	-3.438	2.690	-0.014	1.112	5.983
	(0.024)	(4.858)	(3.935)	(0.025)	(5.061)	(4.030)	(0.027)	(4.822)	(4.339)
>5,000 × 2007	0.016	13.616***	8.049**	0.010	13.525***	7.869**	0.009	12.949***	8.378**
	(0.025)	(4.389)	(3.382)	(0.026)	(4.747)	(3.460)	(0.029)	(4.756)	(4.038)
>5,000 × 2008	0.093***	16.177***	15.908***	0.089***	15.391***	16.144***	0.068**	15.077***	15.698***
	(0.026)	(4.532)	(4.080)	(0.028)	(4.964)	(4.203)	(0.030)	(5.271)	(4.747)
>5,000 × 2007-2012	0.068***	9.545***	7.938***	0.060***	9.504**	8.707***	0.059***	7.692*	7.581**
	(0.019)	(3.540)	(2.816)	(0.021)	(4.220)	(3.061)	(0.021)	(4.120)	(3.374)
Observations	18,720	18,720	18,720	18,648	18,648	18,648	18,720	18,720	18,720
Municipality fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region by year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Dynamic Difference-in-Differences model on sales of real estate as accrual and cash per capita amounts, and as a binary variable; 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. Columns 1-3 only consider the baseline Equation (3.1) with uniform weights and no covariates. Columns 4-6 include linear covariates such as population below 18, population above 65, population and lagged economic variables: ratio of interest over revenues from taxes, fees, and current grants, surplus per capita, current grants over current revenues, personnel expenditure over current expenditure, grants over current expenditure, and tax revenues over current revenues; summary statistics in Table D.4 in Appendix D. The sample is smaller due to missing observations in the covariates. Columns 7-9 are the baseline estimation using triangular weights, decreasing farther away from the cut-off. See accounting definitions in Sections 3.2 and 3.3 and Appendix G. Standard errors are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Since the sale of real estate could have helped with DSP compliance for the whole 2007-2012 period, I also provide an estimate pooling these years (see the separated row

in Table 3.2). The pooled estimate indicates a statistically significant increase of 6.8 percentage points. This corresponds to a 14% rise with respect to 2004.

3.4.2.2 Accrual amounts

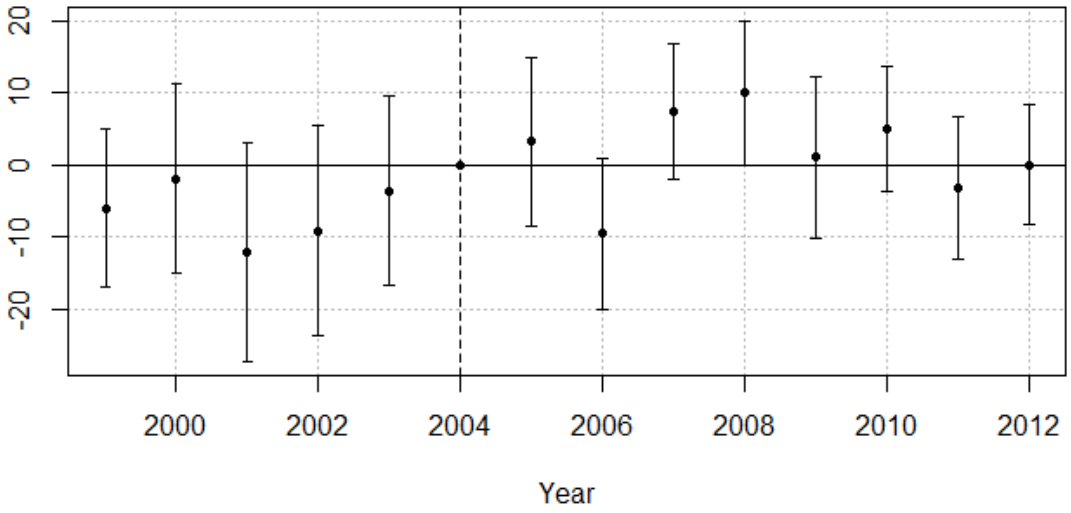
Next, I investigate the intensity of revenues from the sale of real estate, starting with accrual amounts. Figure 3.4 displays the event study estimates for revenues per capita from the sale of real estate (Equation (3.1) in Appendix E). The second column of Table 3.2 (Equation (3.1)) presents the coefficients with the 2001-2004 period as baseline. Although the pre-period estimates in Figure 3.4 are not statistically distinguishable from zero, they are consistently lower than the baseline year with wide confidence intervals. Moreover, they exhibit an increasing pattern in the three years prior, suggesting a violation of the parallel trend assumption; therefore, some form of bias can be expected. However, this pattern might not indicate a trend, as the years 1999-2000 do not align with it, but rather fluctuate around the reference year.

For 2005, Table 3.2 displays an increase of 9.42€. It has a wide confidence interval, and its statistical significance might be an artefact of the baseline period also including the low estimates between 2001 and 2003. In contrast, the 2005 point estimate in Figure 3.4 is not suggestive of municipalities exploiting this revenue channel to finance investment above the DSP cap. Moreover, 2006 saw a decrease of 3.33€ (CI: -12.86€ to 6.20€, Table 3.2). Similar to before, municipalities do not appear to respond to the exception allowed by the fiscal rules. For 2007, Table 3.2 displays an increase of 8.05€, and for 2008, the beginning of the crisis, the point estimate is the highest of the period, at 15.91€. Moreover, the pooled 2007-2012 period shows an increase of 9.55€ (see the separated row in Table 3.2). These estimates suggest a great increase in revenues in 2007-2012, although most of it comes from 2007 and 2008.

3.4.2.3 Cash amounts

Finally, I present the estimates for the cash amounts in Figure 3.5 (Equation (3.3) in Appendix E) and column 3 of Table 3.2 (Equation (3.1)). The coefficient estimates are more precise, and the pre-periods do not show much trending. For 2005, the estimated effect is a small increase of 4.10€ (CI: -2.89€ to 11.09€, Table 3.2). In contrast to the accrual-based estimation, 2006 presents an increase of 2.47€, which is not statistically

Figure 3.4: Real estate sales revenues (per capita, accrual)



Notes: Dynamic Difference-in-Differences model for per capita accrual revenues from the sale of real estate. See Section 3.3 and Appendix G for accounting definitions. Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple testing.

distinguishable from zero (CI: -5.25€ to 10.19€, Table 3.2).

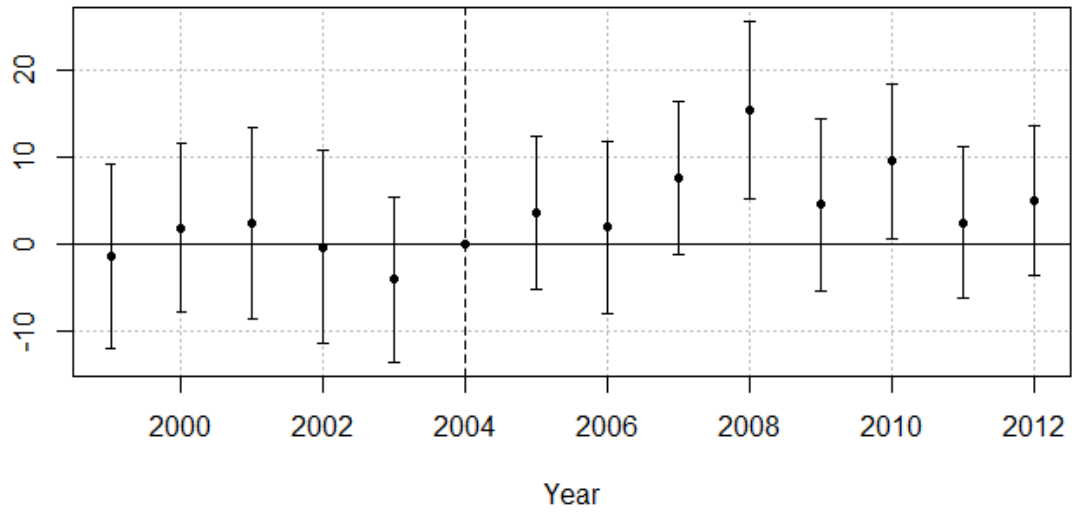
Considering the three estimations presented, I do not find strong evidence for municipalities engaging in more sales of real estate in 2005 to maintain their investment level. Therefore, the sales of real estate do not seem to have mitigated the contraction of capital expenditure. The analysis reaches a different conclusion for the period in which the revenues from the sale of real estate could have helped compliance with the DSP on the budget balance side.

Table 3.2 presents, for the 2007 coefficient, a statistically significant increase of 8.05€, while the year 2008 stands out with an increase of 15.91€. However, pooling the whole 2007-2012 period together, I find a more modest increase of 7.94€ (see the separated row in Table 3.2).

Cash and accrual estimates suggest that in the year 2007, municipalities might have used the sale of real estate as a channel to comply with the DSP; however, the economic environment was not difficult enough for widespread or intensive use. The situation changed in 2008-2012, where the crisis might have incentivized many municipalities to utilize the channel, yet the only year of intensive use was in 2008 (Figures 3.4 and 3.5). This year showed a strong worsening of the economy, and as it marked the beginning of the crisis, the fiscal rules might not have been flexible enough to accommodate such a

scenario.

Figure 3.5: Real estate sales revenues (per capita, cash)



Notes: Dynamic Difference-in-Differences model of cash per capita revenues from the sale of real estate. Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple testing.

To account for the influence of potential confounders, I re-estimate Equation (3.1) using lagged economic variables as covariates, specifically adjusting for surplus per capita and the interest ratio. I present the estimates in columns 4-6 in Table 3.2. The estimates are consistent with the baseline model and do not alter the overall interpretation of the findings. I then proceed to estimate a weighted regression, where the weights decrease farther away from the cutoff (columns 6-9 of Table 3.2). The estimation results in generally higher statistical uncertainty. This specification is also consistent with the baseline model.

3.4.2.4 Summary

Overall, the 2005 estimates are consistent with the survey of mayors conducted in 2004, indicating that municipalities did not often resort to selling real estate to maintain their investment level that year. This could be explained by relying on alternative channels or future reforms to the DSP. The analysis provides evidence that municipalities under fiscal rules increased their revenues from the sale of real estate in 2007 and especially in 2008, and an overall increase in the number of municipalities selling real estate from 2007 to 2012. However, these effects are consistent with smaller municipalities having fewer real

estate properties available for sale when needed. I further investigate this explanation in the robustness checks.

3.4.3 Further estimations

I explore heterogeneity effects by interacting the treatment with the political leaning of the municipal council (left/right)[25], mayor's college education, and whether the municipality resides in a southern region (Equation (3.2)). I address the endogeneity of elections of the first three by considering municipalities under the same mayoral mandate from 2004 to 2008. I present the results in Table D.1 (cash per capita) and Table D.2 (binary) in Appendix D. In addition to heterogeneous treatment effects, I also examine the potential consequences of the sale of real estate on local real estate prices and income tax rates.

3.4.3.1 Municipal council

The restricted samples, particularly those based on political leaning, suffer from high statistical uncertainty, likely due to smaller sample sizes. For 2005, left-leaning municipalities have an average cash increase of 16.31€ (CI: -24.04€ to 56.67€), while right-leaning municipalities show an average decrease of 31.06€; however, the standard error is too high to be credible. For 2008, estimates remain statistically imprecise: left-leaning (5.25€, CI: -37.53€ to 48.04€) and right-leaning (-14.13€, CI:-62.09€ to 33.82€). Even though college-educated mayors' strategies might differ, the small number of observations yields imprecise estimates. The 2005 cash point estimate is 4.83€ (CI: -14.23€ to 23.89€); in 2008, it is -16.04€ (-36.95€ to 4.87€).

3.4.3.2 Southern regions

Southern municipalities had no marked difference in 2005 (-5.73€ per capita, CI: -15.10€ to 3.62€), but had a statistically significant difference of -26.92€ per capita in 2008. Compared to the increase of 20.44€ in other regions, it suggests that they did not drive the 2008 sales revenue growth. On the extensive margin side, southern municipalities also have a negative coefficient of -10.1 percentage points (CI: -23.3 to 3.1), yet not statistically distinguishable from zero. This could be explained by a lower number of

[25]I present in Table D.5 in Appendix D the leanings following the political parties' identification used by Gamalerio (2020) and Bracco et al. (2015). I define the municipal leaning based on the most voted party in the coalition supporting the mayor.

real estate properties owned by municipalities in the southern regions. Although in 2015, southern municipalities between 5,000 and 10,000 inhabitants actually had 10 (5.9%) more real estate assets eligible[26] for sale (MEF (2015a), own calculations).

3.4.3.3 Real estate prices and income tax rates

Figures D.13 and D.14 in Appendix D explore the consequences of selling real estate through other specifications. I estimate different dynamic Difference-in-Differences models for municipalities with populations of 5,000-10,000 inhabitants, defining as treated those that had any revenues from the sale of real estate (excluding residuals) in 2008 and using 2007 as the reference year. The purpose is to investigate whether municipalities that engaged in sales of real estate experienced a decrease in real estate prices or a rise in the top bracket local income tax following the reforms. The resulting estimates lack statistical precision to identify changes in real estate prices or in the top-bracket income tax.

3.4.4 Robustness

I test robustness by shrinking the bandwidths, performing placebo estimations, assessing the influence of concurrent events or policies, and estimating other specifications.

3.4.4.1 Bandwidths and placebos

I start by re-estimating the Equation (3.1) coefficients for 2005 and 2008 at five shrinking bandwidths for binary and cash amounts. The estimates in 2005 are never statistically different from zero (Figures D.9 and D.10 in Appendix D), while for 2008, the coefficients exhibit a loss in magnitude and statistical significance.

As a placebo test, I estimate the 2008 coefficient at random cutoffs (between 3,500-4,500 or 6,000-8,000 inhabitants), comparing treated with treated or control with control. Specifically, the samples are composed either of municipalities between 3,000 and 5,000 inhabitants (control) or of those between 5,000 and 10,000 inhabitants (treated). Since the cutoffs are randomized, I expect a zero effect. To keep the comparison similar to the original, I define the municipalities above the random cutoff as the new treated group,

[26] Eligibility for sale only refers to the types of real estate being allowed for sale, it does not consider the individual needs of the municipality. See Appendix F for more information about sales of real estate.

and those below as the new control group. The placebo tests yield distributions with a positive skew and clusters of estimates Figure D.12 in Appendix D). Furthermore, the binary and cash estimates of the original cutoff are the largest in their respective distribution. I explain the shape of the distributions with the samples being stable across the randomization and the DiD model using simple averages with uniform weights. Moreover, the positive mass indicates that bigger municipalities had higher revenues from the sale of real estate and participated more in such sales than smaller municipalities.

3.4.4.2 Concurrent policies

Here I address the potential bias arising from a mayoral wage reduction (10% to all thresholds) that took place in 2005[27] and from a shift in the population cutoff, from 5,000 to 15,000 inhabitants, determining the number of municipal auditors that occurred in 2006.[28] I examine the years 2006, finding no consistent effect, as shown previously, and estimate a placebo threshold at 15,000 inhabitants following Equation (3.3) in Appendix E (bandwidth 5,000-100,000 to account for fewer larger municipalities). Figures D.15 and D.16 in Appendix D present the event study estimates. There is only a statistically significant increase in 2007, not supported by the extensive margin specification. Overall, the estimates align well with the pre-period variation. This finding weakens the theory that larger real estate stocks are driving the results in 2008, although non-linearities are possible.

3.4.4.3 Fiscal and real estate portfolio exposure

To assess the different exposure of the two groups to the crisis, I present the trends for the interest ratio (Figure D.5 in Appendix D) and surplus per capita (Figure D.6 in Appendix D). Leading up to 2007, the ratio did not show much difference between the groups. In contrast, the surpluses have a wider difference, favouring bigger municipalities. These municipalities also exhibit an overall positive trend, while the opposite is true for smaller ones.

Concerning the different sizes of municipal real estate portfolios, Figure D.11 in Appendix D shows the distribution of real estate holdings in 2007[29] for the two groups,

[27] Legge 266/2005.
[28] Art. 1 c. 732 Legge 296/2006.
[29] Municipalities started reporting real estate holdings in financial reports only after 2006.

expressed in thousands of euros. Since the treated group (orange) tends to have higher amounts, I re-estimate the dynamic Difference-in-Differences model, removing treated municipalities with real estate holdings higher than their median value, and estimate a triple-difference model using the demeaned real estate holdings as the heterogeneity factor. Table D.3 in Appendix D exhibits the estimates, finding robustness in these specifications.

3.4.4.4 DSP extension

Finally, I test whether the extension of the DSP to municipalities between 1,000 and 5,000 inhabitants in 2013 provides further evidence for the sale of real estate. Importantly, in the years 2013, 2014, and 2015, the target was the budget balance, and its formula counted the sale of real estate among the sources of revenue monitored by the DSP. I re-estimate Equation (3.3) in Appendix E using also the years between 2012 and 2015 and the same 5,000-inhabitant threshold as before. I present the results for the extensive margin in Figure D.17 in Appendix D. Despite municipalities above the threshold still exhibiting a statistically significant increase of 7.40 percentage points in 2013, the estimates become indistinguishable from zero for 2014 and 2015[30], although they still align with previous years' estimates. Moreover, Figure D.19 in Appendix D shows that the movement is due to a general decrease in the outcome variable for all the demographic classes considered, except for the municipalities newly subject to the DSP. This test weakens the interpretation of the main findings. However, a possible explanation is that smaller municipalities have a limited capacity for the sale of real estate. Furthermore, they were able to maintain the extensive margin level despite a general decrease in other municipalities.

3.5 Conclusion

This study investigates whether Italian municipalities respond to reforms in the fiscal rules contained in the Domestic Stability Pact (DSP) by increasing their revenues from the sale of real estate. Considerable evidence, including surveys, interviews, and policy reports[31],

[30] Testing 2013-2015 jointly with a 2001-2004 baseline would result in a statistically significant increase of 5.94 percentage points.

[31] See Barbera, Guarini, and Steccolini (2016), Bargero, Delfino, and Zanoni (2009), Camera dei Deputati (2017), Chiades and Mengotto (2013), D'Iorio (2006), Delfino and Zanoni (2008), Grisolia (2010),

supports the claim that municipalities dealt with great difficulties and uncertainty during 1999-2012.

In 2005, the fiscal rules imposed a cap on maximum expenditure, but allowed for capital expenditure above said cap if it was financed with the sale of real estate. In 2008, as the Financial Crisis worsened (Figures D.2 and D.4 in Appendix D), municipalities had to navigate strict fiscal rules with a freeze on the increases in local taxes. Selling real estate was then a suitable strategy to generate the revenue required to comply with the fiscal rules. In the following years, reforms increased the flexibility of the DSP, making 2008 the critical year for this research.

Using a dynamic Difference-in-Differences model with the period 2001-2004 as reference, I compare municipalities above 5,000 inhabitants (subject to the DSP) with municipalities below (not subject to the DSP) finding not enough evidence for an increase in the sale of real estate in 2005, consistent with the survey of mayors (SWG (2004)) where they indicated a preference for other strategies. For 2008, I find an average increase of 15.91 euros per capita in the cash revenue from the sale of real estate for municipalities subject to the DSP. Furthermore, they are also 6.8 percentage points more likely to participate in the sale of real estate for the period 2007-2012, with a significant increase only happening after 2007.

The analysis finds the increase observed in 2008 to be almost entirely driven by non-southern municipalities, suggesting a strong regional influence, possibly explained by the substantial grants received from the European Union and the national government. Placebo estimations reveal that larger municipalities consistently had higher revenues from the sale of real estate in 2008. Robustness checks restricted to municipalities near the 5,000-inhabitant threshold show a loss in magnitude and statistical significance. Moreover, the distribution of revenues from the sale of real estate inherently has many zeroes and a fat right tail, increasing the vulnerability of the estimation to random variation. While the findings presented highlight interesting patterns, the variability around the cutoff and the overall robustness tests warrant a cautious interpretation.

At the time, municipalities in Italy were responsible for nearly half of public investment (Chiades and Mengotto (2013)), and the sale of real estate served as a non-onerous source of financing. Despite fiscal rules permitting municipalities to use the revenues

and SWG (2004).

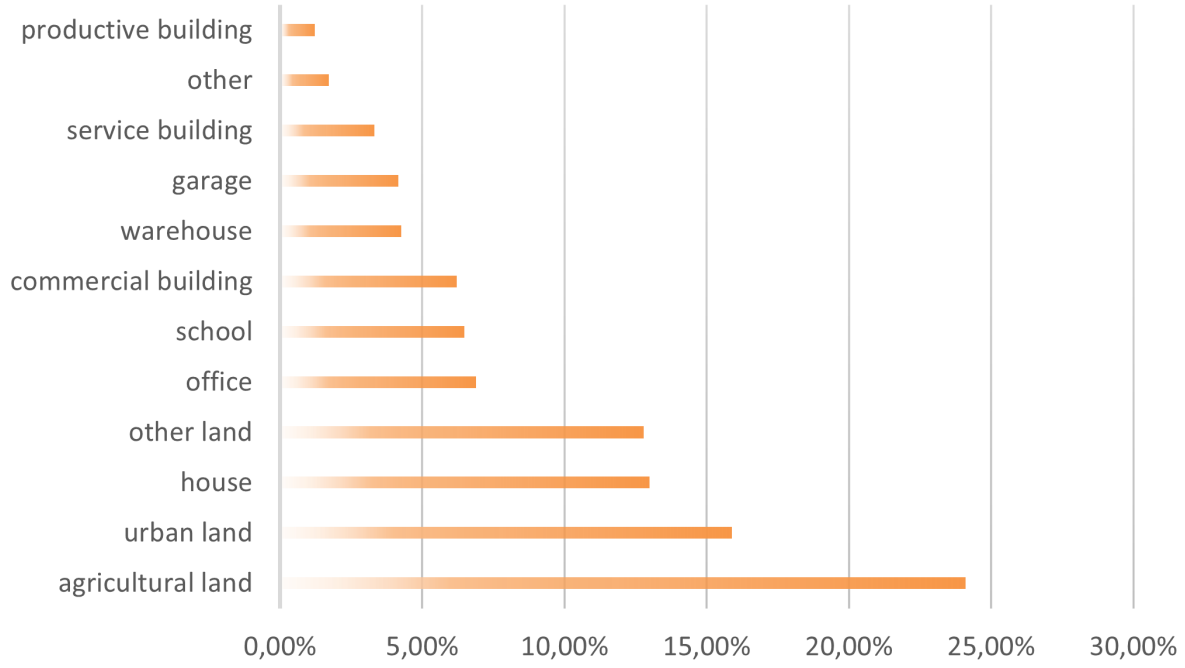
from the sale of real estate to exceed the investment cap, I do not find evidence that this exception helped maintain the investment level. Importantly, the contraction in investment that followed drew extensive criticism towards the Italian fiscal rules (Camera dei Deputati (2017) and Grisolia (2010)).

This finding casts doubt on the ability of municipalities to maintain their investment levels through their own resources while facing constraining fiscal rules. Moreover, my analysis uncovers evidence supporting that municipalities strategically leveraged extraordinary revenues, such as the sale of real estate, to comply with constraining fiscal rules. In particular, the revenue surge in 2008 could be indicative of how municipalities deal with the lack of flexibility of fiscal rules, before the reforms of the following years.

Understanding how municipalities use their scarce resources is pivotal for designing fiscal rules and not impairing economic growth. While counting extraordinary revenues toward compliance with the fiscal rules might discourage municipalities from reducing inefficient spending, it can also provide more flexibility during economic shocks.

Appendix D: Figures and Tables

Figure D.1: Municipal real estate composition (Italy)



Notes: Average composition of real estate owned by Italian municipalities in 2015. Service buildings are collective residential structures, barracks, libraries, museums, galleries, hospitals, and prisons. Commercial buildings are stores, theatres, cinemas, sports centres, hotels, hostels, indoor markets, and bathing establishments. Productive buildings are factories (industrial, artisanal, or agricultural). Land includes big parking lots. "Other land" includes parks, public gardens, forests, and natural reserves. The classification "Other" includes fortifications, buildings of worship, castles, scientific laboratories, roadmen's houses, and lighthouses. Garage includes basements and lofts. Own calculations with data provided by the Ministry of Economics and Finance (MEF (2015a)).

Figure D.2: Real Gross Domestic Product (Italy)

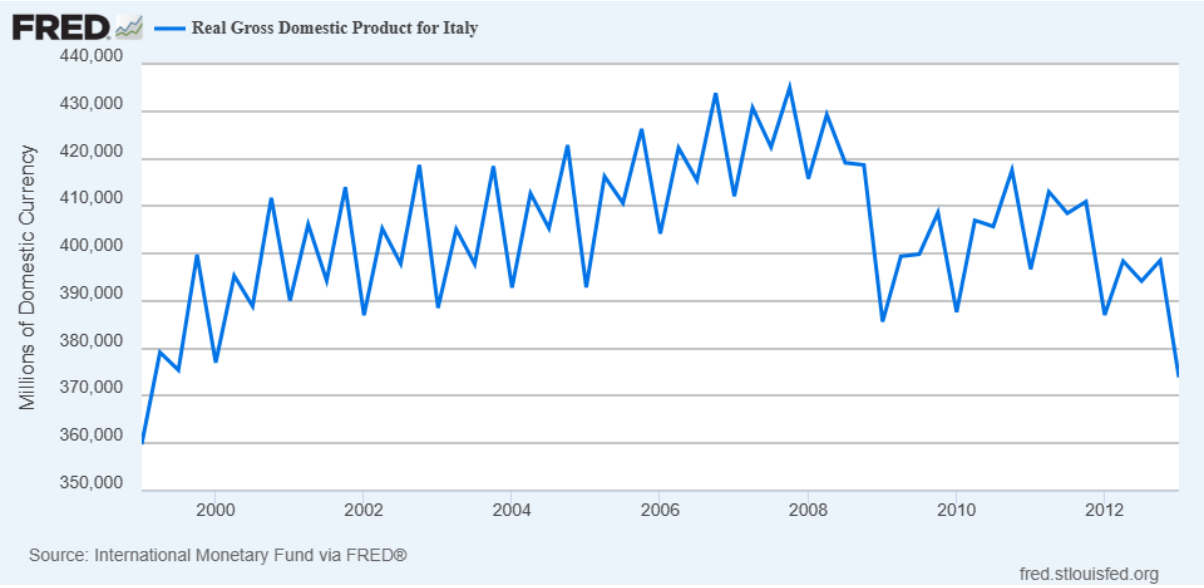


Table D.1: Heterogeneity in dynamic DiD estimates (cash, per capita)

	Left	Right	Degree	Southern Region
>5,000 × 2005	5.065	8.214	4.098	5.068
	(4.865)	(5.192)	(6.509)	(4.262)
>5,000 × 2006	0.100	1.366	2.308	3.403
	(5.308)	(5.420)	(6.203)	(4.705)
>5,000 × 2007	12.183***	13.150***	14.156**	10.620***
	(4.696)	(4.774)	(6.311)	(3.995)
>5,000 × 2008	16.759***	17.598***	23.892***	20.441***
	(5.454)	(5.443)	(6.960)	(4.683)
>5,000 × Heterogeneity × 2005	16.314	-31.062**	4.831	-5.735
	(20.565)	(15.654)	(9.714)	(4.772)
>5,000 × Heterogeneity × 2006	-2.949	-34.766**	-7.461	-5.544
	(21.619)	(16.399)	(10.341)	(5.338)
>5,000 × Heterogeneity × 2007	3.220	-29.511*	-5.713	-15.271***
	(20.041)	(17.517)	(9.150)	(5.414)
>5,000 × Heterogeneity × 2008	5.252	-14.133	-16.038	-26.925***
	(21.801)	(24.436)	(10.655)	(8.453)
Observations	11,172	11,172	11,172	18,720
Municipality fixed effects	✓	✓	✓	✓
Region by year fixed effects	✓	✓	✓	✓

Notes: Dynamic triple-difference model of cash revenues per capita from the sale of real estate. Each column is a triple interaction with a heterogeneity characteristic: left-leaning municipal council, right-leaning municipal council, mayor's college-education, and municipality residing in a southern region. For the first three columns, the sample is reduced to municipalities under the same mayoral mandate in the period 2004-2008. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. Municipalities above 5,000 inhabitants are treated, and those below are controls. The reference period is 2001-2004. 95% confidence intervals with standard errors are clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table D.2: Heterogeneity in dynamic DiD estimates (binary)

	Left	Right	Degree	Southern Regions
>5,000 × 2005	0.011	0.025	0.029	-0.014
	(0.033)	(0.031)	(0.040)	(0.026)
>5,000 × 2006	-0.029	0.008	0.013	-0.017
	(0.034)	(0.033)	(0.042)	(0.027)
>5,000 × 2007	0.055	0.085**	0.065	0.019
	(0.035)	(0.034)	(0.043)	(0.028)
>5,000 × 2008	0.103***	0.122***	0.145***	0.110***
	(0.038)	(0.037)	(0.047)	(0.029)
>5,000 × Heterogeneity × 2005	0.038	-0.102	-0.020	0.020
	(0.098)	(0.137)	(0.062)	(0.058)
>5,000 × Heterogeneity × 2006	0.149	-0.272*	-0.046	-0.022
	(0.106)	(0.143)	(0.063)	(0.060)
>5,000 × Heterogeneity × 2007	0.084	-0.369**	0.008	-0.014
	(0.102)	(0.143)	(0.067)	(0.062)
>5,000 × Heterogeneity × 2008	0.059	-0.231	-0.077	-0.101
	(0.108)	(0.143)	(0.071)	(0.067)
Observations	11,172	11,172	11,172	18,720
Municipality fixed effects	✓	✓	✓	✓
Region by year fixed effects	✓	✓	✓	✓

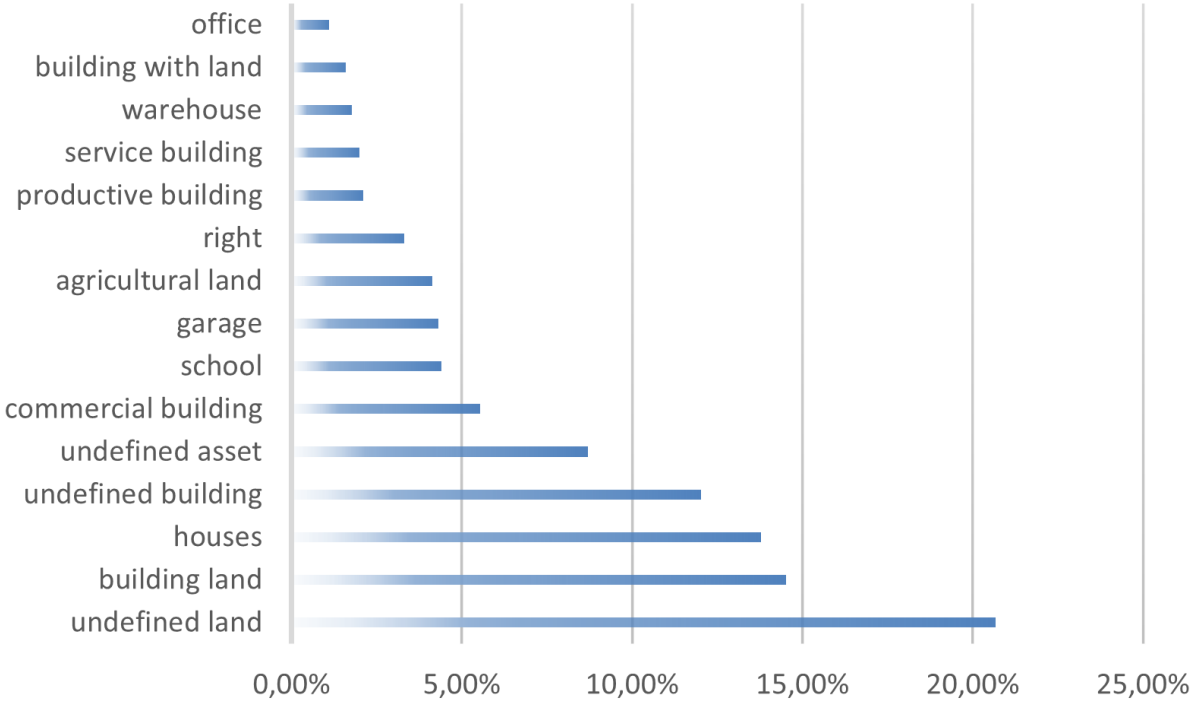
Notes: Dynamic triple-difference model for the proportion of municipalities with revenues from the sale of real estate; 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise. Each column has the triple interaction with a heterogeneity characteristic: left-leaning municipal council, right-leaning municipal council, mayor's college-education, and municipality residing in a southern region. For the first three columns, the sample is reduced to municipalities under the same mandate in the period 2004-2008. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. Municipalities above 5,000 inhabitants are treated, and those below are controls. The reference period is 2001-2004. 95% confidence intervals with standard errors clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table D.3: Dynamic DiD estimates accounting for 2007 real estate holdings

	Restricted sample		**Triple difference**	
	Binary	Cash	Binary	Cash
>5,000 × 2005	-0.006	2.850	-0.004	6.561
	(0.028)	(3.870)	(0.025)	(4.003)
>5,000 × 2006	0.005	0.931	-0.006	5.441
	(0.030)	(4.064)	(0.026)	(4.387)
>5,000 × 2007	0.012	6.756*	0.022	10.357***
	(0.030)	(3.702)	(0.027)	(3.852)
>5,000 × 2008	0.088***	10.806**	0.106***	16.860***
	(0.032)	(4.713)	(0.029)	(4.288)
>5,000 × Heterogeneity × 2005			0.000006	0.001**
			(0.000004)	(0.001)
>5,000 × Heterogeneity × 2006			0.000003	0.001**
			(0.000003)	(0.001)
>5,000 × Heterogeneity × 2007			0.000006	0.002***
			(0.000004)	(0.001)
>5,000 × Heterogeneity × 2008			0.000006	0.002***
			(0.000005)	(0.001)
Observations	13,620	13,620	18,720	18,720
Municipality fixed effects	✓	✓	✓	✓
Region by year fixed effects	✓	✓	✓	✓

Notes: Dynamic difference in differences models for cash revenues from the sale of real estate and the proportion of municipalities with revenues from the sale of real estate (binary); 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise. The restricted sample removed the treated municipalities with a euros amount of real estate holdings above the median of treated municipalities in 2007. The triple difference uses as heterogeneity the euro amount of real estate holdings in 2007, expressed as a distance from the mean. The amount is in thousands of euros. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. Municipalities above 5,000 inhabitants are treated, and those below are controls. The reference period is 2001-2004. 95% confidence intervals with standard errors clustered at the municipal level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Figure D.3: Municipal real estate publicly auctioned by category (Italy 1999-2012)



Notes: Composition of real estate publicly auctioned by Italian municipalities in 1999-2012 by category. The categories reflect a personal classification based on the description of auction notices. I do not report pharmacies as I consider them firms. The rights are mainly surface rights. Building with land primarily captures real estate in rural areas. Service buildings are real estate usually owned by municipalities to offer public services. Productive buildings are factories. Garage also includes single parking lots. The auction notices cover 1,030 municipalities and 7,553 assets. Source: Official Gazette of the Italian Republic.

Figure D.4: Monthly Unemployment Rate Total for Italy

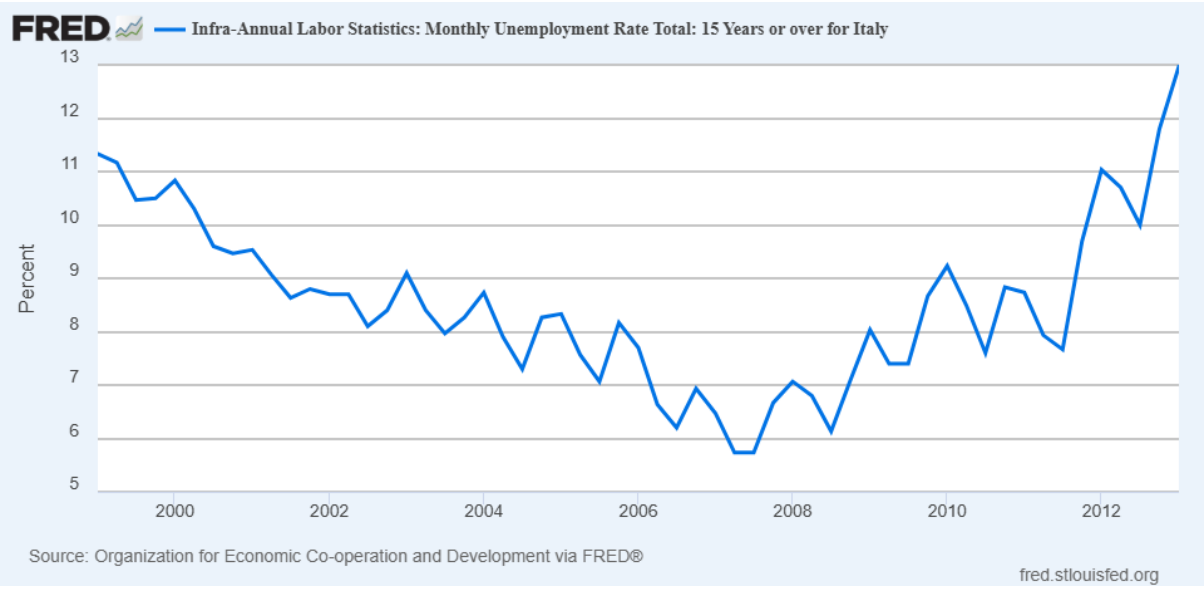
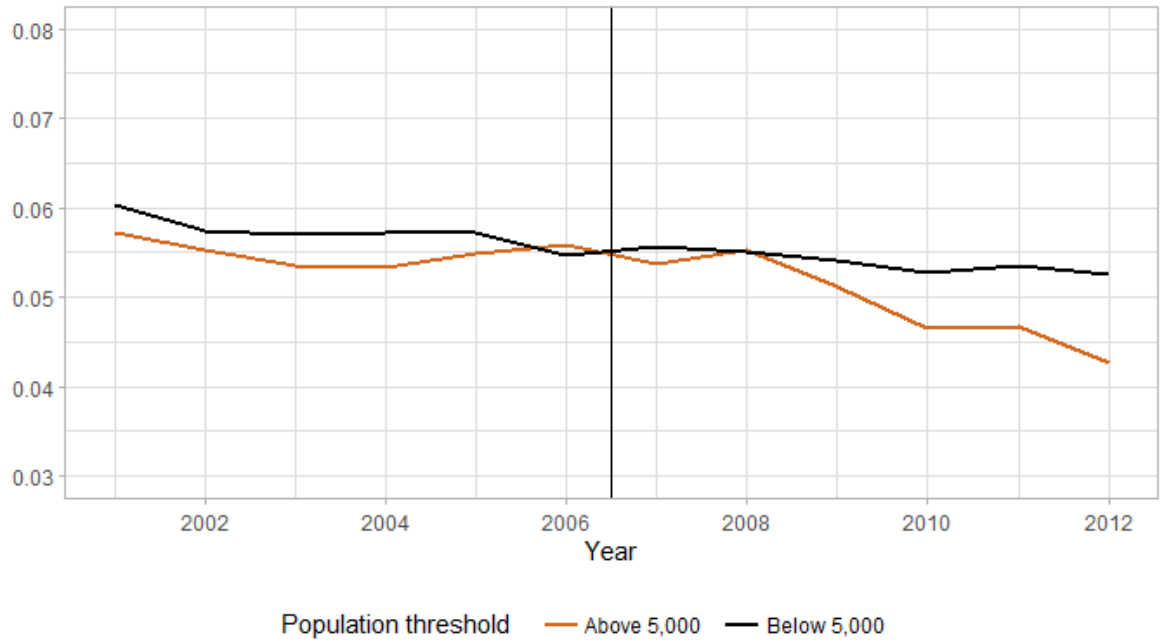
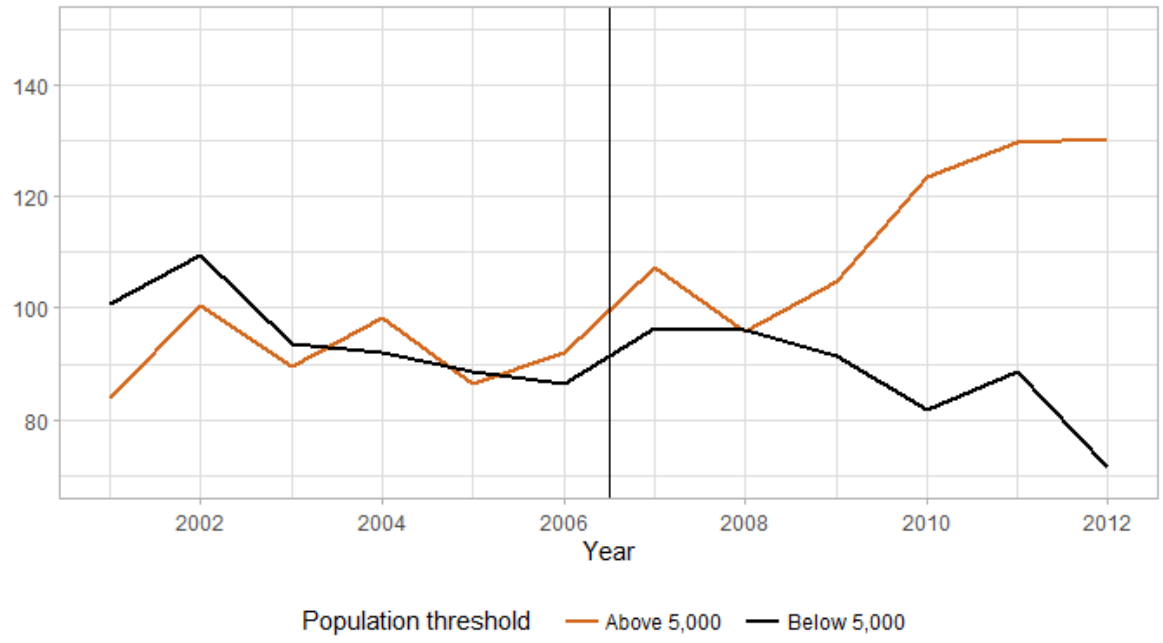


Figure D.5: Interest ratio



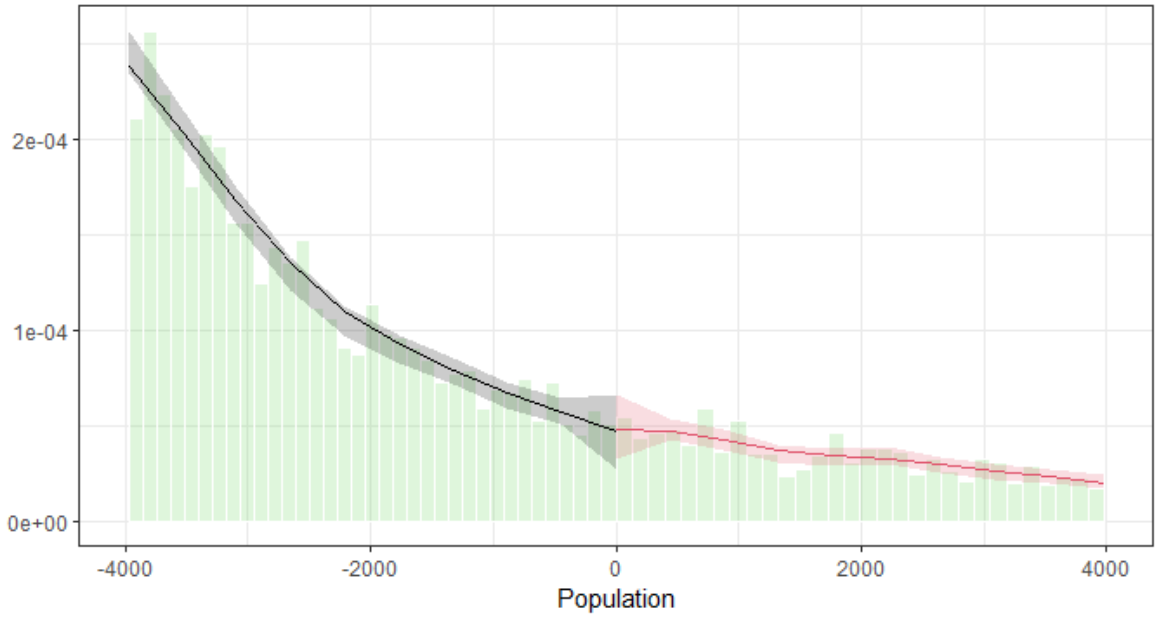
Notes: Average municipal interest ratio, the ratio of interest over revenues from taxes, fees, and current grants in 2000-2012. The municipalities included are within 3,000-10,000 inhabitants and are divided into those above or below 5,000 inhabitants. I excluded the year 1999 to allow a closer look at the relevant years. The vertical black line is jittered left to 2007.

Figure D.6: Surplus per capita



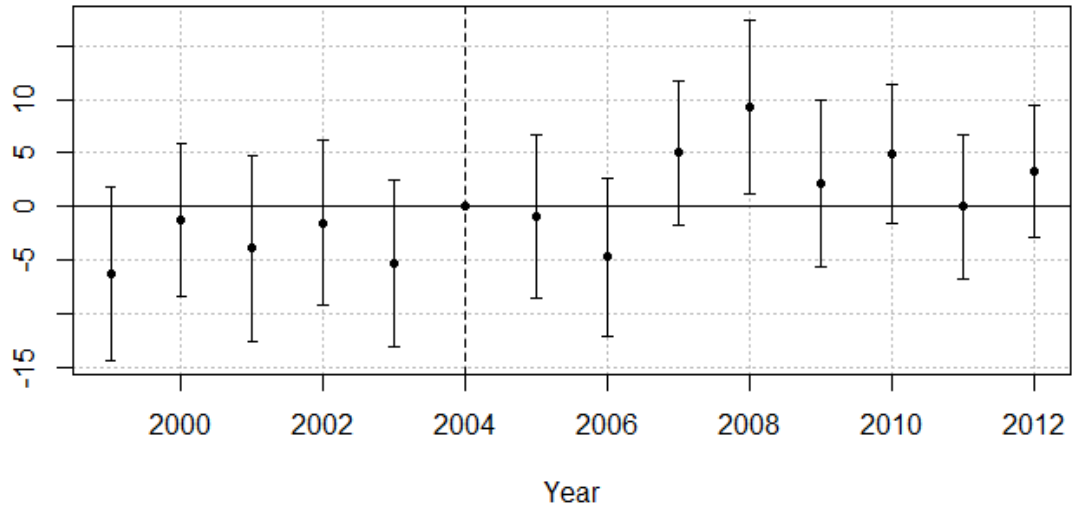
Notes: Average surplus per capita of municipalities over the period 2000-2012. The municipalities included are within 3,000-10,000 inhabitants and are divided into those above or below 5,000 inhabitants. I drop 6 municipalities for having extreme values to focus on a more representative behaviour. The vertical black line is jittered left to 2007.

Figure D.7: Population density test



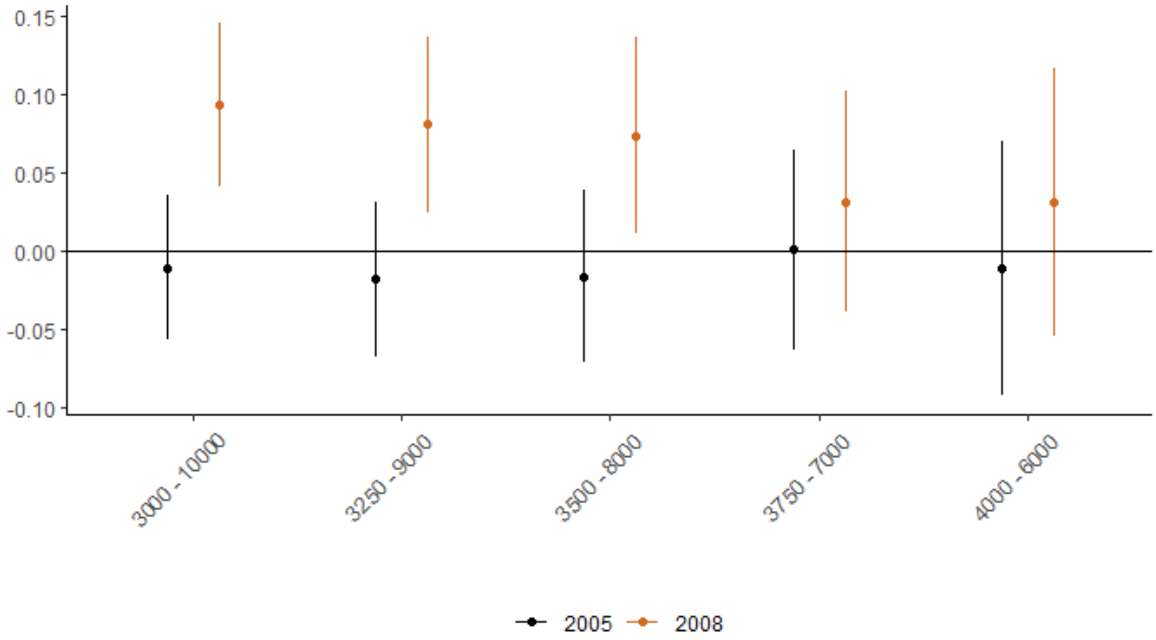
Notes: Manipulation density test for the municipal 2003 population at the 5,000 inhabitants cutoff.

Figure D.8: Cash real estate sales revenues (per capita, excluding residuals)



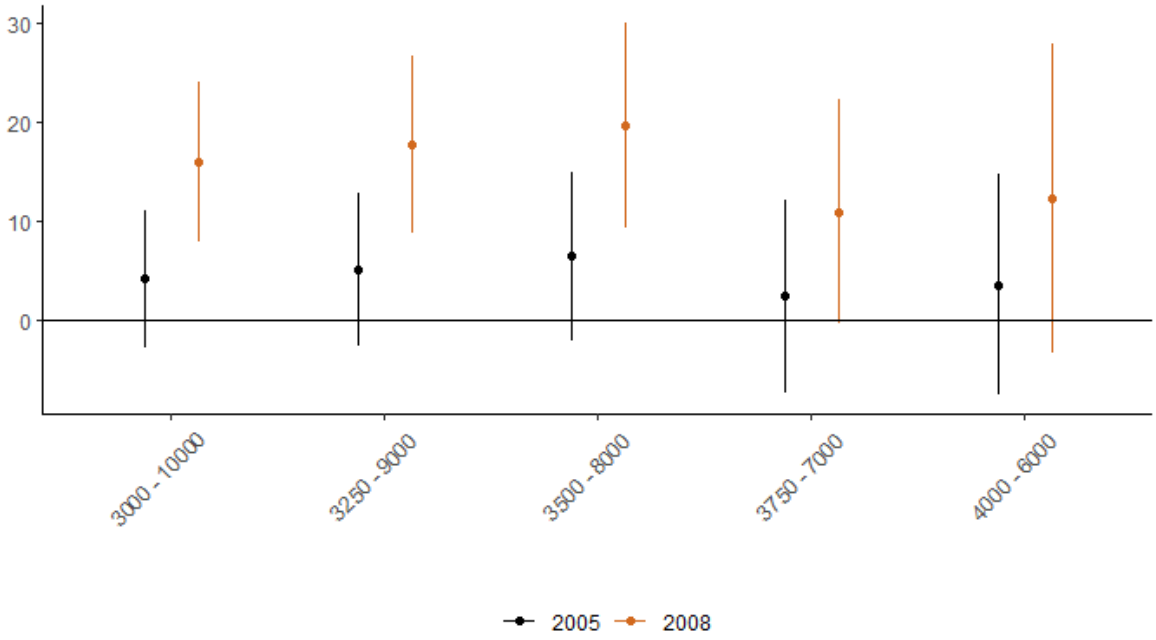
Notes: Dynamic Difference-in-Differences model of cash per capita revenues from the sale of real estate, excluding those from previous years' economic activity. Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple testing.

Figure D.9: Real estate sales revenues at different bandwidths (binary)



Notes: Dynamic Difference-in-Differences model estimates for the year 2005 (black) and 2008 (orange) for the proportion of municipalities with revenues from the sale of real estate (binary variable: 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise). Municipalities above 5,000 inhabitants are treated, and those below are controls. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level. The number of municipalities is: 1560, 1337, 1083, 806, and 518, respectively.

Figure D.10: Real estate sales revenues at different bandwidths (cash per capita)



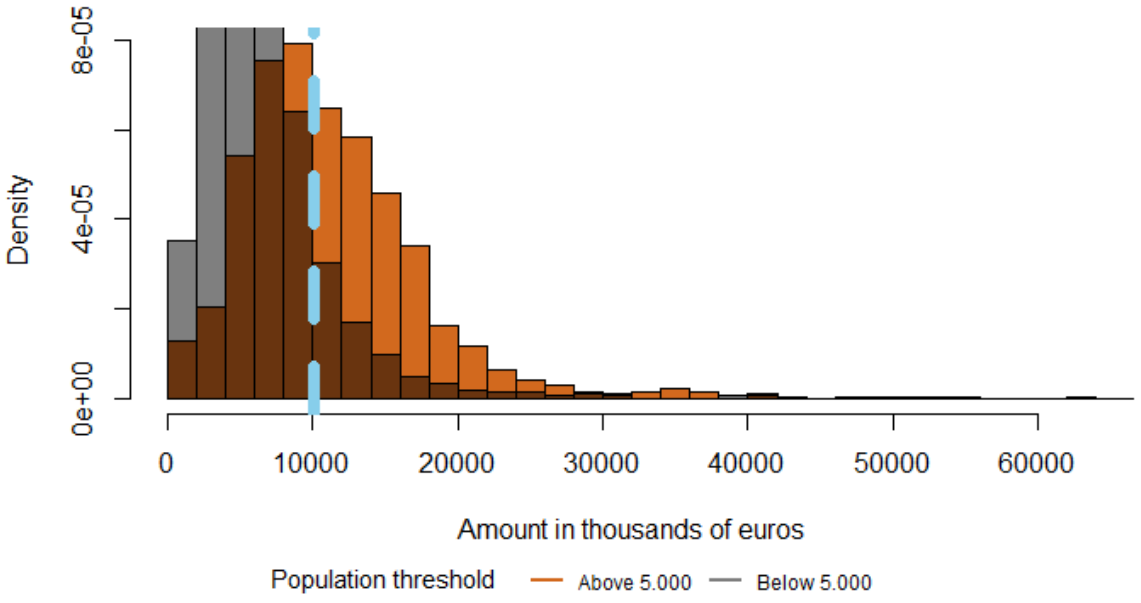
Notes: Dynamic Difference-in-Differences model estimates for the year 2005 (black) and 2008 (orange) of cash revenue per capita from the sale of real estate at different population bandwidths. Municipalities above 5,000 inhabitants are treated, and those below are controls. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level. The number of municipalities is: 1560, 1337, 1083, 806, and 518, respectively.

Table D.4: Overview of Italian municipalities (covariates)

Variable	Mean	SD	Min	Max	Median
Demography					
Population	5703.53	2026.14	2334.00	13660.00	5387.00
Population older 65	0.19	0.04	0.06	0.36	0.19
Population younger 18	0.17	0.02	0.10	0.29	0.17
Revenues					
Grants/current rev. (cash)	0.27	0.17	0.01	0.94	0.26
Grants/current exp. (cash)	0.31	0.21	0.01	2.52	0.29
Tax rev./current rev. (cash)	0.52	0.16	0.02	0.92	0.52
Surplus per capita	104.73	725.28	-1667.86	69527.54	62.83
Grants/current rev. (accrual)	0.26	0.16	0.00	0.89	0.26
Grants/current exp. (accrual)	0.28	0.17	0.00	2.50	0.27
Tax rev./current rev. (accrual)	0.53	0.16	0.05	0.92	0.52
Expenditures					
Interest ratio (cash)	0.05	0.03	0.00	0.37	0.05
Personnel exp./current exp. (cash)	0.31	0.07	0.00	0.62	0.31
Interest ratio (accrual)	0.05	0.03	0.00	0.37	0.05
Personnel exp./current exp. (accrual)	0.30	0.06	0.04	0.58	0.30

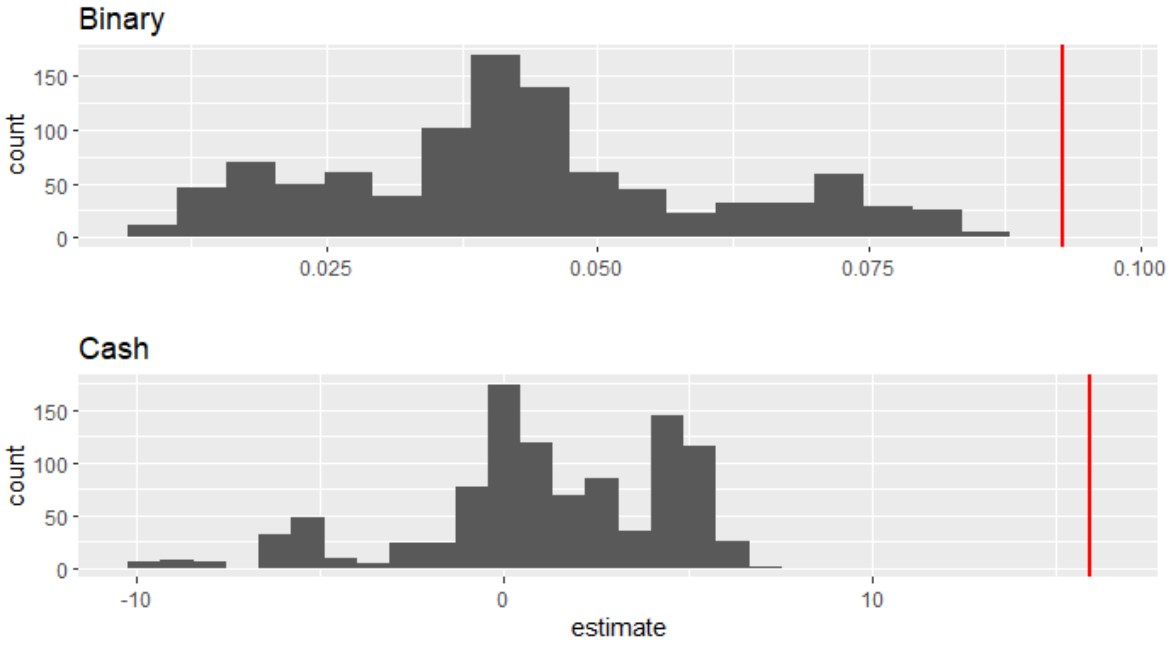
Notes: The table presents the main economic and socio-geographic variables describing Italian municipalities between 3,000-10,000 inhabitants in the period 1999-2011. All the monetary variables are expressed in per capita cash amounts in 2022 euros unless indicated otherwise. The interest ratio is interest expenditure over current revenues. See Sections 3.2 and 3.3 and Appendix G for accounting definitions.

Figure D.11: Real estate holdings (2007)



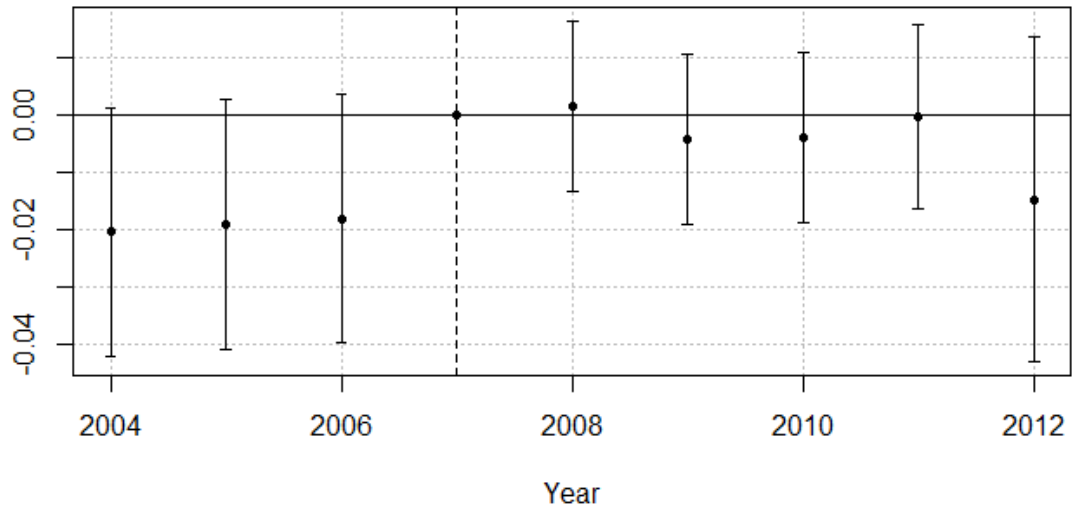
Notes: Real estate holdings in thousands of euros in 2007. Orange for municipalities between 5,000 and 10,000 inhabitants, black for municipalities between 3,000 and 10,000 inhabitants. The vertical blue line is the median of the orange distribution.

Figure D.12: Placebo real estate sales revenues (2008)



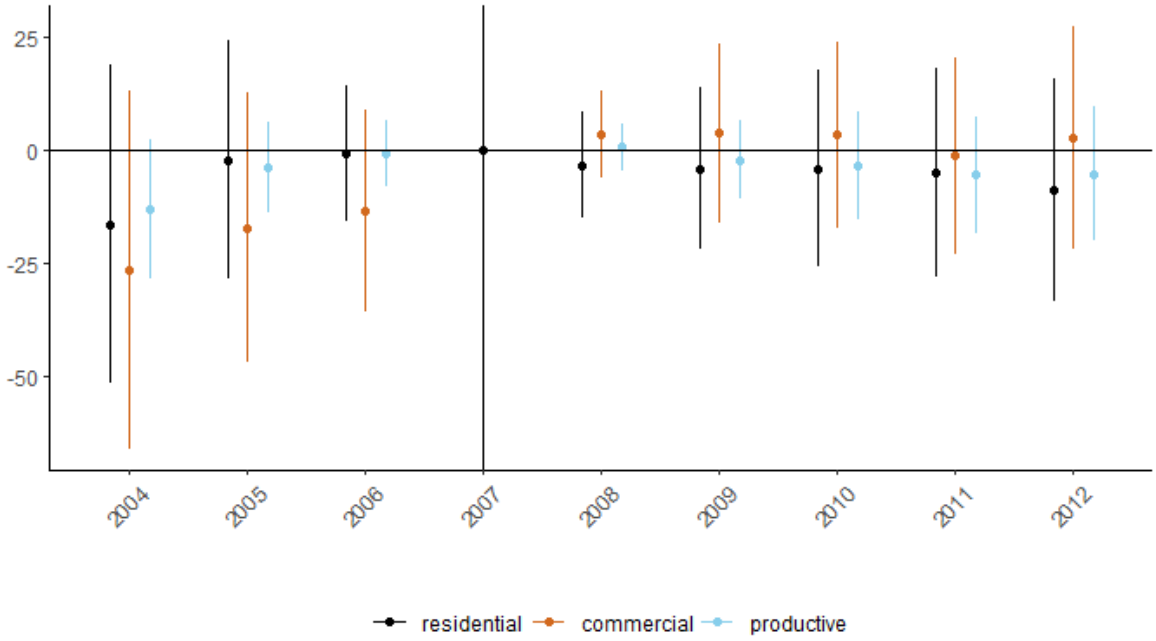
Notes: Dynamic Difference-in-Differences estimates for the year 2008 for cash revenue per capita from the sale of real estate and the proportion of municipalities with revenues from the sale of real estate (1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise) at random cutoffs between 3,500-4,500 or 6,000-8,000. Each cutoff uses either municipalities between 3,000-5,000 or 5,000-10,000 inhabitants, respectively. Municipalities above the random cutoff are treated, and those below are controls. The reference years are 2001-2004. The vertical line is the estimate at the true cutoff of 5,000 inhabitants (Binary: 0.0929, Cash: 15.91€).

Figure D.13: Dynamic DiD on Income surcharge tax



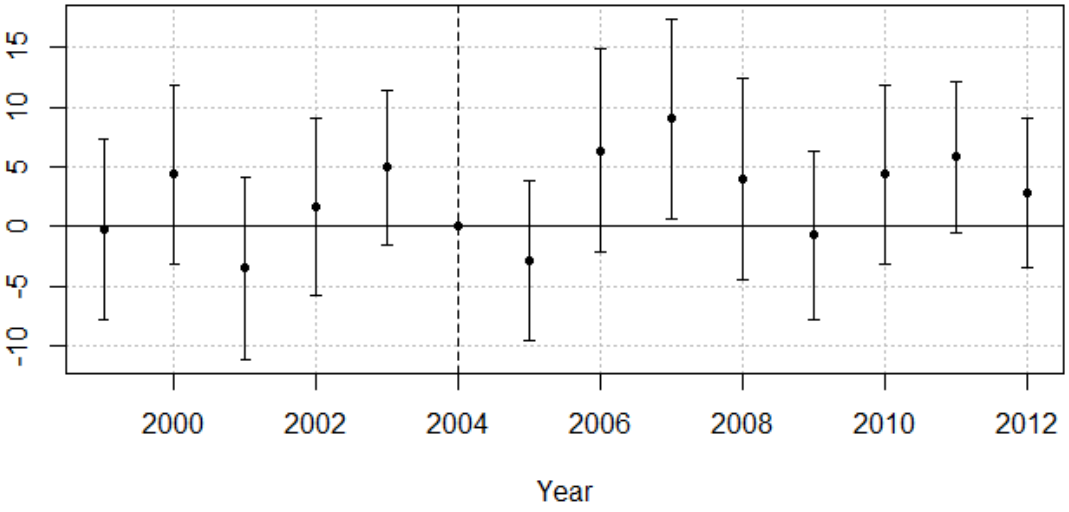
Dynamic Difference-in-Differences model of top-bracket income surcharge. The sample is restricted to municipalities with a population between 5,000 and 10,000 inhabitants. Treated municipalities are the ones with any cash revenues from the sale of real estate in 2008, excluding those from previous years' economic activity. The reference year is 2007. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple tests.

Figure D.14: Dynamic DiD on real estate prices



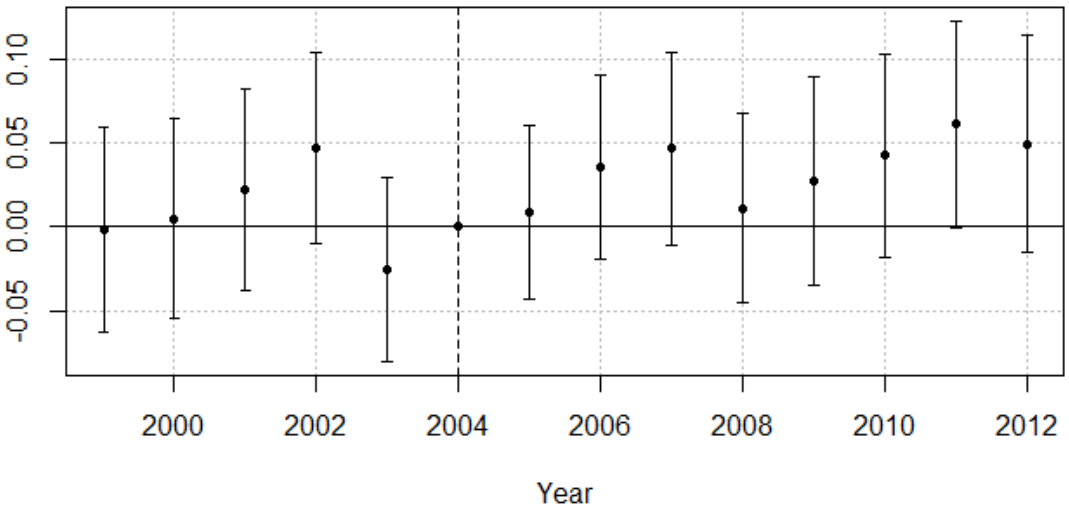
Dynamic Difference-in-Differences of real estate prices (per square meter). The sample is restricted to municipalities with a population between 5,000 and 10,000 inhabitants. Treated municipalities are municipalities with populations above 5,000 inhabitants. The reference year is 2007. Real estate prices for residential, commercial, and productive assets are per square meter. These prices are averages between the minimum and maximum for each municipal zone, then averaged across all the zones. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple tests.

Figure D.15: Real estate sales revenues (cash per capita, 15,000 inhabitants threshold)



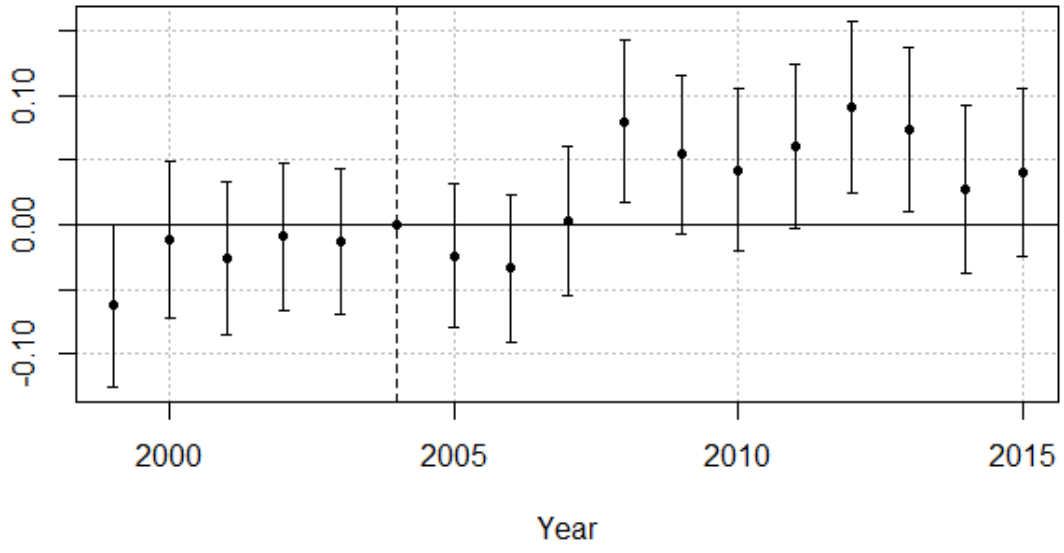
Notes: Dynamic Difference-in-Differences model of cash revenues per capita from the sale of real estate. Municipalities above 15,000 inhabitants are treated, and those below are controls. The reference years are 2001-2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple tests.

Figure D.16: Real estate sales revenues (binary, 15,000 inhabitants threshold)



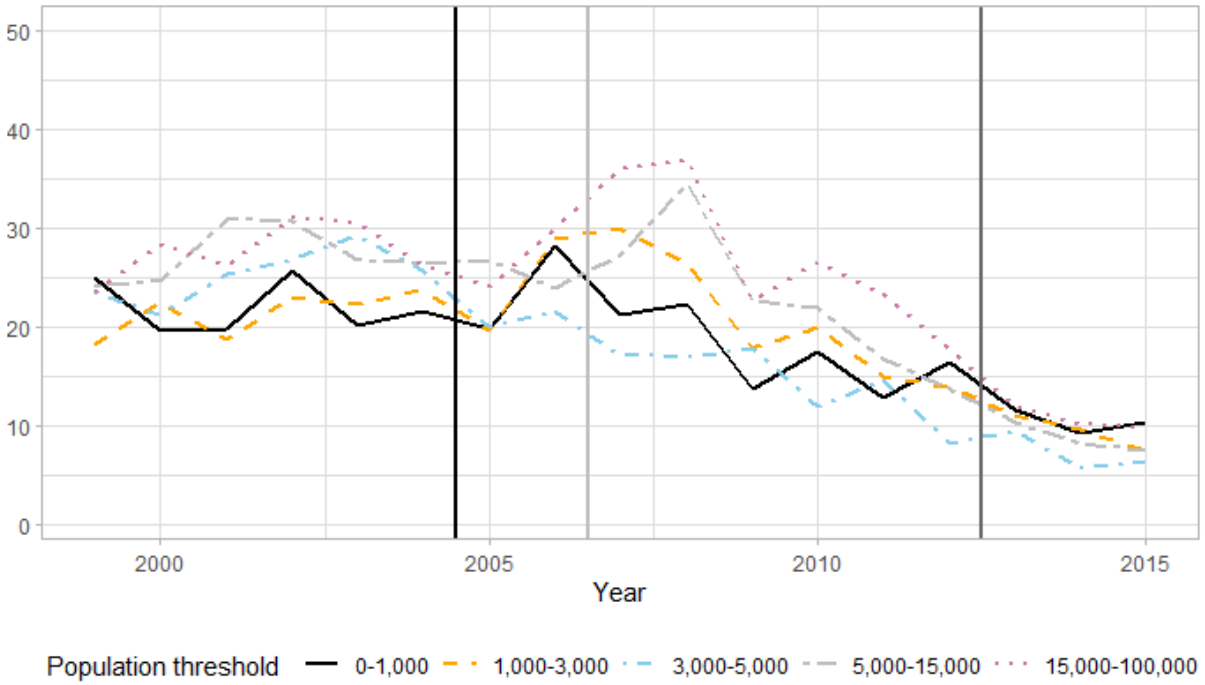
Notes: Dynamic Difference-in-Differences model for the proportion of municipalities with revenues from the sale of real estate; 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise. Municipalities above 15,000 inhabitants are treated, and those below are controls. The reference years are 2001-2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple tests.

Figure D.17: Real estate sales revenues 1999-2015 (binary)



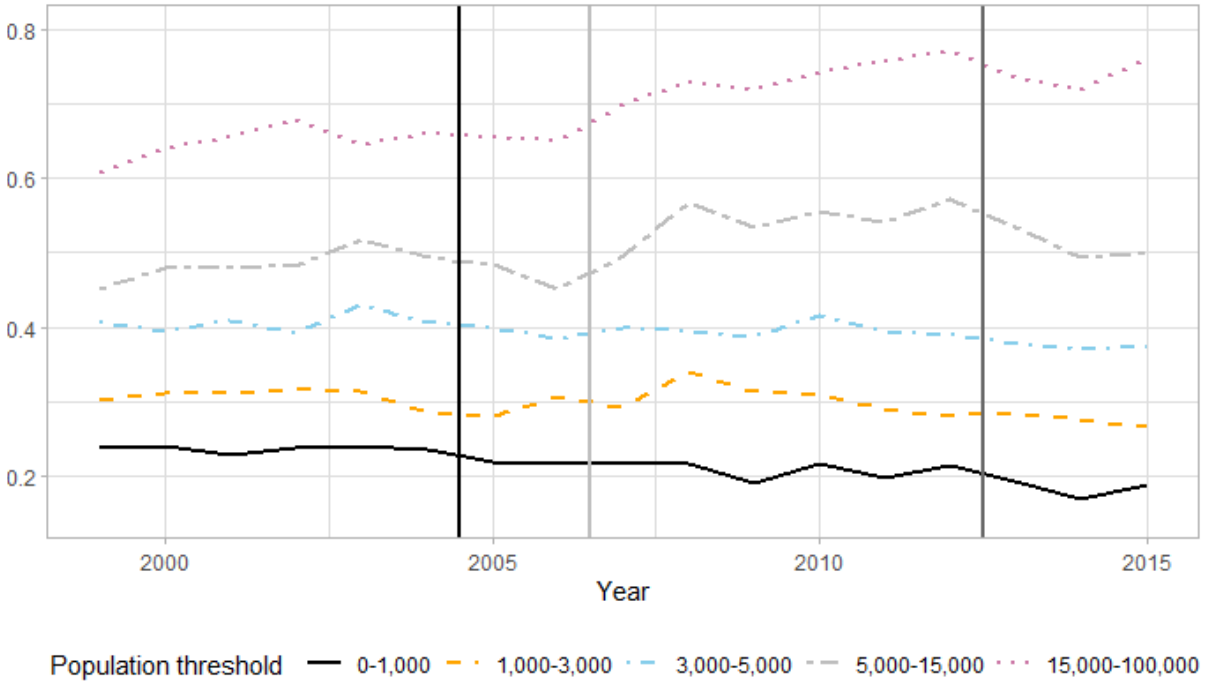
Notes: Dynamic Difference-in-Differences model for the proportion of municipalities with revenues from the sale of real estate (binary variable: 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise). Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample is restricted to municipalities with a population between 3,000 and 10,000 inhabitants. The reference year is 2004. 95% confidence intervals with standard errors clustered at the municipal level, not adjusted for multiple testing.

Figure D.18: Real estate sales revenues (cash per capita)



Notes: Average cash revenue per capita from the sale of real estate. Municipalities above 5,000 inhabitants are treated, and those below are controls. The sample has a population between 0 and 100,000 inhabitants. Vertical lines are jittered left to 2005 (Black), 2007 (Gray), and 2012 (Dark gray).

Figure D.19: Real estate sales revenues (binary)



Notes: Average proportion of municipalities with revenues from the sale of real estate revenue; 1 if any cash revenue from the sale of real estate, excluding those from previous years' economic activity, 0 otherwise. Municipalities above 5,000 inhabitants are treated, and those below are controls. Vertical lines are jittered left to 2005 (Black), 2007 (Gray), and 2012 (Dark gray).

Table D.5: Leanings of Italian local parties

Right leaning parties	Left leaning parties
CEN-DES(LS.CIVICHE)	CEN-SIN(LS.CIVICHE)
CENTRO DESTRA	CENTRO SINISTRA
FORZA ITALIA	DEMOCRATICI SINISTRA
LEGA NORD	PDS
CENTRO	SINISTRA
ALLEANZA NAZIONALE	P.POPOLARE ITALIANO
POLO PER LE LIBERTA'	PPI (POP)
CENTRO CRIST.DEM	DL.LA MARGHERITA
CASA DELLE LIBETA'	RIFONDAZIONE COMUNISTA
CDU	LA MARGHERITA
IL POPOLO DELLA LIBERTA'	PROGRESSISTI
LEGA LOMB-LEGA NORD	CEN-SIN(CONTR.UFF)
LG.NORD-LG.VENETA	PARTITO DEMOCRATICO
L.VEN-L.NORD	POPOLARI
PDL-UNIONE DI CENTRO	SINISTRA IND.
UNIONE DI CENTRO	PER VERONA
CCD-CDU	PROGRESSISTI SALERNO
DESTRA	SDI-ALTRI
FI-CCD.	FED.DEI VERDI
FI-CCD-AN	UNITI NELL'ULIVO
NUOVO PSI	ALL. DI PROGRESSO
CDL	CENTROSINISTRA
CENTRODESTRA	I DEMOCRATICI
LG.VENETA REPUBBLICA	LA MARG.
FI-CCD-CDU	SDI
FORZA IT-POLO POP.	I SOCIALISTI-ALTRI
AN-P.SEGNI	P.DEM
CEN-DES(CONTR.UFF.)	PATTO DEMOCRATICI
IL POPOLO DELLA	POPOLARI-CIVICA
LIBERTA'-ALTRI	
IL POPOLO DELLA LIBERTA'-LEGA	VERDI
NORD	
LEGA NORD-ALTRE	CEN-SIN(CONTR.UFF.)
L.NORD-CIVICHE	CIVICA MARGHERITA
LEGA PADANA LOMBARDIA -	L'ULIVO
ALTRI	
NO EURO	SINISTRA DEMOCRATICA
	L'UNIONE
	LA MARG.
	PARTITO DEMOCRATICO-CIVICA
	PARTITO SOCIALISTA
	SINISTRA ECOLOGIA LIBERTA'

Notes: Leaning identification of municipal Italian parties following Bracco et al. (2015) and Gamalerio (2020).

Table D.6: Data sources

Data	Source
Financial reports	MI (2023a)
Inflation rates for Italy	FRED (2023)
Income surcharge tax	MEF (2022)
Real estate prices	Agenzia delle Entrate (2024)
Real estate stock composition	MEF (2015a)
Real estate auction notices	OGIR (2025b)
Electoral data	MI (2022)
Local administrators data	MI (2023b)
Demographic and other municipal level information	ISTAT (2025b)
Municipalities in financial distress	Fondazione Università Ca' Foscari (2025)
Municipalities infiltrated by mafia	OGIR (2025a)

Notes: List of data sources.

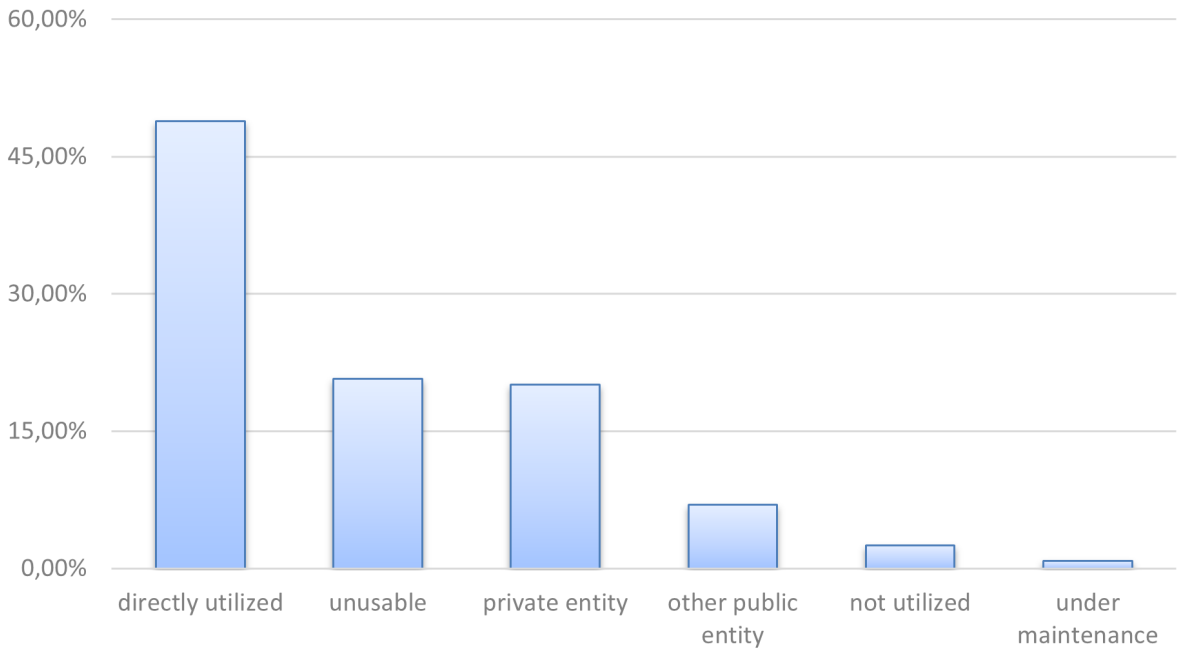
Figure D.20: Financial report, Rome 2005 (extract)

Titolo IV - ENTRATE DERIVANTI DA ALIENAZIONE, DA TRASFERIMENTI DI CAPITALEI E DA RISCOSSIONI DI CREDITI — Group 4 (Capital revenues): Revenues from sales, capital transfers, and debt collections

VOCI — Items	Accertamenti — Accrual	Riscossioni in conto competenza — Cash collections (ex. residuals)	Riscossioni in conto residui — Cash collections (residuals)
Categoria 1° - Alienazione di beni patrimoniali	75.592.363,00	19.649.322,00	132.959.364,00
Alienazione beni mobili e diritti reali su beni immobili	33.424,00	26.164,00	0,00
Alienazione beni immobili e diritti reali su beni immobili — Sales of real estate and property rights	75.558.939,00	19.623.158,00	123.933.045,00
di cui : - aree	1.994.095,00	1.601.631,00	2.433,00
Concessione di beni demaniali	0,00	0,00	0,00
Alienazione di beni patrimoniali diversi	0,00	0,00	9.026.319,00
Categoria 2° - Trasferimenti di capitali dallo Stato	33.595.458,00	3.163.860,00	171.821.761,00
Categoria 3° - Trasferimenti di capitali dalla Regione	44.384.955,00	35.000,00	1.261.776,00
Categoria 4° - Trasferimenti di capitali da altri enti del settore pubblico	5.452.150,00	5.000.000,00	1.465.975,00
di cui : - dalle Province	5.452.150,00	5.000.000,00	1.465.975,00
Categoria 5° - Trasferimenti di capitali da altri soggetti :	246.765.541,00	228.967.540,00	18.243.608,00
Proventi per concessioni edilizie e sanzioni urbanistiche	236.977.896,00	222.311.448,00	17.438.797,00
Trasferimenti di capitale straordinari da altri soggetti	9.787.645,00	6.656.092,00	804.811,00
di cui : - da imprese	0,00	0,00	0,00
- da famiglie (eredita' e donazioni)	0,00	0,00	0,00
Categoria 6° - Riscossioni di crediti	380.430.860,00	120.992.498,00	3.473.069,00
TOTALE ENTRATE DERIVANTI DA ALIENAZIONE, TRASFERIMENTI DI CAPITALI E DA RISCOSSIONI DI CREDITI	786.221.327,00	377.808.220,00	329.225.553,00

Notes: Screenshot of the capital revenues from the 2005 financial report of the municipality of Rome. Screenshot taken from the website of the Ministry of the Interior for Certificati Consuntivi dpr 194/1996.

Figure D.21: Municipal allocation of real estate (Italy)



Notes: Average allocation of Italian municipal real estate assets in 2015. Properties deemed unusable are likely unsuitable for public purposes due to their inherent characteristics, physical conditions, or financial or legal requirements. Own calculation with data provided by the Ministry of Economics and Finance (MEF (2015a)).

Appendix E: Estimation equations

Dynamic difference-in-difference regression equation:

$$y_{it} = \sum_{j=1999}^{2003} b_j \mathbb{I}\{> 5,000\}_i \times \phi_j + \sum_{j=2005}^{2012} b_j \mathbb{I}\{> 5,000\}_i \times \phi_j + \phi_i + \phi_t \times \phi_r + \epsilon_{it} \quad (3.3)$$

Where ϕ_i, ϕ_t, and ϕ_r are municipal, year, and regional dummies, respectively, $\phi_j s$ are year dummies, and y_{it} is the revenue from the sale of real estate expressed in different forms.

Appendix F: Domestic Stability Pact

This section summarizes the domestic stability pact and other relevant policies happening concurrently involving Italian municipalities. It is not meant to be an exhaustive description. The laws and decrees cited are to be considered along with timed modifications.

1999

- Local governments: all municipalities.
- Objective: budget balance, cash.
- Items: revenues and current expenditures.
- Excluded Items: state grants, interest payments, revenues from the sale of financial assets, and debt collection.
- Monitoring: Ministry of Treasury monitors monthly for municipalities >60,000, 15,000-60,000 quarterly, and annually for the rest.
- Sanctions: in case Italy is sanctioned by Europe for excessive debt, it is allocated to municipalities according to responsibilities.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 77/1995 art. 46 c. 1).
- Source: Legge 448/1998 art.28, Circular 11/1999 Ministry of Treasury.

2000

- Local governments: all municipalities.
- Objective: budget balance, cash.
- Items: revenues and current expenditures.
- Excluded Items: interest payments, grants from State, EU, or other entities subject to the pact and connected expenses, properties and financial assets sold, debt collection, exceptional revenues and expenditure.

- Monitoring: Ministry of Treasury and provincial accounting offices monitor quarterly for municipalities >15,000 and annually for the rest.
- Sanctions: interest rate cuts on state loans for every municipality if the total objective is reached, otherwise only complying.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 267/2000 art. 204 c. 1).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 488/1999 art.30, Circular 4/2000 Ministry of Treasury.

2001

- Local governments: municipalities (>5,000).
- Objective: budget balance, cash.
- Items: revenues and current expenditures.
- Excluded Items: interest payments, grants from State, EU, or other entities subject to the pact, and connected expenses. Revenues from properties and financial assets sold. Exceptional revenues and expenditure. Expenditure or revenues connected to new laws or functions. Debt collections.
- Monitoring: Ministry of Treasury and provincial accounting offices monitor quarterly for municipalities >15,000 and annually for the rest.
- Sanctions: interest rate cuts on state loans for every municipality if the total objective is reached, otherwise only complying.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 267/2000 art. 204 c. 1).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 388/2000 art.53, Circular 6/2001 Ministry of Treasury.

2002

- Local governments: municipalities (>5,000).
- Objective: budget balance, cash. Current expenditure limit (net of expenditure for interest payments, delegated functions, and exceptional events), cash, and accrual.
- Items: revenues and current expenditures.
- Excluded Items: interest payments, grants from State, EU, or other entities subject to the pact, and connected expenses. Revenues from properties and financial assets sold. Expenses connected to European programs or functions delegated from the State or regions. Exceptional revenues and expenditure. Expenditure or revenues connected to new laws or functions. Debt collections.
- Monitoring: Ministry of Economics and Finance monitors quarterly for municipalities >60,000.
- Sanctions: grants cuts then redistributed to complying municipalities.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 267/2000 art. 204 c. 1).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 448/2001 art.24, Circular 11/2002 Ministry of Economics and Finance.

2003

- Local governments: municipalities (>5,000).
- Objective: budget balance, cash, and accrual.
- Items: revenues and current expenditures.
- Excluded Items: interest payments, grants from State, EU, or other entities subject to the pact. Expenses related to grants earmarked by the EU. Revenues from properties and financial assets sold. Revenues from debt collection and co-participation

IRPEF (income tax). Expenses connected to functions delegated from the State or regions. Expenditure related to elections and natural calamities.

- Monitoring: Ministry of Economics and Finance and provincial accounting offices monitor quarterly for municipalities >60,000 and annually for the rest. The Board of Auditors communicates compliance.
- Sanctions: Freeze on hiring and debt for investments. Reduction of 10% expenditure for goods and services.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 267/2000 art. 204 c. 1).
- Local taxes: block on income surcharge increases deliberated after 29/09/2002 (Legge 289/2002 art. 3 c. 1).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 289/2002 art.29, Circular 7/2003 Ministry of Economics and Finance.

2004

- Local governments: municipalities (>5,000).
- Objective: budget balance, cash, and accrual.
- Items: revenues and current expenditures.
- Excluded Items: interest payments, grants from State, EU, or other entities subject to the pact, and connected expenses. Revenues from properties and financial assets sold. Revenues from debt collection. Expenses related to grants earmarked by the EU. Expenditure for higher personnel costs (2002-2003). Revenues from debt collection and co-participation IRPEF (income tax). Expenses connected to functions delegated from the State or regions. Expenditure related to elections and natural calamities.

- Monitoring: Ministry of Economics and Finance and provincial accounting offices monitor quarterly for municipalities >60,000 and annually for the rest. The Board of Auditors communicates compliance.
- Sanctions: Freeze on hiring and debt for investments. Reduction of 10% expenditure for goods and services.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 25% (Decreto Legislativo 267/2000 art. 204 c. 1).
- Local taxes: block on income surcharge increases continues until 31/12/2004 (Legge 350/2003 art. 2 c. 21-22).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 289/2002 art.29, Legge 350/2003 art. 3, and Circular 5/2004 Ministry of Economics and Finance.

2005

- Local governments: municipalities (>5,000)[32].
- Objective: expenditure limit, cash, and accrual.
- Items: current and capital expenditure.
- Excluded Items: certain personnel expenditure, financial assets purchase, capital contributions, grant of credits, expenditure connected to public grants given and delegated functions, expenditure favouring the juvenile justice system, and natural calamities. Expenditures connected to debt sanctions. Expenditure to co-finance EU projects. Expenditure connected to Torino Winter Olympics.
- Extra: It is possible to exceed the capital expenditure limit if financed by property sales, transfers free of charge, and donations. There is a fund to sustain cultural and development investments to be allocated based on projects submitted.

[32]Initially it was extended to >3,000, but then reversed by Decreto Legge 31st March 44/2005 (converted into Legge 31st May 88/2005).

- Monitoring: The Ministry of Economics and Finance and provincial accounting offices monitor quarterly. The Board of Auditors communicates compliance.
- Sanctions: Freeze on hiring and debt for investments. Reduction of 10% expenditure for goods and services.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 12% (Legge 311/2004 art. 1 c. 44).
- Local taxes: block on income surcharge increases continues until 31/12/2006 (Legge 311/2004 art. 1 c. 51, 61). Except who never increased the tax, and with a maximum of 0,1%.
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 311/2004 art. 1 and Circular 4/2005 Ministry of Economics and Finance.

2006

- Local governments: municipalities (>5,000).
- Objective: expenditure limit, cash, and accrual.
- Items: current and capital expenditure.
- Excluded Items: certain personnel expenditure, financial assets purchase, capital contributions, grant of credits, and interest expenses. Expenditure connected to public grants given, delegated functions, natural calamities, and certain social expenses. Expenditures connected to debt sanctions. Expenditure to co-finance EU projects.
- Extra: you can go over the limits if stemming from free grants, donations, or proceeds related to the fight against tax evasion. Reduction in current expenditure can compensate for capital expenditure.
- Monitoring: The Ministry of Economics and Finance and provincial accounting offices monitor quarterly. The Board of Auditors communicates compliance.

- Sanctions: Freeze on hiring and debt for investments. Reduction of 10% expenditure for goods and services.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 12% (Legge 311/2004 art. 1 c. 44).
- Local taxes: block on income surcharge increases continues until 31/12/2006 (Legge 311/2004 art. 1 c. 51, 61).
- EU policies: development funds 2000-2006 for regions Basilicata, Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Molise (MEF (2010)).
- Source: Legge 266/2005 art. 1 and Circular 8/2006 Ministry of Economics and Finance.

2007

- Local governments: municipalities (>5,000).
- Objective: budget balance, cash, and accrual.
- Items: current and capital revenues and expenditure.
- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Expenditure related to the opening of judicial offices authorized by the Ministry and expenditure for the state of emergency. Revenues in 2003-2005 from property sales that were earmarked for early repayment of loans.
- Monitoring: The Ministry of Economics and Finance monitors quarterly.
- Sanctions: If not recovered the past differential, increase in income surcharge tax 0,3%.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 15% (Legge 296/2006 art. 1 c. 698).
- Local taxes: block on income surcharge increases is repealed (Legge 296/2006 art. 1 c. 144).

- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).
- Source: Legge 296/2006 art. 1 and Circular 12/2007 Ministry of Economics and Finance.

2008

- Local governments: municipalities (>5,000).
- Objective: budget balance, mixed. Accrual for current revenues and expenditure, cash for capital revenues and expenditure.
- Items: current and capital revenues and expenditure.
- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Expenditure due to the higher cost of personnel. Expenditure related to the opening of judicial offices authorized by the Ministry. Revenues in 2003-2005 from property sales, within some limits.
- Monitoring: The Ministry of Economics and Finance monitors quarterly.
- Sanctions: reduction in grants (max 5%), current expenditure not higher than the previous three years' average, no debt for investments, no hiring.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 15% (Legge 296/2006 art. 1 c. 698).
- Local taxes: no increases in tributes and local rates until fiscal federalism (Decreto Legge 93/2008 art. 1 c. 7, converted by Legge 126/2008, repealed by Decreto Legge 201/2011, converted by Legge 214/2011). Property tax exclusion for the first residence, compensated with grants.
- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).
- Source: Legge 244/2007 art. 1 and 3, Decreto Legge 112/2008 art. 77bis (converted by Legge 133/2008), and Circular 8/2008 Ministry of Economics and Finance.

2009

- Local governments: municipalities (>5,000).
- Objective: budget balance, mixed. Accrual for current revenues and expenditure, cash for capital revenues and expenditure.
- Items: current and capital revenues and expenditure.
- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Resources from the State for expenditure related to the ordinance of the Prime Minister. Revenues from the sale of financial and property assets, if earmarked for debt or investments.[33] Moreover, certain types of investment expenses are excluded if stemming from previous years or for social and security objectives; these exclusions only apply to municipalities satisfying certain conditions.
- Extra: Vertical (region) and horizontal (municipalities) flexibility allowed for the compliance of the pact, shifting space in the objective among the entities (Decreto Legge 5/2009, converted by Legge 33/2009, Decreto legge 2/2010, converted by Legge 42/2010, Legge 220/2010, Decreto Legge 112/2008, converted by Legge 133/2008).
- Monitoring: The Ministry of Economics and Finance monitors biannually.
- Sanctions: reduction in grants (max 5%), current expenditure not higher than the previous three years' average, no debt for investments, no hiring. For complying municipalities, the reduction of the next year's objective. Reduction in benefits for local administrators.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 15% (Legge 296/2006 art. 1 c. 698).
- Local taxes: no increases in tributes and local rates until fiscal federalism (Decreto legge 93/2008 art. 1 c. 7, converted by Legge 126/2008, repealed by Decreto

[33]This applies if the budget was approved before 10th March; however, these municipalities were able to opt out and follow the rule applied to the other municipalities, which counted the revenues in the budget balance formula.

Legge 201/2011, converted by Legge 214/2011). Exception of TARSU (repealed by Decreto Legge 16/2012, converted by Legge 44/2012).

- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).

- Source: Legge 203/2008 art. 2, Decreto Legge 112/2008 art. 77bis (converted by Legge 133/2008), Legge 33/2009 art. 7quater, Decreto Legge 78/2009 art. 9bis (converted by Legge 2/2009), and Circular 2/2009 Ministry of Economics and Finance.

2010

- Local governments: municipalities (>5,000).

- Objective: budget balance, mixed. Accrual for current revenues and expenditure, cash for capital revenues and expenditure.

- Items: current and capital revenues and expenditure.

- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Resources from the State for expenditure related to the ordinance of the Prime Minister. Resources stemming from the EU and connected expenses. Municipalities hit by the earthquake in Abruzzo are to receive up to 15 million euros for investment in public safety. Revenues from property and financial assets sales, if earmarked for debt or investments (depending on whether they were also excluded in the previous year). Revenues and expenditure related to holding major events. Moreover, certain types of investment expenses are excluded if stemming from previous years or for social and security objectives; these exclusions only apply to municipalities satisfying certain conditions.

- Extra: Vertical (region) and horizontal (municipalities) flexibility allowed for the compliance of the pact, shifting space in the objective among the entities; (Decreto Legge 5/2009, converted by Legge 33/2009, Decreto Legge 2/2010, converted by Legge 42/2010, Legge 220/2010, Decreto Legge 112/2008, converted by Legge 133/2008).

- Monitoring: The Ministry of Economics and Finance monitors biannually.
- Sanctions: reduction in grants, current expenditure not higher than the previous three years' average, no debt for investments, no hiring. For complying municipalities, a reduction for next year's objective. Reduction in benefits for local administrators.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 15% (Legge 296/2006 art. 1 c. 698).
- Local taxes: no increases in tributes and local rates until fiscal federalism (Decreto Legge 93/2008 art. 1 c. 7, converted by Legge 126/2008, repealed by Decreto Legge 201/2011, converted by Legge 214/2011). Exception of TARSU (repealed by Decreto Legge 16/2012, converted by Legge 44/2012).
- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).
- Collaboration policy: municipalities below 5,000 inhabitants (3,000 for mountains) are obliged to exercise fundamental functions in associated forms (Decreto Legge 78/2010 art. 14, converted by Legge 122/2010).
- Source: Legge 203/2008 art. 2, Decreto Legge 112/2008 art. 77bis (converted by Legge 133/2008), Legge 191/2009 art. 2, Decreto Legge 39/2009 art. 1, converted by Legge 77/2009, Legge 33/2009 art. 7quater, Decreto Legge 78/2010 art. 14 (converted by Legge 122/2010), and Circular 15/2010 Ministry of Economics and Finance.

2011

- Local governments: municipalities (>5,000).
- Objective: budget balance, mixed. Accrual for current revenues and expenditure, cash for capital revenues and expenditure.
- Items: current and capital revenues and expenditure.

- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Resources from the State for expenditure related to the ordinance of the Prime Minister. Resources stemming from UE and connected expenses. Resources related to city council dismissals. Municipalities Aquila for investments up to 2,5 million. Expenditure for interventions related to the European School in Parma, EFSA, and Expo Milan. Revenues and expenditure related to holding major events or calamities. Expenditure for management and maintenance of the assets transferred. Expenditures related to the ISTAT census.

- Extra: Vertical (region) and horizontal (municipalities) flexibility allowed for the compliance of the pact, shifting space in the objective among the entities (Decreto Legge 5/2009, converted by Legge 33/2009, Decreto Legge 2/2010, converted by Legge 42/2010, Legge 220/2010, Decreto Legge 112/2008, converted by Legge 133/2008).

- Monitoring: The Ministry of Economics and Finance monitors biannually.

- Sanctions: reduction in grants, current expenditure not higher than the previous three years' average, no debt for investments, no hiring. For complying municipalities, a reduction for next year's objective. Reduction in benefits for local administrators.

- Special regions and autonomous provinces: agreed with the government.

- Debt limit: 12% (Decreto Legge 225/2010 art. 2 c. 39, converted by Legge 10/2011).

- Local taxes: no increases in tributes and local rates until fiscal federalism (Decreto Legge 93/2008 art. 1 c. 7, converted by Legge 126/2008, repealed by Decreto Legge 201/2011, converted by Legge 214/2011). Exception of TARSU (repealed by Decreto Legge 16/2012, converted by the 44/2012).

- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).

- Source: Legge 220/2010 art. 1 and Circular 11/2011 Ministry of Finance.

2012

- Local governments: municipalities (>5,000).
- Objective: budget balance, mixed. Accrual for current revenues and expenditure, cash for capital revenues and expenditure.
- Items: current and capital revenues and expenditure.
- Excluded Items: expenditure from the granting of credit. Revenues from credit collection. Resources stemming from the EU and connected expenses. Resources from the State for expenditure related to the ordinance of the Prime Minister. Municipalities Aquila for investments up to 2,5 million. Expenditure for interventions related to the European School in Parma and EFSA. Revenues and expenditure related to holding major events. Expenditure for management and maintenance of the assets transferred. Expenditures related to the ISTAT census.
- Extra: Vertical (region) and horizontal (municipalities) flexibility allowed for the compliance of the pact, shifting space in the objective among the entities (Decreto Legge 5/2009, converted by Legge 33/2009, Decreto Legge 2/2010, converted by Legge 42/2010, Legge 220/2010, Decreto Legge 112/2008, converted by Legge 133/2008). Introduction horizontal national compensation (Decreto Legge 16/2012, converted by Legge 44/2012).
- Monitoring: The Ministry of Economics and Finance monitors biannually.
- Sanctions: reduction in experimental funds, current expenditure not higher than the previous three years' average, no debt for investments, no hiring. For complying municipalities, a reduction for next year's objective. Reduction in benefits for local administrators.
- Special regions and autonomous provinces: agreed with the government.
- Debt limit: 8% (Legge 183/2011 art. 8 c. 1).
- EU policies: development funds 2007-2013 for regions Calabria, Campania, Puglia, Sardegna and Sicilia. Phasing out region: Basilicata (Camera dei Deputati (2013)).

- Source: Legge 183/2011 art. 30, 31, and 32 and Circular 5/2012 Ministry of Economics and Finance.

2013-2015

- While the main sample ends in 2012, the DSP rules for the years 2013, 2014, and 2015 are largely similar to those of 2012. The main difference is that municipalities between 1,000 and 3,000 inhabitants are also subject to the DSP.

  The objective is budget balance expressed in mixed amounts; accrual for current revenues and expenditure, and cash for capital revenues and expenditure. Importantly, revenues from the sale of real estate were counted as part of the overall revenues in the budget balance formula.

- Source:Legge 183/2011 art. 30, 31, and 32, Legge 228/2013, Legge 147/2013, Legge 190/2014, Circulars 5/2013 and 6/2014, and Prot. 52505/2015 Ministry of Economics and Finance.

Objectives for 2005 and 2008

The numerical objective for 2005 imposed that municipalities could not exceed their average expenditure from 2001-2003, increased by around 10%. While for 2008, the objective depended on the average budget balance of 2003-2005. If it was positive, the DSP tasked municipalities to maintain the same budget balance. If it was negative, municipalities had to improve budget balance by up to 8% of the average expenditure of 2003-2005. Specifically, the numerical objective calculation for the year 2005 followed these steps: i) municipalities were divided into demographic classes (e.g. 5,000-9,999 inhabitants, 10,000-19,999 inhabitants, etc.), ii) municipalities calculated the average per capita sum of current and capital cash expenditure for the years 2001-2003, iii) if the result was below the average within the demographic class, then the the sum of current and capital expenditure could not exceed its equivalent average for the years 2001-2003 increased by 11.5%. Otherwise, the percentage increase was 10%. For the year 2008 instead, the calculation followed these steps: i) municipalities calculated the difference between revenues and expenditure in cash values for the years 2003-2005, ii) if this difference was positive, then that is the objective, iii) if the difference was negative,

then its absolute value is multiplied by 0.205 and summed to the average cash current expenditure for the years 2003-2005 multiplied by 0.017, iv) municipalities had to improve their budget balance by the minimum between the calculated amount and 8% of the average sum of current and capital cash expenditure for the years 2003-2005.

Remuneration of local administrators

Local administrators receive a number of benefits. They are remunerated according to the population class of the municipality.[34] This implies that there are jumps in remuneration when changing population class. One of them is the difference between municipalities with 3,001-5,000 inhabitants with a mayor's remuneration of 2,169.12 euros and those with 5,001-10,000 inhabitants earning 2,788.87 euros. The remuneration of other local administrators is in proportion to that of the mayor. These numbers were periodically updated[35] to cover the following three years, with the only relevant change during the researched period occurring in 2005 where all the remunerations were reduced by 10%.

Italian municipal real estate

Municipal real estate is classified either as available, unavailable, or public domain. The latter combines a number of different real estate, for example: highways, libraries, archives, graveyards, etc.[36] Unavailable real estate is defined as the real estate used for public service, and the rest is available real estate. In 2015, municipal available and unavailable real estate were on average 60% and 34% respectively (MEF (2015a), own calculations). Importantly, while available real estate can be sold, public domain real estate cannot be sold, and unavailable real estate can be sold only if it keeps its intended use. Real estate operated by the public has high costs (around 3%), two or three times the costs in the private sector. At the same time, the income generated from real estate allocated to other organizations is around 0.5% (IFEL SSPAL (2009), citing data reported by Fondazione Magna Carta in June 2008). On average, municipalities use nearly half of local real estate directly and allocate another 25% to other private or public or-

[34] These classes also changed through time, but the ones relevant to the period are: below 1,000, 1,001-3,000, 3,001-5,000, 5,001-10,000, 10,001-30,000, 30,001-50,000, 50,001-100,000, 100,001-250,000, 250,001-500,000, and above 500,000; with some exceptions.

[35] Legge 816/1985, Decreto 11/04/1988, Decreto 02/04/1991, Legge 81/1993, Legge 265/1999, Decreto 119/2000, Legge 266/2005 and Decreto Legge 78/2010, converted by Legge 122/2010.

[36] Art. 822-828 Codice Civile.

ganizations (MEF (2015a), own calculations, Figure D.21 in Appendix D). Additionally, about 20% of the real estate is considered unusable. Properties deemed unusable are likely unsuitable for public purposes due to their inherent characteristics, physical conditions, or financial or legal requirements. They mainly consist of houses, agricultural land, or other land. The reason for selling a real estate is typically one of the following: having low-income generation, high cost of recovery, not having institutional interest, or being a source of investment financing.[37] Municipalities can dispose of their real estate assets in multiple ways. They can: i) sell them via public auction, private negotiation, or securitization via a public firm, ii) grant them to private or public entities, iii) lease them, iv) contribute them to a fund for a quota, or v) barter (IFEL (2015)). Auctions are the common method, especially when the value is high and the customer group is broad. Private negotiation can follow an empty auction, cases in which the value is lower[38], or when negotiating in the public interest. Barter is rarer, and when the asset received is particularly favourable. In these operations, municipalities have to follow principles of transparency and publicity. The advertising needs to be broader, the higher the value of the real estate.[39] According to the sample reported by IFEL (2015), the payment instalments are mainly spread over 1 or 3 years.

[37]This information is coming from the regulations enacted by a sample of municipalities during the period 1998-2012 (Ferrara n.19 21/07/2011, Este n.67 29/11/2011, Alpignano n.46 15/06/2005, Udine n.176 11/12/2000, Pontedera n.58 31/05/2005,n.144 Potenza 05/12/2008 and Castellaneta n.52 04/04/2007).

[38]The concept of lower value varies among municipalities.

[39]This information is coming from the regulations enacted by a sample of municipalities during the period 1998-2012 (Ferrara 21/07/2011, Molinella, Este 29/11/2011, Alpignano 15/06/2005, Udine 11/12/2000, Pontedera 31/05/2005, Potenza 05/12/2008, and Castellaneta 04/04/2007).

Appendix G: Accounting terms

In this section, I present more formal definitions and explanations for the Italian accounting terms, following ISTAT (2012), connecting them with the terminology used in the main text. The expressions in apostrophes are personal translations from ISTAT (2012).

- Accrual
  - *Impegni* - These are commitments of expenditure for specific amounts, legal obligations of payments taken by a municipality.
  - *Accertamenti* - These are recognized revenues, representing an established right for a municipality to collect specific amounts from defined sources.
- Cash
  - *Pagamenti in conto competenza* - Payments related to expenditure commitments (*Impegni*) belonging to the same fiscal year.
  - *Riscossioni in conto competenza* - Collections related to revenue commitments (*Accertamenti*) belonging to the same fiscal year.
  - *Pagamenti in conto residui* - Payments related to expenditure commitments (*Impegni*) from prior fiscal years.
  - *Riscossioni in conto residui* - Collections related to revenue commitments (*Accertamenti*) from prior fiscal years.

Further useful terms are:

- Current expenditure (*Spese correnti*) - "The expenditure intended for the production and functioning of public service and the redistribution of income outside of productive goals."
- Capital expenditure (*Spese in conto capitale*) - "The expenditure that affects directly or indirectly public assets formation."
- Current revenues (*Entrate correnti*) - Revenues from taxes, fees and current grants.
- Capital revenues (*Entrate in conto capitale*) - "Capital revenues are from the sales of assets and capital grants."

Chapter 4

Early and late signals of municipal distress

JEL: H70, H72, H77

Keywords: Municipal default, decentralization, local public finance

4.1 Introduction

Shifting fiscal and administrative responsibilities from the central government to municipalities poses serious challenges. On the one hand, a high degree of autonomy can improve municipal efficiency by better reflecting local needs (Rodden, Eskeland, and Litvack (2003)). On the other hand, expectations of central government interventions can also lead to budgetary issues due to conflicts of interest and excess risk-taking (Rodden, Eskeland, and Litvack (2003)). In extreme circumstances, budgetary issues can result in a municipal default, with consequences spreading to a wide range of stakeholders. Residents, for instance, rely on continuous and reliable public services and the sound management of public resources. Furthermore, the central government has an interest in avoiding costly bailouts and in preventing a deterioration of local governments' creditworthiness, which could impact its own borrowing costs. Investigating early and late patterns of defaulting municipalities helps monitor financial distress and understand its components.

This research examines the relationship between defaults and common financial indicators reported in Italian municipal defaults. Specifically, I test how many years in

advance these indicators signal distress before the default. The analysis estimates five Logit models, one for each year before the default, using a default dummy as the dependent variable. Each model lags the predictors accordingly, e.g., model 1 lags them by one year, model 2 by two years, and so forth.

The Italian setting is of interest for two reasons: i) municipal autonomy greatly increased in the 1990s (Ambrosanio, Bordignon, and Cerniglia (2010)), and ii) the fiscal burden on the central government from bailout interventions was massive in 1989, but significantly reduced after 2003 (MI (2010)). As a consequence, Italian municipalities had more financial autonomy and responsibility.

This research uses two main data sources. The first consists of municipal financial reports provided by the Ministry of the Interior, which detail revenues and expenditures of Italian municipalities (MI (2023a)). The second contains data on municipal defaults, provided by the Fondazione Università Ca' Foscari. This gives information on the timing and declarations of defaults.

To capture the relationship between weak liquidity flows and financial default, I measure the variables in cash amounts. Furthermore, to ensure comparability across specifications, the sample covers the same years between 2004 and 2015, ending with the introduction of a new accounting framework[1]. The sample comprises 6,200 municipalities and counts 81 defaulting municipalities. Finally, since municipal defaults are rare and extreme events, Logit models might result in perfect predictions for many observations. For this reason, I also analyse five linear probability models.

In Italy, Verde (2017) explains municipal defaults with a combination of: i) internal issues, such as budget rigidities due to high expenditure and low revenues; and ii) external factors, such as payments related to legal disputes. I inspected a sample of default declarations of Italian municipalities[2], finding several recurring indicators. These municipalities accumulated high levels of debt, often off-balance sheet[3] and linked to legal litigations. They were often burdened by high personnel costs, reliance on cash advances[4], and large deficits. In addition, some engaged in the sale of real estate to find liquidity.

[1]For more information, see IFEL (2012).

[2]The sample is made up of the municipalities of Cirò (2001), Maltignano (2003), Pontinia (2004), Gallodoro (2005), Taranto (2006), Mentana (2007), Velletri (2009), Lauro (2010), Barni (2011), Nardodipace (2012), Viareggio (2014), and Rodi Garganico (2015)

[3]This kind of debt is not formally recorded in municipal budgets because in violation of accounting rules (Circolare Ministero dell'Interno 21/1993).

[4]Cash advances are short-term borrowings taken to provide immediate liquidity.

Many also accumulated outstanding revenues still deemed collectible alongside unpaid past liabilities.

The analysis finds some financial indicators to have distinguishable patterns in defaulting municipalities for several years prior to the default. Among the liquidity indicators, *cash advances relative to current revenues*[5] have a positive and statistically significant relationship in all models. In addition, *debt from cash advances over current revenues* exhibits a similar relationship. However, it is statistically significant only three to five years before the default. These results suggest that defaulting municipalities struggle to find available cash for many years before the default. Similarly, the *ratio of outstanding revenues still deemed collectible to current revenues* shows a positive and statistically significant relationship at every lag except the first. At the same time, the *share of outstanding revenues still deemed collectible compared to those declared in the previous year* exhibits a negative and statistically significant relationship only a few years before default. Together, these findings suggest that defaulting municipalities write off outstanding revenues primarily near default. Finally, another strong relationship is that of *current expenditure*[6] *relative to current revenues*, exhibiting a positive correlation at early lags and a negative, statistically significant correlation near default. At face value, this suggests that municipalities with high current expenditure are more likely to default at early lags. However, an endogenous response to decrease the chances of default reverses the sign of the relationship at late lags.

The previous literature on Italian municipalities focused on predicting municipal defaults or identifying important indicators. On the prediction side, Cohen, Costanzo, and Manes-Rossi (2017) present a Logit model focusing on accounting measures, while Antulov-Fantulin, Lagravinese, and Resce (2021) present several machine learning models based on institutional, socio-demographic, and economic variables. Concerning the identification of important factors, Gregori and Marattin (2019) find that the ratio of loan repayments to total expenditure is one of the most relevant budget indicators when it comes to default probability. Moreover, Padovani, Porcelli, and Zanardi (2024) find that municipalities with inadequate resources for delivering public services have higher chances of default. I contribute to the literature by studying the timing at which common

[5]Current revenues come from taxes, fees, and grants that don't finance investment, while capital revenues originate from the sale of assets and from grants that finance investment (ISTAT (2012)).

[6]For instance, the expenditure for the functioning of public service (ISTAT (2012)), such as salaries, utilities, office supplies, or rental expenses.

financial indicators reported in Italian municipal defaults start to signal financial distress. By estimating the influence of multiple lags, I identified which indicators suggest early warnings and which late stages of financial distress.

The literature also explored municipal financial distress outside of Italy. Herold (2018) provides an overview of insolvency frameworks for local governments around the world. For Spanish municipalities, Buendía-Carrillo et al. (2020) find that the relationship between default risk and its predictors varies with population size. For the United States, Hillhouse (1936) studies historical local governments' defaults, supporting that, in the 1870s and 1930s, municipalities engaged in risky debt accumulation during economic booms. As a consequence, municipal budgets were inflexible during economic downturns. Furthermore, Dove (2016) studies the effect of fiscal constraints in the United States during the 1870s. The author presents evidence for a reduced likelihood of default in the presence of hard budget constraints and the prohibition on debt accumulation. On the other hand, the author also finds that tax limits and procedural safeguards, such as majority voting on the issuance of new debt, increased such likelihood.

In Section 4.2, I summarize the information regarding the Italian municipal context and the default framework. Section 4.3 presents the data used. In Section 4.4, I show the empirical analysis and interpret the results. Section 4.5 concludes.

4.2 Background

This section summarizes the characteristics of Italian municipalities. It then overviews the municipal default framework and concludes by describing relevant municipal fiscal rules.

4.2.1 Italian municipalities

Italy is composed of twenty regions and around 8,000 municipalities (ISTAT (2025c)). Art. 119 of the Italian Constitution grants municipalities financial autonomy in revenue and expenditure, property ownership, and the ability to contract debt solely to finance investment.[7] Municipal revenue autonomy permits them to set local taxes within legal

[7]The article was introduced by Legge Costituzionale 3/2001 and formalized municipal autonomy. This was part of a process mostly carried out in 1997-2000 with the intent to decrease dependence on governmental grants and increase municipal revenues (Camera dei Deputati (2008)). The constraint on

limits. Between 1999 and 2015, for instance, they could impose an income surcharge tax[8] or adjust the local property tax.[9] However, both taxes were bound by a maximum rate ceiling.

4.2.2 Municipal financial default

Decreto Legge 66/1989[10] introduced a municipal default framework (*dissesto*) in response to the massive debt accumulated by local governments (MI (2010)). Under this framework, the municipal council has the responsibility to declare default.[11] Specifically, the legislation prescribed that municipalities no longer capable of financing essential public services (e.g., police, primary and secondary education, garbage collection, etc (Decreto Ministero dell'Interno 28/05/1993)) have the obligation to declare default.

To address the financial distress, defaulting municipalities unable to finance themselves could borrow from Cassa Depositi e Prestiti, a financial institution mainly owned by the Ministry of Economics and Finance. The purpose of this loan was to cover the deficit and off-balance sheet debts, with the Italian State bearing the full costs.

Policymakers revised the defaulting process several times in the following years, culminating in the framework set out by Decreto Legislativo 267/2000 (TUEL). A key addition was the appointment of an extraordinary committee. Its purpose was to manage the liquidation process through the detection and settlement of the debt (MI (2010)). In 2003 and 2004, several reforms reduced the burden on the State and increased it on municipalities. These came in the form of restrictions on borrowing to restructure debt, and the Italian State ceased covering the borrowing costs. Instead, the Italian State provided extraordinary contributions to aid the liquidation process (MEF (2010)).

The Ministry of the Interior periodically sets the parameters that, if more than half are fulfilled, define the status of financial distress (Art. 242 Decreto Legislativo 267/2000 (TUEL)). These parameters changed throughout time and specified thresholds for financial ratios involving: deficit, outstanding revenues, unpaid liabilities, expenditure for legal enforcement proceedings, personnel expenditure, debt, off-balance sheet debt, cash advances, interest expenses, own revenues, and revenues from the sale of real estate (Decreto

debt to solely finance investment, however, was only introduced in 2001.

[8] Decreto Legislativo 360/1998.

[9] Decreto Legislativo 504/1992 and Decreto Legislativo 23/2011.

[10] Converted by Legge 144/1989.

[11] The declaration can occur any time during the fiscal year.

Ministero dell'Interno 10/06/2003, 24/09/2009, and 18/02/2013).

Overall, the legislation required defaulting municipalities to approve a restructuring plan aimed at: i) maximizing internal revenues, taxes in particular; ii) reducing operational expenditure, such as personnel costs; and iii) aiding the liquidation effort by selling real estate not essential to public functions (MI (2010)). Moreover, Decreto Legislativo 149/2011 set a monitoring system designed to detect budgetary issues and trigger corrective measures. In case municipal actions proved insufficient, the authorities would declare a default. The decree also provided sanctions for local administrators found gravely responsible for the municipal default, including a ten-year ban from holding certain public offices.

In addition to the established default framework, Decreto Legge 174/2012[12] introduced a procedure of pre-default (*predissesto*). This procedure targeted municipalities experiencing conditions that might eventually lead to a full default. Key elements include the development of a restructuring plan and access to State funds, conditional on imposing measures similar to those applied in the default framework described above.

Examining a sample of default reports[13] reveals several common characteristics of distressed municipalities. These comprise a high level of debt, often off-balance sheet[14] and stemming from legal litigations. These municipalities were often burdened by high personnel expenses, large deficits, and reliance on cash advances.[15] In addition, some municipalities engaged in the sale of real estate to find liquidity. Many also accumulated outstanding revenues still deemed collectible alongside unpaid past liabilities. Overall, these indicators, along with other financial rigidities in revenues and expenditures, render municipalities vulnerable to shocks. Accordingly, Verde (2017) explains Italian municipal defaults as interactions between similar internal issues and external factors. Common external factors are court-ordered payments for expropriations, legal disputes over public works, and compensation payments.

[12]Converted by Legge 213/2012

[13]The sample is made up of the municipalities of Cirò (2001), Maltignano (2003), Pontinia (2004), Gallodoro (2005), Taranto (2006), Mentana (2007), Velletri (2009), Lauro (2010), Barni (2011), Nardodipace (2012), Viareggio (2014), and Rodi Garganico (2015).

[14]This kind of debt is not formally recorded in municipal budgets because in violation of accounting rules (Circolare Ministero dell'Interno 21/1993).

[15]Cash advances are short-term liabilities taken to acquire immediate liquidity.

4.2.3 Fiscal rules

The 1999-2015 period also saw the introduction and reform of municipal fiscal rules, reducing local deficits (Grembi, Nannicini, and Troiano (2016)) and investments (Chiades and Mengotto (2013)). In 1997, the European Union approved the Stability and Growth Pact (SGP)[16], a collection of rules aimed at compelling member states to comply with the deficit-to-GDP ratio limit. In an attempt to reduce the contribution of local governments to the deficit and to increase their financial accountability, Italy introduced a set of fiscal rules constraining local governments, the Domestic Stability Pact (DSP) (Camera dei Deputati (2017)).

The DSP underwent several reforms between 1999 and 2015.[17] In 1999-2000, the DSP applied to all municipalities; starting in 2001, only to municipalities with more than 5,000 inhabitants; and from 2013, solely to those with more than 1,000 inhabitants. Over the period, the DSP primarily constrained the budget balance, defined as the difference between revenues and expenditures. The only exception was in 2005 and 2006, when the DSP instead limited the maximum expenditure. To monitor compliance, the DSP required municipalities to submit their financial results to the Ministry of Economics and Finance to verify the fulfilment of the objectives; failure to share them constituted a violation of the fiscal rules.

In addition to DSP regulations, all municipalities were also constrained by a debt limit.[18] This limit is defined as the ratio of debt payments to current revenues[19].

4.3 Data

The data primarily consists of municipal financial reports[20] detailing the revenues and expenditures of Italian municipalities from 1998 to 2018 (MI (2023a)). The accounting framework followed by these reports was established by Decreto del Presidente della Repubblica 194/1996. However, after the 2015 accounting reform, most municipalities

[16]Resolution of the European Council on the Stability and Growth Pact, Amsterdam, 17 June 1997.

[17]The sources concerning the DSP are the circulars of the Ministry of Treasury 11/1999, 4/2000, 6/2001, circulars of te Ministry of Economics an Finance 11/2002, 7/2003, 5/2004, 4/2005, 8/2006, 12/2007, 8/2008, 2/2009, 15/2010, 11/2011, 5/2012, 5/2013, 6/2014, and Prot. 52505/2015.

[18]Decreto Legislativo 267/200 art. 204 (TUEL).

[19]Current revenues come from taxes, fees, and grants that don't finance investment, while capital revenues originate from the sale of assets and from grants that finance investment (ISTAT (2012)).

[20]I present a financial report extract in Figure H.2 in Appendix H.

reported their financial situation only through the new accounting framework.[21] For this reason, I end the sample in 2015.

The financial reports provide information about revenue and expenditure components (budget items) using both accrual and cash accounting.[22] A value under *accrual* accounting represents the amount the municipality earns or owes during the year, regardless of whether the municipality received or paid cash. For instance, when a municipality sells real estate, accrual accounting records the revenue amount even if the buyer has not paid yet. *Cash* accounting records the cash actually received or paid during the year, including amounts related to past years' transactions (residuals). In this research, I focus on cash amounts to exploit the relationship between weak liquidity flows and financial default.

The second data source is the Fondazione Università Ca' Foscari (2025), providing information on Italian municipal financial defaults spanning 1989 to 2025. Finally, the National Institute of Statistics (ISTAT (2025b)) offers complementary information about municipal codes, surface area, regions, and demographics.[23]

Outcome and explanatory variables

The outcome variable is the *default* dummy, which assumes the value of one for the year in which a municipality declares default and 0 otherwise. I focus on *defaults*, rather than *pre-defaults*, as the latter were only introduced later in the sample period.

The information contained in the financial reports is either limited or absent when it comes to off-balance sheet debt, public firms, and the specific natures of revenues and expenditures. The analysis, therefore, considers many financial indicators related to municipal defaults based on aggregate values. As a consequence, some form of bias can be expected. For instance, if financially distressed municipalities are more prone to shift expenditures and debt to public firms, or incur off-balance sheet debt, then the coefficient estimates would be biased in the opposite direction of their sign.

Debt indicators include: i) the ratio of total debt over current revenues (*debt*, expected sign: +); and ii) the ratio of debt from cash advances over current revenues (*debt from cash advances*, +). Liquidity indicators indicators include: iii) the ratio of cash advances

[21] For more information, see IFEL (2012).

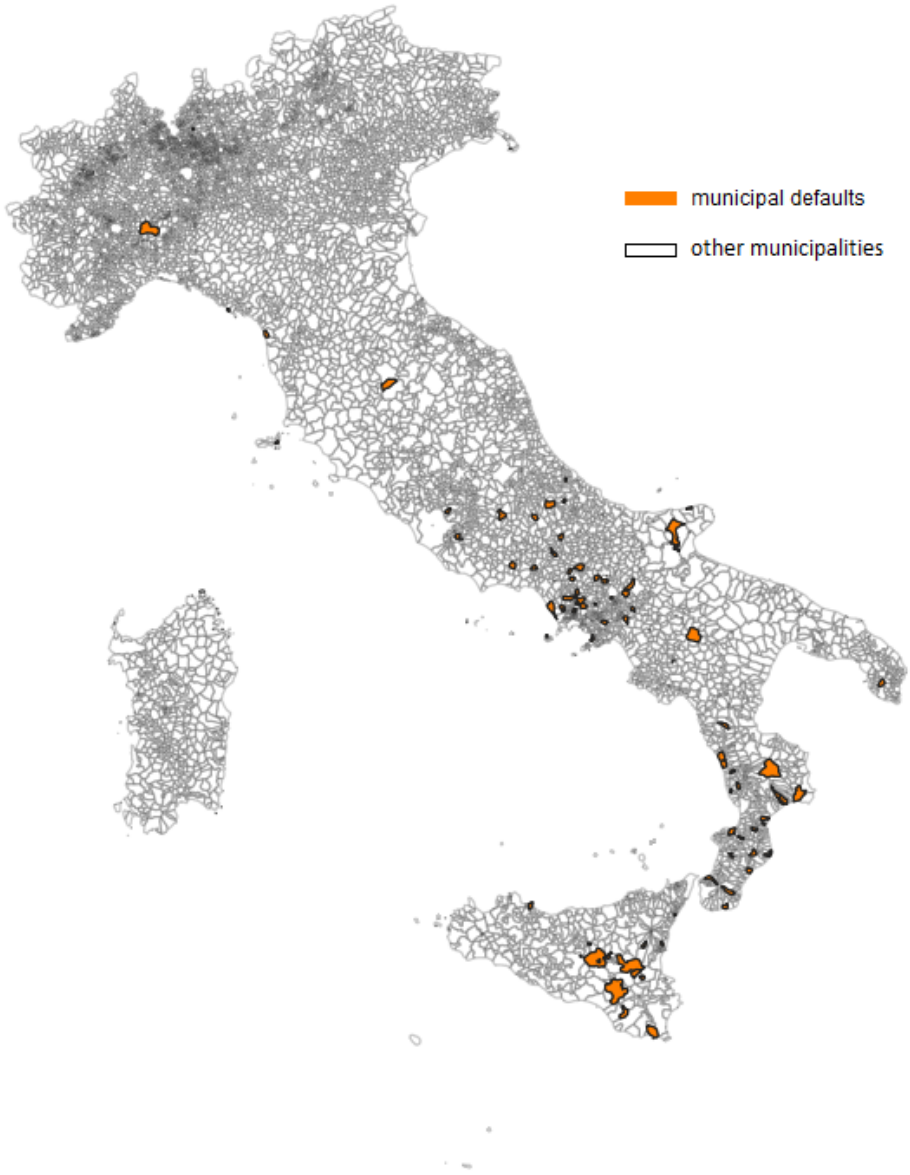
[22] Accrual is in reference to the Italian *impegni* and *accertamenti*, and cash is in reference to *pagamenti in conto competenza e residui*. See Appendix I for more formal definitions.

[23] The merging process followed municipal codes whenever possible; otherwise, the name of the municipality and the region.

over current revenues (*cash advances*, +); iv) the ratio of surplus over current revenues (*surplus*, -); and v) the ratio of revenues from the sale of real estate over debt repayments (*real estate sales*, +).

Budget rigidity indicators include: vi) the share of current expenditure made up of personnel expenses (*personnel expenditure*, +); vii) the ratio of current expenditure over current revenues (*current expenditure*, +); and viii) the ratio of revenues from governmental grants over current revenues (*grants*, -).

Figure 4.1: Italian municipal defaults (2004-2015)



Notes: In orange, defaulting Italian municipalities during the period 2004-2015; in white, other municipalities. The period counts 82 municipalities defaulting. See Section 4.3 for information on sample restrictions. Own calculations with data on municipal defaults from the Fondazione Università Ca' Foscari. Italian map provided by ISTAT (2025a).

Finally, revenue and expenditure management indicators: ix) the ratio of outstanding

revenue still deemed collectible over current revenues (*revenue residuals*, +); x) the ratio of unpaid past liabilities over current revenues (*expenditure residuals*, +); and xi) the ratio of carried over outstanding revenues still deemed collectible in a given year over the amount that was declared to be collectible at the end of the previous year (*readjusted revenue residuals*, -).

Table 4.1: Overview of Italian municipalities (2004-2015)

Variable	Mean	SE	Min	Max	Median
Municipal characteristics					
Population	8,237	45,575	30	2,794,353	2,666
Defaults	0.00	0.03	0	1	0
Debt indicators					
Debt	1.54	4.65	-12.93	1112.64	1.33
Debt from cash advances	0.01	0.08	-0.92	3.76	0.00
Liquidity indicators					
Cash advances	0.07	0.24	0.00	8.71	0.00
Surplus	0.14	0.24	-9.24	15.01	0.08
Real estate sales	0.31	2.28	0.00	361.96	0.00
Rigidity indicators					
Personnel expenditure	0.32	0.09	0.00	0.88	0.31
Current expenditure	0.93	0.14	0.15	7.84	0.92
Grants	0.28	0.22	0.00	0.99	0.24
Revenue management indicators					
Revenue residuals	0.70	1.00	-0.81	39.90	0.40
Readjusted revenue residuals	0.92	0.28	-12.07	36.45	0.97
Expenditure residuals	0.79	1.02	-0.99	40.08	0.52
Number of municipalities	6,200				
Number of observations	74,400				

Notes: The table presents the main economic and socio-geographic variables describing Italian municipalities in the period 2004-2015. All the monetary variables are expressed in per capita cash amounts in 2022 euros unless indicated otherwise. The columns are, respectively, the average, standard deviation, minimum, maximum, and median. See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.

4.3.1 Sample selection

To improve comparability in the data and have a balanced panel, I drop municipalities without information for the relevant variables over the whole period. Since this research compares relationships at different lag lengths up to 5 years prior, and reporting is lower in 1998, I restrict the dependent variable period to 2004-2015. The sample ends in 2015, along with the introduction of a new accounting framework.

The main estimation sample thus covers 6,200 municipalities between 2004 and 2015, and counts 81 defaulting municipalities; Figure 4.1 presents their location. The figure suggests that defaults are relatively rare and more likely to occur in southern regions.

4.3.2 Summary statistics

Table 4.1 presents the yearly numbers for the relevant financial indicators for Italian municipalities between 2004 and 2015. Italy adopted the Euro only in 2002; therefore, I converted the previous years' amounts using the 1998 exchange rate of 1,936.27 Italian Lira per Euro. Moreover, I inflation-adjust the monetary values to 2022 Euros using the FRED St. Louis rates for Italy (FRED (2023)). The financial indicators have very wide ranges among municipalities. Debt, residuals, and re-adjusted residuals indicators in particular present extreme values, possibly due to typos, and are going to be excluded in robustness tests. On the financing side, the vast majority of municipal debt is composed of loans from the Cassa Depositi e Prestiti (MI (2023a)).

4.4 Empirical analysis

This research investigates the relationships between municipal defaults and financial indicators, focusing on the timing of the financial distress patterns. I estimate five Logit models (Equation (4.1)), one for each year prior to the default, using the default dummy (y_{it}) as the dependent variable. The covariates (X_{it-j}) are lagged accordingly, e.g., model $j = 1$ has the covariates lagged by one year, model $j = 2$ has them lagged by two years, and so forth. Since the municipalities can deliberate the default at any time during the year, the effective time distance represented by the lagged covariates varies by the date of deliberation. As the month of deliberation is fairly evenly distributed, with a higher concentration towards the end of the year, this variation introduces only limited noise in the covariates without systematic bias. $g(.)$ is the logistic function. θ_r and θ_t represent dummies for region and year. Furthermore, the model is over yearly (t) municipal (i) observations, with standard errors clustered at the municipal level.

$$P(y_{it} = 1|X_{it-j}, \theta_r, \theta_t) = g(\gamma_{0j} + X'_{it-j}\gamma_{1j} + \theta_r + \theta_t) \tag{4.1}$$

Since the number of defaults is very small and concentrated in the South, the estima-

tion models might not be able to perform well in out-of-sample predictions. Moreover, since municipal defaults are rare and extreme events, Logit models might result in perfect predictions for many observations and may impact the estimated coefficients. To address this concern, I also estimate five linear probability models (LPM) according to Equation (4.2) in Appendix J. Furthermore, I exclude the variable *expenditure residuals*, as it is highly correlated with *revenue residuals*.

4.4.1 Results

Table 4.2 presents the estimates for the five Logit models, and Figure 4.2 plots the corresponding coefficients. Several financial indicators exhibit distinct patterns at various lag lengths, suggesting early and late signals of financial distress. To assess the magnitudes, Table H.3 in Appendix H exhibits the average marginal effects (AMEs). The AMEs' estimates are small, largely due to the low number of defaulting municipalities in the sample. Moreover, since all covariates are ratios, the estimates in Table H.3 in Appendix H reflect the change in default probability associated with a one unit increase in the ratio. For instance, in the case of total debt over current revenues, this would imply an increase in debt equal to the current revenues.

The debt indicators have distinguishable patterns in early to mid lags. Specifically, the ratio of debt to current revenue is generally negatively correlated with municipal default and statistically significant only at lag 5. This weak relationship and the negative sign may reflect the presence of off-balance sheet debt, which is not present in the financial reports but nonetheless contributes to municipal default. In contrast, the ratio of debt from cash advances over current revenues is positively correlated with default, but statistically significant only at lag 3 to 5. Both debt indicators have relatively small marginal effects for the whole period. These findings suggest that the debt accumulated from cash advances captures early signals of financial distress, not easily reflected by the total debt reported.

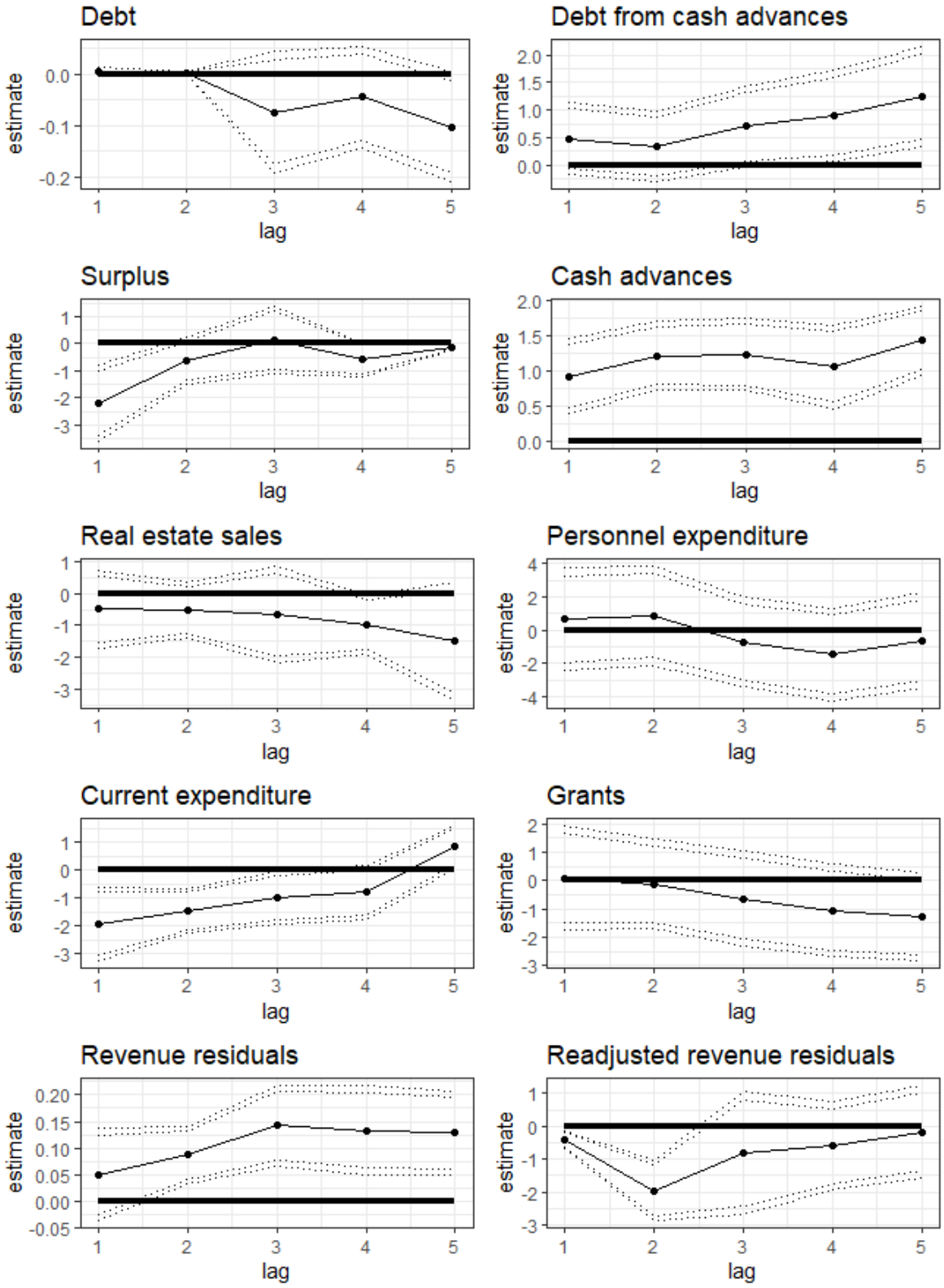
The liquidity indicators signal default for many years before the actual default. The surplus to current revenues ratio, as expected, is negatively related to default, with statistical significance and magnitude varying across the lags. The ratio of revenues from the sale of real estate to debt repayment expenditure is negatively related to default and is weakly significant only at lag 4. This result is inconsistent with the expected sign and

Table 4.2: Municipal defaults (Logit)

	lag 1	lag 2	lag 3	lag 4	lag 5
(intercept)	-20.328***	-19.379***	-26.523	-28.907***	-23.455***
	(1.146)	(0.891)	(89.755)	(9.394)	(3.561)
Debt indicators					
debt	0.005	0.002	-0.074	-0.045	-0.102*
	(0.005)	(0.002)	(0.061)	(0.051)	(0.055)
debt from cash advances	0.484	0.337	0.706*	0.887**	1.244***
	(0.339)	(0.329)	(0.378)	(0.425)	(0.471)
Liquidity indicators					
cash advances	0.924***	1.220***	1.234***	1.060***	1.435***
	(0.275)	(0.249)	(0.264)	(0.306)	(0.251)
surplus	-2.189***	-0.638	0.127	-0.591*	-0.136***
	(0.728)	(0.436)	(0.645)	(0.324)	(0.046)
real estate sales	-0.485	-0.511	-0.653	-0.978**	-1.497
	(0.625)	(0.449)	(0.775)	(0.478)	(0.958)
Rigidity indicators					
personnel expenditure	0.650	0.867	-0.721	-1.483	-0.633
	(1.578)	(1.537)	(1.383)	(1.443)	(1.486)
current expenditure	-1.930***	-1.462***	-0.995**	-0.793	0.845**
	(0.687)	(0.410)	(0.481)	(0.495)	(0.388)
grants	0.093	-0.127	-0.629	-1.049	-1.283
	(0.950)	(0.813)	(0.875)	(0.848)	(0.801)
Revenue management indicators					
revenue residuals	0.050	0.087***	0.142***	0.133***	0.128***
	(0.045)	(0.028)	(0.039)	(0.043)	(0.041)
readjusted revenue residuals	-0.402***	-1.963***	-0.814	-0.601	-0.170
	(0.138)	(0.473)	(0.966)	(0.695)	(0.724)
Year FE					
Region FE					
Municipalities	6,200	6,200	6,200	6,200	6,200
Observations	74,400	74,400	74,400	74,400	74,400

Notes: The columns present the coefficient estimates for Logit models predicting municipal defaults from lag one to five (Equation (4.1)). See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Figure 4.2: Municipal defaults lags coefficients (Logit)



Notes: Logit models estimated coefficients predicting municipal defaults (Equation (4.1)). The x-axis shows the models one to five, defined as having all covariates lagged by that number (e.g., model 1 as them lagged one year). The internal and external dotted bandwidths are the 90% and 95% confidence intervals, respectively. The standard errors are clustered at the municipal level.

could be interpreted as municipalities capable of selling real estate are less likely to default. However, the estimates carry substantial statistical uncertainty. The ratio of cash advances to current revenues has a strong and significant positive correlation with defaults. While real estate sales show a small magnitude at every lag, cash advances have a relatively high marginal effect for the whole period, except lag 1, at around 0.1 percentage points. Surplus exhibits a strong marginal effect at lag 1, around -0.2 percentage points, but has a smaller magnitude otherwise. Together, these liquidity indicators align with defaulting municipalities that are experiencing a decline in surpluses and consistently rely on short-term borrowing.

The budget rigidity indicators have more heterogeneous results. While personnel expenditure and grants ratios display high statistical uncertainty, rendering them indistinguishable from zero, the ratio of current expenditure over current revenue has a notable dynamic. It is positive and statistically significant five years before the default, then turns negative and statistically significant at shorter lags (1-3). At face value, this could indicate an endogenous response to financial distress. Municipalities initially characterized by high current expenditure later reduce it to address the financial distress. Similar to the other indicators, personnel expenditure and grants have small marginal effects. At the same time, current expenditure has a moderate marginal effect at around -0.1 percentage points. These results may reflect how defaulting municipalities have more control over reducing total current expenditure rather than the more rigid personnel expenditure.

Finally, the revenue and expenditure management indicators exhibit an insightful relationship. The ratio of revenue residuals to current revenues is positively correlated with financial default and statistically significant at all lags except the first. In contrast, the readjusted revenue residuals are negatively correlated with financial default and statistically significant only at the first and second lag. These results are compatible with the notion that defaulting municipalities accumulate hard-to-collect revenues for many years before default and write them off mainly in the years immediately preceding the default. Marginal effects are generally small, except for readjusted revenue residuals at lag 2, with a marginal effect of around -0.2 percentage points.

4.4.2 Robustness

I assess the robustness of the results by estimating LPM models, more parsimonious Logit models, and comparing the average values of financial indicators for defaulting municipalities across the five years preceding the default.

4.4.2.1 Model estimations

Tables H.1 and H.2 in Appendix H present the LPM estimates and Figure H.1 in Appendix H plots the corresponding coefficients. These models give robustness to some of the previous relationships (personnel expenditure, revenue residuals, surplus, cash advances, debt from cash advances, and readjusted revenue residuals). Nevertheless, other financial indicators exhibit different patterns. The real estate sales indicator, for instance, changes sign from negative to positive; however, the estimates are still statistically imprecise and not distinguishable from zero. The strongest differences are found in the current expenditure ratio, no longer statistically significant, though preserving the signs, and in the grants ratio, with a strong negative and significant correlation with municipal defaults. Finally, the debt ratio shows a positive and significant relationship with municipal default.

Overall, these estimates are consistent with the previous models, with the exception of grants and debt ratios. Moreover, excluding municipalities with extreme values in debt or residuals in any of the models does not meaningfully change the interpretation of the results.

Finally, I re-estimate Equation (4.1) using a more parsimonious model, preserving only the covariates that were statistically significant. The results are consistent with the main specification.

4.4.2.2 Average financial indicators

Table H.5 in Appendix H presents the average values of financial indicators for defaulting municipalities up to five years prior to default. The patterns are consistent with the previous findings. In particular, cash advances maintain a high level at around 0.36 for the entire period. Debt from cash advances is relatively high in earlier years (0.11) and decreases towards default (0.08), except for the year immediately preceding the

default (0.12). The revenue residuals are high throughout the five years at around 2.10, but decrease in the two years before default to 1.87, along with the readjusted revenue residuals falling from 0.93 to 0.79.

4.5 Conclusion

In this research, I investigate the relationship between common financial indicators reported in Italian municipal defaults and the default outcome itself. The focus is to test how many years in advance these indicators become noticeable before the default.

The analysis relies on financial reports detailing revenues and expenditures of Italian municipalities, provided by the Ministry of the Interior, along with data on municipal defaults provided by the Fondazione Università Ca'Foscari. I estimate five Logit models, one for each year before the default, using a default dummy as the outcome variable. Each model lags covariates accordingly. Model 1 has covariates lagged by one year, model 2 has them lagged by two years, and so forth. Since municipal defaults are rare and extreme events, I also estimate five linear probability models. The sample covers the period between 2004 and 2015, ending with the introduction of a new accounting framework.

The analysis finds some of the recurring indicators reported in municipal defaults to have distinguishable patterns for many years before the default. On the liquidity side, cash advances over current revenues have a positive and statistically significant relationship for all the lag models. Debt from cash advances over current revenues exhibits a similar relationship, although statistically significant only at lag 3 to 5. These results align with the necessity of the municipality to have immediate available cash for many years before the default. Similarly, the ratio of accumulated outstanding revenues still deemed collectible over current revenues has a positive and statistically significant relationship at every lag except the first. At the same time, the percentage of outstanding revenues still deemed collectible with respect to those declared the previous year exhibits a negative and statistically significant relationship only for the lags immediately preceding the default (first and second lag). Together, these findings suggest that writing off outstanding revenues mainly happens near default. Finally, another strong relationship is given by current expenditure over current revenues, exhibiting a positive relationship at

early lags and a negative, statistically significant relationship near default. At face value, this could be interpreted as municipalities having high current expenditure as being more likely to default at early lags; however, an endogenous response to decrease the chances of default inverts the sign of the relationship near default.

Overall, this research examines the timing of financial distress signals in Italian municipalities, finding early and late patterns involving short-term borrowings and outstanding revenues. The findings suggest that financial distress is observable years before default through the rising use of cash advances and the accumulation of outstanding revenues. Furthermore, late-stage distress is reflected in the write-off of these outstanding revenues. These relationships can help inform monitoring systems on how close to default a municipality is. Future research could investigate the reaction of municipal stakeholders to early and late signals of distress beyond the municipal cost of borrowing.

Appendix H: Figures and Tables

Table H.1: Municipal defaults (LPM, lag 1-3)

	lag 1	lag 2	lag 3
(intercept)	0.00217442	0.00255141	0.00315298*
	(0.00190837)	(0.00166553)	(0.00177144)
Debt indicators			
debt	0.00000606	0.00000548	-0.00000005
	(0.00000938)	(0.00000497)	(0.00000057)
debt from cash advances	0.01318867**	0.00878278*	0.01199782*
	(0.00516609)	(0.00451896)	(0.00620899)
Liquidity indicators			
cash advances	0.00326009**	0.00603806***	0.00608888***
	(0.00140921)	(0.00170184)	(0.00183817)
surplus	-0.01008777***	-0.00092518	0.00000172
	(0.00202470)	(0.00074433)	(0.00011755)
real estate sales	0.00001646*	0.00000647	0.00000254
	(0.00000998)	(0.00000578)	(0.00001196)
Rigidity indicators			
personnel expenditure	0.00213780	0.00230957	-0.00077571
	(0.00225810)	(0.00227176)	(0.00196428)
current expenditure	-0.00068734	-0.00162797	-0.00122751
	(0.00166727)	(0.00113108)	(0.00125663)
grants	-0.00208705*	-0.00242291**	-0.00286791***
	(0.00108708)	(0.00107714)	(0.00106039)
Revenue management indicators			
revenue residuals	0.00050093*	0.00056862**	0.00106825**
	(0.00026522)	(0.00023226)	(0.00042611)
readjusted revenue residuals	-0.00000790*	-0.00000428	-0.00000136
	(0.00000437)	(0.00000264)	(0.00000167)
Year FE			
Region FE			
Municipalities	6,200	6,200	6,200
Observations	74,400	74,400	74,400

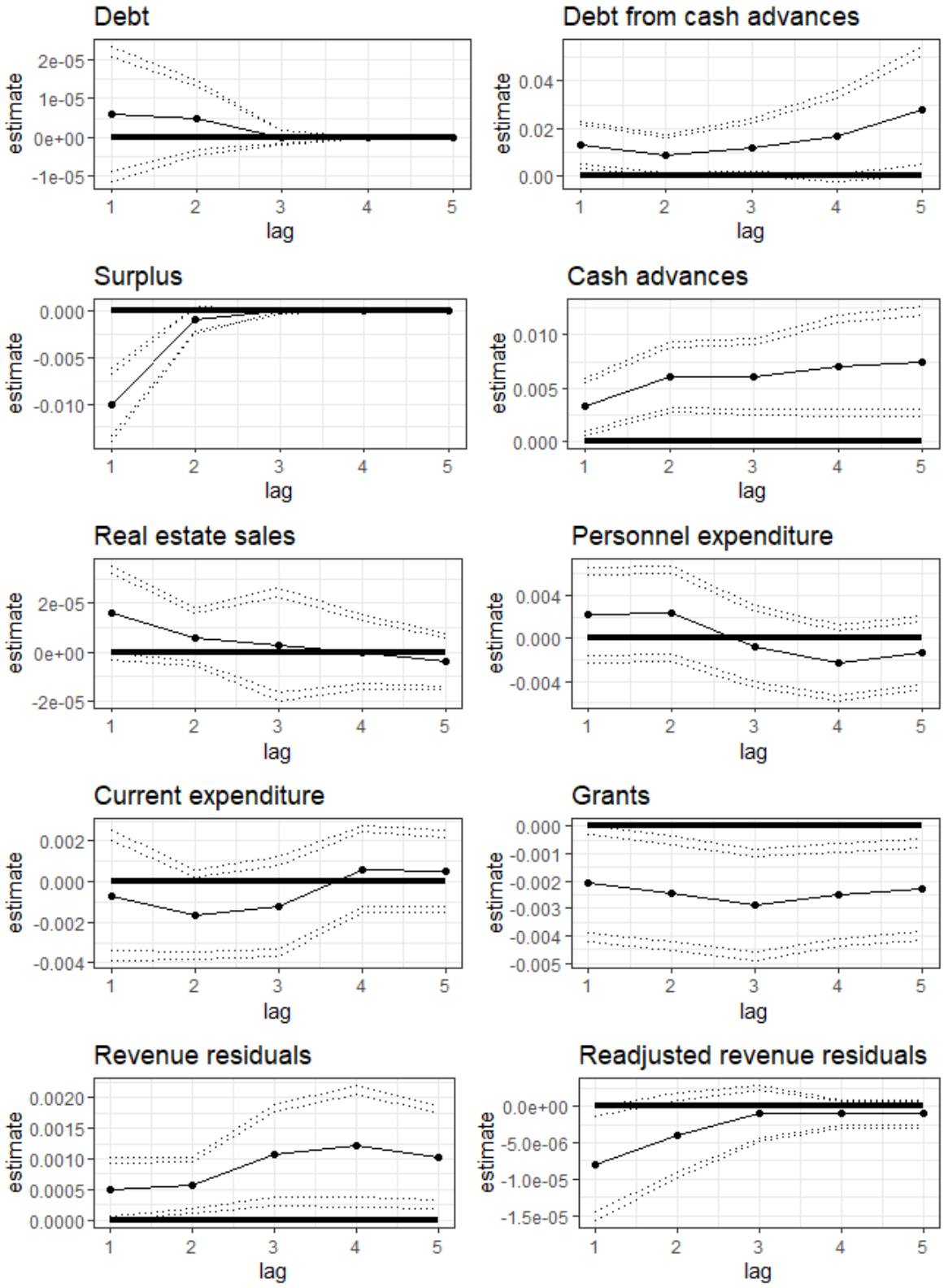
Notes: The columns present the coefficient estimates for linear probability models predicting municipal defaults from lag one to five (Equation (4.2) in Appendix J). See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table H.2: Municipal defaults (LPM, lag 4-5)

	lag 4	lag 5
(intercept)	0.00187874	0.00135882
	(0.00173174)	(0.00166352)
Debt indicators		
debt	-0.00000032	-0.00000023**
	(0.00000030)	(0.00000011)
debt from cash advances	0.01666103*	0.02774621**
	(0.00986620)	(0.01387938)
Liquidity indicators		
cash advances	0.00708666***	0.00749765***
	(0.00244307)	(0.00268579)
surplus	-0.00000560	-0.00000509
	(0.00000478)	(0.00000331)
real estate sales	0.00000024	-0.00000390
	(0.00000760)	(0.00000571)
Rigidity indicators		
personnel expenditure	-0.00229586	-0.00139539
	(0.00183654)	(0.00175348)
current expenditure	0.00061126	0.00049754
	(0.00110924)	(0.00104371)
grants	-0.00251529***	-0.00230922**
	(0.00096197)	(0.00094265)
Revenue management indicators		
revenue residuals	0.00120861**	0.00103017**
	(0.00050864)	(0.00043203)
readjusted revenue residuals	-0.00000149	-0.00000143
	(0.00000131)	(0.00000144)
Year FE		
Region FE		
Municipalities	6,200	6,200
Observations	74,400	74,400

Notes: The columns present the coefficient estimates for linear probability models predicting municipal defaults from lag one to five (Equation (4.2) in Appendix J). See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Figure H.1: Municipal defaults lags coefficients (LPM)



Notes: LPM models estimated coefficients predicting municipal defaults (Equation (4.2) in Appendix J). The x-axis shows the models one to five, defined as having all covariates lagged by that number (e.g., model 1 as them lagged one year). The internal and external dotted bandwidths are the 90% and 95% confidence intervals, respectively. The standard errors are clustered at the municipal level.

Table H.3: Average marginal effect (Logit)

	lag 1	lag 2	lag 3	lag 4	lag 5
Debt indicators					
debt	0.000005	0.000002	-0.000079	-0.000048	-0.000110
debt from cash advances	0.000496	0.000358	0.000756	0.000944	0.001324
Liquidity indicators					
cash advances	0.000947	0.001297	0.001322	0.001129	0.001527
surplus	-0.002242	-0.000679	0.000136	-0.000631	-0.000145
real estate sales	-0.000497	-0.000544	-0.000700	-0.001042	-0.001600
Rigidity indicators					
personnel expenditure	0.000666	0.000922	-0.000773	-0.001579	-0.000674
current expenditure	-0.001976	-0.001555	-0.001066	-0.000844	0.000899
grants	0.000095	-0.000135	-0.000674	-0.001117	-0.001365
Revenue management indicators					
revenue residuals	0.000051	0.000092	0.000152	0.000142	0.000137
readjusted revenue residuals	-0.000412	-0.002206	-0.000880	-0.000643	-0.000181

Notes: The columns present the average marginal effect estimates for Logit models predicting municipal defaults from lag one to five. See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Figure H.2: Financial report, Rome in 2005 (extract)

Titolo IV - ENTRATE DERIVANTI DA ALIENAZIONE, DA TRASFERIMENTI DI CAPITALEI E DA RISCOSSIONI DI CREDITI — Group 4 (Capital revenues): Revenues from sales, capital transfers, and debt collections

VOCI — Items	Accertamenti — Accrual	Riscossioni in conto competenza — Cash collections (ex. residuals)	Riscossioni in conto residui — Cash collections (residuals)
Categoria 1° - Alienazione di beni patrimoniali	75.592.363,00	19.649.322,00	132.959.364,00
Alienazione beni mobili e diritti reali su beni immobili	33.424,00	26.164,00	0,00
Alienazione beni immobili e diritti reali su beni immobili — Sales of real estate and property rights	75.558.939,00	19.623.158,00	123.933.045,00
di cui : - aree	1.994.095,00	1.601.631,00	2.433,00
Concessione di beni demaniali	0,00	0,00	0,00
Alienazione di beni patrimoniali diversi	0,00	0,00	9.026.319,00
Categoria 2° - Trasferimenti di capitali dallo Stato	33.595.458,00	3.163.860,00	171.821.761,00
Categoria 3° - Trasferimenti di capitali dalla Regione	44.384.955,00	35.000,00	1.261.776,00
Categoria 4° - Trasferimenti di capitali da altri enti del settore pubblico	5.452.150,00	5.000.000,00	1.465.975,00
di cui : - dalle Province	5.452.150,00	5.000.000,00	1.465.975,00
Categoria 5° - Trasferimenti di capitali da altri soggetti :	246.765.541,00	228.967.540,00	18.243.608,00
Proventi per concessioni edilizie e sanzioni urbanistiche	236.977.896,00	222.311.448,00	17.438.797,00
Trasferimenti di capitale straordinari da altri soggetti	9.787.645,00	6.656.092,00	804.811,00
di cui : - da imprese	0,00	0,00	0,00
- da famiglie (eredita' e donazioni)	0,00	0,00	0,00
Categoria 6° - Riscossioni di crediti	380.430.860,00	120.992.498,00	3.473.069,00
TOTALE ENTRATE DERIVANTI DA ALIENAZIONE, TRASFERIMENTI DI CAPITALI E DA RISCOSSIONI DI CREDITI	786.221.327,00	377.808.220,00	329.225.553,00

Notes: Screenshot of the capital revenues from the financial report of the municipality of Rome in 2005. Screenshot taken from the website of the Ministry of the Interior for Certificati Consuntivi dpr 194/1996.

Table H.4: Municipal defaults (Logit, reduced specification)

	lag 1	lag 2	lag 3	lag 4	lag 5
(intercept)	-20.034***	-19.161***	-34.330	-27.407***	-22.817***
	(0.947)	(0.798)	(82.311)	(9.269)	(0.989)
Debt indicators					
debt from cash advances	0.488	0.374	0.520	0.824**	1.127**
	(0.336)	(0.305)	(0.339)	(0.411)	(0.466)
Liquidity indicators					
cash advances	0.960***	1.269***	1.269***	1.124***	1.499***
	(0.271)	(0.245)	(0.253)	(0.295)	(0.237)
surplus	-2.220***	-0.654	0.175	-0.515	-0.158***
	(0.723)	(0.471)	(0.591)	(0.317)	(0.044)
Rigidity indicators					
current expenditure	-1.997***	-1.538***	-1.027**	-0.814*	0.474
	(0.667)	(0.412)	(0.462)	(0.492)	(0.354)
Revenue management indicators					
revenue residuals	0.055	0.088***	0.111***	0.113***	0.084**
	(0.045)	(0.028)	(0.035)	(0.038)	(0.042)
readjusted revenue residuals	-0.415***	-1.927***	-0.754	-0.522	-0.141
	(0.135)	(0.460)	(0.948)	(0.665)	(0.660)
Year FE					
Region FE					
Municipalities	6,200	6,200	6,200	6,200	6,200
Observations	74,400	74,400	74,400	74,400	74,400

Notes: The columns present the coefficient estimates for Logit models predicting municipal defaults from lag one to five. See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The p-values are not adjusted for multiple tests.

Table H.5: Average financial indicators before default

	lag 1	lag 2	lag 3	lag 4	lag 5
Debt indicators					
Debt	2.83	2.68	2.40	2.52	2.43
Debt from cash advances	0.12	0.08	0.08	0.09	0.11
Liquidity indicators					
Cash advances	0.37	0.37	0.35	0.36	0.35
Surplus	-0.25	-0.03	0.09	0.04	0.03
Real estate sales	0.04	0.05	0.04	0.04	0.03
Rigidity indicators					
Personnel expenditure	0.38	0.39	0.38	0.38	0.38
Current expenditure	1.01	0.95	0.96	1.01	1.02
Grants	0.31	0.32	0.38	0.44	0.47
Revenue management indicators					
Revenue residuals	1.86	1.88	2.19	2.33	2.06
Expenditure residuals	2.04	1.89	2.10	2.28	2.04
Readjusted revenue residuals	0.79	0.84	0.90	0.91	0.93

Notes: The columns present the average value of the financial indicators for defaulting municipalities from one year (column 1) up to five years (column 5) prior to the default. See Sections 4.2 and 4.3 and Appendix I for accounting definitions and the main text for more information about the variables.

Table H.6: Data sources

Data	Source
Financial reports	MI (2023a)
Inflation rates for Italy	FRED (2023)
Demographic and other municipal level information	ISTAT (2025b)
Italian map	ISTAT (2025a)
Municipalities in financial distress	Fondazione Università Ca' Foscari (2025)

Notes: List of data sources.

Appendix I: Accounting terms

In this section, I present more formal definitions and explanations for the Italian accounting terms, following ISTAT (2012), connecting them with the terminology used in the main text. The expressions in apostrophes are personal translations from ISTAT (2012).

- Accrual
  - *Impegni* - These are commitments of expenditure for specific amounts, legal obligations of payments taken by a municipality.
  - *Accertamenti* - These are recognized revenues, representing an established right for a municipality to collect specific amounts from defined sources.
- Cash
  - *Pagamenti in conto competenza* - Payments related to expenditure commitments (*Impegni*) belonging to the same fiscal year.
  - *Riscossioni in conto competenza* - Collections related to revenue commitments (*Accertamenti*) belonging to the same fiscal year.
  - *Pagamenti in conto residui* - Payments related to expenditure commitments (*Impegni*) from prior fiscal years.
  - *Riscossioni in conto residui* - Collections related to revenue commitments (*Accertamenti*) from prior fiscal years.

Further useful terms are:

- Current expenditure (*Spese correnti*) - "The expenditure intended for the production and functioning of public service and the redistribution of income outside of productive goals."
- Capital expenditure (*Spese in conto capitale*) - "The expenditure that affects directly or indirectly public assets formation."
- Current revenues (*Entrate correnti*) - Revenues from taxes, fees, and current grants.
- Capital revenues (*Entrate in conto capitale*) - "Capital revenues are from the sales of assets and capital grants."

Appendix J: Equations

Similar to Equation (4.1), I estimate five LPM models using the default dummy (y_{it}) as the dependent variable. The covariates ($X_{1,it-j}$) are lagged accordingly, i.e., model $j = 1$ has the covariates lagged by one year, model $j = 2$ has them lagged by two years, and so forth. ϕ_r and ϕ_t represent dummies for region and year. Furthermore, the model is over yearly (t) municipal (i) observations, with standard errors clustered at the municipal level.

$$y_{it} = \beta_{0j} + X'_{it-j}\beta_1 + \phi_r + \phi_t + \epsilon_{it} \tag{4.2}$$

Chapter 5

Conclusion

This dissertation studies the behaviour of Italian municipalities between 1999 and 2015, exploring the influence of political ideologies, responses to fiscal constraints, and signals of financial distress. In particular, this research focuses on purchases and sales of municipal real estate as a means to study the allocation of public resources.

Using data on financial reports detailing revenues and expenditures of Italian municipalities, I first examine the influence of right and left-leaning political parties on purchases and sales of real estate. Estimating a Regression Discontinuity Design (RDD) on close municipal elections, the analysis does not find strong evidence for any systematic difference between the two political leanings. The study concludes that changes in real estate portfolios are inherently noisy and influenced by local needs and opportunities, which may hide a potentially small political effect.

The second study proceeds by investigating the effect of fiscal rules under Italy's Domestic Stability Pact (DSP) on municipal sales of real estate. It estimates a Difference-in-Differences (DiD) model comparing larger municipalities, targeted by the DSP, with smaller municipalities, exempted from it. The results do not find general evidence that municipalities sold real estate to fund investment while facing fiscal constraints. At the same time, the results also suggest that municipalities strategically sold real estate to comply with the fiscal rules. However, the skewed distribution of the outcome variable and the sensitivity of the estimates warrant caution in the interpretation of these results.

The last study examines the dynamics of Italian municipal defaults based on financial indicators commonly reported in default declarations. The analysis estimates five Logit models capturing relationships up to five years prior to the default. The results indicate

that defaulting municipalities rely more often on short-term borrowings and accumulate outstanding revenues for several years before default. Moreover, in the few years prior to the default, defaulting municipalities write off a larger share of the outstanding revenues compared to solvent municipalities. Together, these findings illustrate the dynamics of defaulting municipalities at early and late stages of financial distress.

Overall, these studies provide a picture of municipal behaviour under administrative autonomy, fiscal constraints, and financial accountability. Particularly, they investigate the allocation of public resources such as municipal real estate, a topic left relatively unexplored by the economic literature. While local political parties seem to play a secondary role in the management of real estate portfolios, compliance with fiscal rules appears to be an influential factor. At the same time, these findings cast doubt on the ability of municipalities to rely on their own resources to maintain their investment levels when facing fiscal constraints.

By examining the dynamics of defaulting municipalities, the dissertation provides insightful information on early and late signals of financial distress. Collectively, these findings can aid policymakers in forming expectations around municipal behaviour under fiscal and financial pressure. These results can prove helpful to policymakers developing polices such as the transfers of real estate from higher levels of government or fiscal constraints. Particularly, permitting extraordinary revenues such as the sale of real estate to count towards compliance could lead municipalities to reduce their expenditure reduction efforts, but also provide tools to cope with the rigidity of fiscal rules.

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