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Spatial patterns and local banks' tax behavior: an empirical analysis in Italy

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Abstract

In this study, we consider the spatial dependence effects in an empirical model measuring local banks' tax behavior, assessing the interdependence between geographical units and the related spillover effects. Our results strongly support the existence of co–movements among banks' tax avoidance policies. The findings rely on the assumption local banks compete mainly among themselves, even on the funding side, and therefore unfair tax behavior can trigger loss of customers, which limits banks' tax avoidance activities. However, neighbors' adoption of opportunistic tax strategies can remove the competition hurdle in pursuing tax avoidance policies. Our findings point out a virtuous effect of customer pressure, which could take effect in other areas of bank management.

Keywords: Tax Behavior, Spatial Dependence, Small Cooperative Banks, Lerner Index

1. Introduction

In the last decade, firm tax behavior has been a matter of growing interest, not only for academic researchers and policy makers (Chen and Lin, 2017; Wilde and Wilson, 2018; Kovermann and Velte, 2019; Baudot et al., 2020) but also for the general public via media reports (Kanagaretnam et al., 2018). In particular, tax avoidance refers to all tax planning practices, legal or otherwise, undertaken in order to minimize tax payments (Frank et al.,

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2009; Hanlon and Heitzman, 2010). Terms such as tax management or tax aggressiveness can also be used to describe the same issue (e.g., Hanlon and Heitzman, 2010; Lanis and Richardson, 2012).

Although scholars have often studied tax–planning strategies in manufacturing industries (e.g., Rego and Wilson, 2012; Chyz et al., 2013; Kim and Zhang, 2016; Balakrishnan et al., 2019), more work is needed to characterize tax planning behavior in the banking industry (see Gawehn and Müller, 2019; Gawehn, 2019, Shackelford and Shevlin, 2001 for a call for research on this topic).

Specifically, despite the well–documented relevance of tax planning in the banking industry and the appeal of an empirical explanation, few studies directly explore whether and how neighboring local banks can impact each other's tax behavior. Local banks play an important role in an economy and have distinct characteristics in terms of institutional goals, regulation, types of customers. Damberg et al. (2022) find that given the cooperative nature of these institutions, the cooperative banks' reputation plays a key role in determining banks' financial practices.

In this study, we try to fill this gap by compiling a unique panel dataset of Italian small cooperative banks (Credit Cooperative Banks – CCBs) and examining their tax burden in terms of the tax strategy of nearby banks, under the assumption that CCBs customers are concerned about banks' adherence to business ethics rules.

Previous studies have investigated banks' overall reaction to taxation, highlighting a dynamic response to tax rate differentials by profit–shifting strategies (Meeks and Meeks, 2014; Merz and Overesch, 2016; Schandlbauer, 2017; Janský et al., 2020).

An extensive literature argues banks might be less inclined to engage in aggressive tax avoidance strategies compared to non–financial firms due to the broad control of banking supervision and regulation – and the related enforcement power of supervisors (e.g., Graham et al., 2014; Dyreng et al., 2016; Boyer and Kempf, 2020). If unsound or illegal practices are detected, regulators are empowered to enforce sanctions by requiring adequate remedial actions and imposing safe practices, thereby preventing reputational losses and guaranteeing solidity in the banking industry (Pereira et al., 2019).

Actually, reputational concerns could affect local banks fiscal strategy, since such banks constitute a unique universe within the banking system. Local banks compete mainly among themselves, serving the niche markets of households and micro and small enterprises (De Masi and Gallegati, 2012; Coccorese et al., 2016; Yosano and Nakaoka, 2019) and representing high retail funding stability, even in economic downturn periods (McKillop et al., 2020). Additionally, since local banks are often cooperative, the owners and depositors usually correspond, avoiding the agency problems between shareholders and depositors. This scheme explains why cooperative banks fund via deposits. Besides, the low reliance on market capital for funding entails high dependence on depositors to collect financial resources (Ayadi et al., 2010). Consistent with the high commitment of local banks in funding with deposits, Hannan and Prager (2006), Beyhaghi et al. (2014), and Jacewitz and Pogach (2018) showed that the largest banks pay significantly lower interest rates for funding from deposits products. Recently, Sedunov (2020) argued that smaller financial institutions pay greater attention than large banks to their customers' degree of satisfaction. This finding confirms the results of the Wave 24 Chicago Booth/Kellogg School Financial Trust Index Survey, which showed that households trust local banks more than large national banks.[1]

As a result, the market structure of local banks highlights the non–tax costs of fiscal choices, in particular the reputational risk, which the literature has introduced as a key factor in explaining firm tax management (Chen et al., 2010; Allen et al., 2016).[2] Corporate reputation is one of the most important intangible assets leading corporate performance (Gibson et al., 2006). Despite significant scholarly debate (Barnett and Pollock, 2012), firm reputation is intended to reflect the expectations that stakeholders have about a corporation's future behavior based on their sense of its past conduct (Deephouse and Carter, 2005; Carroll, 2013). But reputation also denotes an accountability system, one that constituents have notable control over as a form of social assessment (Lange et al., 2011). Consequently, negative (positive) reputational influences generate economic sanctions (rewards) for the entities (Cable and Graham, 2000; Brammer and Pavelin, 2006). Additionally, the research on corporate accountability has expanded traditional discussions on social responsibility to wider stakeholders (Freeman, 2010), incorporating civic accountability towards the citizens of the country in which the enterprise operates, particularly through taxation (Christensen and Murphy, 2004; Russell and Brock, 2016; Payne and

[1] See the following website for more information: `http://www.financialtrustindex.org/resultswave24.htm`.

[2] The literature also includes disclosure and agency costs within non–tax costs (Garbarino, 2011). The former are linked with communication on tax matters, specifically the description of corporate tax policies alongside their adequate exposure (Erle, 2008). The latter are the agency costs accompanying tax planning activities. Managers might hide rent extraction via tax management when the two actions are complementary. This might, however, produce significant agency costs for shareholders (Laguir et al., 2014).

Raiborn, 2018). Hanlon and Slemrod (2009) argued that revealing aggressive tax management activities might even lead to customer boycotts, which might provide sufficient incentive to renounce tax avoidance possibilities in order to support current revenues.

One of the main principles that shapes the structure of Italian CCBs and distinguishes them from shareholder–based banks is that they serve the interest of their members, who are also their customers, and aim to reach pre–established economic and social goals. Bank members are generally located in the areas where these banks have their headquarters or branches, and their membership is also concentrated at a local or regional level, satisfying the financial needs of members, small firms, and community groups (Barra and Zotti, 2019; Botta et al., 2020). Furthermore, cooperative banks use a democratic guideline (one head, one vote), 70% of the bank's profit must be held as reserve, and no shareholder is permitted to own shares valued higher than 50,000 euros (Coccorese and Ferri, 2020). In terms of tax treatment, it complies with cooperative taxation rules, which are more favorable from those applicable to commercial banks.[3]

The influence of local conditions underlines how the banking environment can strongly influence the tax behavior of a small bank. A bank's tax behavior might likewise be influenced by the tax conduct of the neighboring banks. Consistent with the prediction that bank tax behavior is essentially affected by its reputational position among customers with respect to their

[3] 90 percent of profits earned by prevailing mutual purposes cooperatives devoted to legal reserves and social funds (70 percent of total profits in the case of CCBs) are state–tax exempt (corporate income tax, or IRES), but CCBs do not receive preferential tax treatment under regional taxation, or IRAP, which has a broader tax base than the IRES.

competitors (that is, nearby banks), we first use a spatial econometrics approach to empirically investigate Italian local banks' co–movements in tax choices. This spatial technique allows us to assess if a bank's tax behavior is affected by the tax strategy of the neighboring banks, and therefore considers the possible reputational risk effect of adopting tax avoidance policies.

The possible negative reputational effects of tax avoidance for a local bank might discourage it from undertaking such a strategy, but that hesitance could vanish as more direct competitors practice tax management. In fact, the tax choices of nearby banks can significantly affect a given bank's tax policies, as a result of the trade–off between the effects of tax management strategies on banks' cash flows and on their reputations. In this respect, bank customers might punish a tax avoidance initiative as they become increasingly aware of corporate tax conduct (Graham et al., 2014).

We proxy the cooperative banks' tax behavior via their effective tax rates (see most recently Chen et al., 2020; Fatica and Gregori, 2020; Ortas et al., 2020). Our results indicate that spatial dependence has a strong effect on the tax management of Italian small cooperative banks, even after controlling for bank competition. We carry out several tests in order to detect the presence of spatial dependence in the data, showing a strong existence of co–movement in the banks' tax policies. These results validate the adoption of spatial econometrics techniques, which we conduct along four different distance ranges, inside of which other local banks are considered competitors. The subsequent spatial regressions allow us to observe a significant and positive relationship between a local bank's tax behavior and the neighboring banks' tax behavior, for all the distance ranges considered in the spatial techniques.

The remainder of the paper is organized as follows. Section 2 shows the data and variables used in our empirical specification, and discusses the spatial econometrics techniques. Section 3 presents and debates the diagnostic tests to control for the presence of spatial correlation and random effects in our dataset, as well as the empirical estimation of the model. Finally, Section 4 offers some final remarks and concludes the paper.

2. Data, methodology, and variable definitions

2.1. Data and Empirical Model

To conduct our empirical investigation, we utilize a set of panel data over the 2011–2018 period for 259 CCBs with 2,072 observations.[4] The dataset come from two several sources: Bureau van Dijk Orbis–Bank Focus' (BvD Orbis) database for the banks' balance sheet information[5] and ISTAT for the local macroeconomic indicators at the provincial level.[6] In order to geo–reference the individual observations for building the geospatial dataset, we geocoded the address of each CCB's headquarters using the latitude and longitude geographic coordinates. Figure 1 exhibits the geographical distribution of the CCB's headquarters.

[Figure 1 about here]

To investigate the determinants of the cooperative banks' tax behavior, we apply a Time–Space Dynamic (TSD) model (Anselin et al., 2007) via the

[4]Since the econometric model requires a strongly balanced panel dataset, we removed all the banks that do not report data for the whole spanning period considered.

[5]The missing values have been replenished by consulting the balance sheets that the CCBs published online.

[6]See http://dati.istat.it/index.aspx?lang=en&SubSessionId=a9642c15-9337-4a9b-8088-914ee0947dfd.

System Generalized Method of Moments (SYS–GMM) dynamic estimator (as in Bouayad-Agha and Védrine, 2010; Bouayad-Agha et al., 2013; Cainelli et al., 2014; Segura III, 2017; Donfouet et al., 2018). The SYS—GMM specification empirical model is estimated using Windmeijer's (2005) finite sample correction and forward orthogonal deviation (FOD) transformation, which takes the following form:

$$\begin{aligned}
Tax\ Behavior_{i,t} = \alpha + \varrho Tax\ Behavior_{i,t-1} \lambda \sum_{j=1}^{n} \widetilde{w}_{ij} \cdot Tax\ Behavior_{j,t} \\
+ \zeta \sum_{j=1}^{n} \widetilde{w}_{ij} \cdot Tax\ Behavior_{j,t-1} + \vartheta Lerner_{i,t} \\
+ \varphi Post\text{–}Sanction_{i,t} + \gamma Employees_{i,t} \\
+ \phi Loan\ to\ Assets_{i,t} + \kappa \Delta GDP_{i,t} + (\eta_i + \epsilon_{i,t})
\end{aligned} \tag{1}$$

$$i = 1 \ldots N; \quad t = 1 \ldots T$$

where α is the constant term, ϱ, λ, and ζ are the time, spatial and spatial–lagged terms, while ϑ, φ, γ, ϕ and κ are the coefficients of the others explanatory variables. Finally, $(\eta_i + \epsilon_{i,t})$ represents the disturbance term expressed as sum of two components: the fixed effects η_i and random error $\epsilon_{i,t}$.[7]

The global stationarity condition requires that the serial, spatial, and spatial–time autoregressive parameters (ϱ, λ, and ζ) have a value smaller than one, both individually and as a total; otherwise, a unit root issue may occur.[8]

[7]The random error is assumed to be normally distributed with zero mean and unit variance.

[8]For further information on estimating the unit root in the SDPD model, see Yu and

2.2. Measure of Tax Behavior

The dependent variable is represented by *Tax Behavior*, an indicator of tax choice based on effective tax rates (ETRs). ETRs denote a measure of the relative tax burden between corporations and are usually measured via the information drawn from financial statements as tax liability divided by income (Hanlon and Heitzman, 2010; Jarboui et al., 2020; Drake et al., 2020.)

Since ETRs compare the current tax liability, gathered by taxable income and earnings before tax (pre–tax income) on the basis of the generally accepted accounting principles (GAAP), they are designed to measure the corporation's ability to reduce its current tax liability relative to its pre–tax accounting income (Rego, 2003).

The use of this variable is also motivated by the fact that considering the difference between accounting (book) income and tax income, accounting profit might not constitute the effective chargeable income of a firm (Derashid and Zhang, 2003). Following conventional scholarship (e.g., Gupta and Newberry, 1997; Lanis and Richardson, 2012; Laguir et al., 2015), to improve the robustness of our empirical investigation we use two measures of ETRs. The first one (*ETR1*) is calculated as the ratio between total tax expense and pre–tax income, while the second (*ETR2*) is defined as total tax expense divided by operating cash flows. The higher the value of ETR is, the lower the tax avoidance level will be, and the lower the ETR is, the greater the tax avoidance level will be.

Lee (2010).

2.3. Spatial Autoregressive Parameters

Spatial econometrics techniques use Tobler's first law of geography (Tobler, 1970) to track the relationships between spatial units located in different territorial areas by including spatial interaction (spatial autocorrelation) and spatial structure (spatial heterogeneity) into econometric models (Anselin, 2003; Elhorst, 2014).[9]

The Spatial Dynamic Panel Data (SDPD) model (Elhorst, 2005, 2010, 2014; Lee and Yu, 2010a,b; Ho et al., 2013; Shi and Lee, 2017; Hory, 2018; Jeong and Lee, 2020) in Equation (1) incorporates the spatial and spatial–time lagged dependent variables of *Tax Behavior*, which are calculated using a spatial weight matrix $\boldsymbol{W}$. In particular, the general TSD model is as follows:

$$\mathbf{y}_t = \boldsymbol{\tau}\mathbf{y}_{t-1} + \boldsymbol{\iota}\boldsymbol{W}\mathbf{y}_t + \boldsymbol{\rho}\boldsymbol{W}\mathbf{y}_{t-1} + \mathbf{z}_t\boldsymbol{\beta} + \boldsymbol{\varepsilon}_t \tag{2}$$

where $\mathbf{y}_t$ and $\mathbf{y}_{t-1}$ are the dependent variable vector and its lagged term, $\boldsymbol{W}\mathbf{y}_t$ and $\boldsymbol{W}\mathbf{y}_{t-1}$ are the vector of the contemporaneous and non–contemporaneous spatial variables, where $\boldsymbol{W}$ is the spatial weight matrix, $\mathbf{z}_t$ is the matrix of the covatiates, and $\boldsymbol{\varepsilon}_t$ is the vector of idiosyncratic errors. Lastly, $\boldsymbol{\tau}$, $\boldsymbol{\iota}$, $\boldsymbol{\rho}$ and $\boldsymbol{\beta}$ are unknown vector parameters to be identified. To construct $\boldsymbol{W}\mathbf{y}_t$ and $\boldsymbol{W}\mathbf{y}_{t-1}$, as well as the spatial model, a well–balanced dataset is required (Chi and Zhu, 2019).

The spatial weighting matrix $\boldsymbol{W}$ depicts the main component for spatial analysis, taking into account the cross–sectional interdependence of spatial units with respect to $\mathbf{y}_t$ (Anselin, 1988). More particularly, denoting n as

[9] Spatial autocorrelation is a term used to describe spatial connections, however it is merely a weak expression of spatial dependence (Anselin, 2003).

the set of all the cross–sectional units, the spatial weight matrix $\boldsymbol{W}$ is a non–stochastic, fixed, and non–negative $n \times n$ matrix with zero on the diagonal by definition (Cliff and Ord, 1968; Kelejian and Prucha, 2010), since no spatial unit is spatially connected with itself; therefore, $w_{ii} = 0 \ \forall \ i = 1, \ldots, n$. The matrix $\boldsymbol{W}$ indicates a spatial weighting scheme capturing the spatial relationship (autocorrelation) framework between pair of units, such that each element $(w_{ij} : i, j = 1, \ldots, n)$ takes the following properties:

(i) $w_{ij} \neq 0$ if i and j are spatially correlated;

(ii) $w_{ij} = 0$ if i and j are spatially uncorrelated.

To structure the geographical connections across CCBs' tax behavior, we use a distance–weighted matrix in which a set of weights takes into account banks distance. In more detail, we follow Tabak et al.'s (2013) maximum likelihood approach to determine the weights of $\boldsymbol{W}$, where each element w_{ij} represents a continuous, monotonic decreasing function of the Euclidean distance between points i and j (Fotheringham et al., 2003). Formally, the values of w_{ij} are defined as follows:

$$w_{ij} = \frac{e^{-\left(\frac{d_{ij}}{\sigma}\right)^2}}{\sigma\sqrt{2\Pi}} \tag{3}$$

where d_{ij} is the orthodromic distance (in kilometers) between spatial units i and j, and σ is a distance–decay parameter (bandwidth) that begets a decrease of influence with increasing distance.

Changing the bandwidth produces several profiles of exponential decay and generates spatial weights ranging more or less quickly over space. Therefore, given increasing distance between units i and j, the weighting of other data will diminish according to a distance–decay curve (Fotheringham et al., 1998).

The weight w_{ij} approaches zero for the units farthest from i. Such spatial matrix specification, permitting structural dependence in behavior, is particularly suitable for our study, as the distance–decay parameter σ offers an inspection of the circular area of influence in each observation. In order to normalize the influence on each spatial data, the weight matrix $\boldsymbol{W}$ is row–standardized, that is, each row sum is equal to 1.

Formally, the normalized non–negative weights can be expressed as follows:

$$\tilde{w}_{ij} = \frac{w_{ij}}{\sum_j w_{ij}} \tag{4}$$

where w_{ij} is specified in (3) and $\sum_j w_{ij}$ is the sum of w_{ij} for each row of the matrix $\boldsymbol{W}$ (not standardized).

In the panel data framework, the exogenous $nt \times nt$ spatial weights matrix, under the hypothesis of constant distance, is given by:

$$\boldsymbol{W}_{nt} = \boldsymbol{I}_t \otimes \boldsymbol{W}_n \tag{5}$$

where $\boldsymbol{I}_t$ is an identity matrix of dimension t and $\boldsymbol{W}_n$ is the row–normalized spatial weight matrix of size n.[10]

The spatially lagged term, which captures the influence of the neighborhood, is computed by multiplying the dependent variables (*ETR1* and *ETR2*) by four different spatial weighting matrices. In detail, we make use of spatial matrix $\boldsymbol{W}$ with four dispersion parameters expressed in kilometers

[10] For further information, see Anselin et al. (2007).

(km):

(1) $\sigma = \text{Minimum}(d_{ij}) = \sigma_1$

(2) $\sigma = 0.01[\text{Maximum}(d_{ij})] = \sigma_2$

(3) $\sigma = 0.02[\text{Maximum}(d_{ij})] = \sigma_3$

(4) $\sigma = 0.5[(\sigma_1 + \sigma_5)] = \sigma_4$

where σ_1 (equal to 3.6 km) constitutes the minimum distance so that each bank has at least one neighbor, σ_2 (equal to 13.37 km) indicates the 1% of the maximum distance between two CCBs (1336.6 km), σ_3 (equal to 26.73 km) represents 2% of the maximum distance, and σ_4 (equal to 68.63 km) corresponds to the average between σ_1 and σ_5 (i.e., 10% of the maximum distance).

2.4. Control Variables

In Equation (1), we include other variables used as control variables. More specifically, the second variable constitutes a measure of market power of banks proxied by the Lerner index. The third one indicates the supervisory enforcement actions (EAs) against banks. Finally, other bank–specific determinants are included as control variables.[11]

In order to define the measure of the cooperative bank market power, we consider the Lerner Index (Lerner, 1934) commonly used in the conventional banking literature (e.g., Ariss, 2010; Weill, 2013; Fernández et al., 2016; Ahamed and Mallick, 2017; Leroy and Lucotte, 2019; Shaffer and Spierdijk, 2020). It captures the degree to which a bank can boost its marginal price

[11] We tested for multicollinearity among the explanatory and control variables by calculating their variance inflation factors (VIFs, Neter et al., 1989). The mean VIF is equal to 1.05 for both specifications and the highest VIF equals 1.11.

beyond its marginal cost (Berger et al., 2009). The higher (lower) the value of the index is, the greater (lower) the bank's market power is— and the greater the market power, the higher the price compared to the marginal cost.

Formally, the Lerner index of monopoly power is constructed as follows:

$$Lerner_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}} \tag{6}$$

where $P_{i,t}$ is the output price of bank i at time t and $MC_{i,t}$ is the total marginal cost. If the value of *Lerner* is equal to zero, it denotes perfect competition (i.e., the bank has no market power), while if the index value is equal to unity, it indicates a monopoly.

Following recent literature (e.g., Carbó et al., 2009; Fiordelisi and Mare, 2014; Coccorese and Santucci, 2020; Degl'Innocenti et al., 2020; Coccorese and Ferri, 2020), the bank price $P_{i,t}$ is calculated as total revenue (interest plus non–interest income) divided by total assets. The marginal cost $MC_{i,t}$ is computed from a standard translog cost function with a single output (total assets) and three input prices (labor, physical capital, and deposits). The bank's cost function is specified as follows:

$$\begin{aligned} lnC_{i,t} &= \theta_0 + \theta_1 lnQ_{i,t} + \frac{1}{2}\theta_2 lnQ_{i,t}^2 + \sum_{k=1}^{3}\psi_k lnP_{k,i,t} \\ &+ \frac{1}{2}\sum_{k=1}^{3}\sum_{j=1}^{3}\tau_{k,j} lnP_{k,i,t} lnP_{j,i,t} + \frac{1}{2}\sum_{k=1}^{3}\delta_k lnQ_{i,t} lnP_{k,i,t} \\ &+ (u_{i,t} + v_{i,t}) \end{aligned} \tag{7}$$

where $C_{i,t}$ stands for the total cost (i.e., total operating expenses), Q is the total assets, P_1 is the price of labor (staff expenses divided by total assets),

P_2 is the price of capital (other administrative expenses plus other operating expenses on total fixed assets), P_3 is the price of borrowed funds (interest expenses over bank funding), θ, ψ, τ as well as δ are unknown parameters to be identified, and $(u_{i,t} + v_{i,t})$ is the decomposition of the error term. That is, the two–sided error term, $v_{i,t}$, means the statistical noise i.i.d. as $N(0, \sigma_v^2)$, the one–sided error term, $u_{i,t}$, catching the actual cost inefficiency term shaped as a truncated non–negative random variable $N^+(0, \sigma_u^2)$.

Once we derive the parameters from the estimation of the cost function, the marginal cost for each bank i at time t is computed via the partial derivatives of Equation (7) with respect to the bank output Q. Formally:

$$\begin{aligned} MC_{i,t} &= \frac{\partial C_{i,t}}{\partial Q_{i,t}} = \frac{\partial lnC_{i,t}}{\partial lnQ_{i,t}} \frac{C_{i,t}}{Q_{i,t}} \\ &= \left(\hat{\theta}_1 + \hat{\theta}_2 \, lnQ_{i,t} + \sum_{k=1}^{3} \hat{\delta}_k \, lnP_{k,i,t} \right) \frac{C_{i,t}}{Q_{i,t}} \end{aligned} \tag{8}$$

Consistently with previous studies adopting Lerner index to investigate CCBs market power effects (see, e.g., Fiordelisi and Mare, 2014; Clark et al., 2018; Coccorese and Ferri, 2020) and in coherence with the extent of our analysis, we evaluate market power based only on CCBs. As a result, the index measures competition within the CCB market segment, rather than across the entire banking industry.

To catch the influence of the EA on tax behavior, we determine a dummy (binary) variable, *Post–Sanction*, similarly to Roman (2020). It assumes a value of one for the years after the enforcement actions (sanctions) carried out by the bank supervisors, and zero otherwise.[12] The possible effect on the

[12] For a focus on EAs, see the recent studies by Caiazza et al. (2018) and Pereira et al. (2019).

CCBs tax behaviour is uncertain. Indeed, on the one hand, being sanctioned by the bank regulator should encourage bank management to be more tax law compliant. On the other hand, during the year in which the penalties are assessed, bank management accounts for the impaired loans revealed by the supervisor's report, resulting in losses that reduce the bank's fiscal burden in subsequent years.[13]

Finally, we consider several other bank–specific control variables. *Employees* denotes the number of employees for each bank and is used as a proxy of bank size (Tran et al., 2019). It controls for the economies of scale in terms of tax planning (Rego, 2003). *Loan to Assets* is a financial ratio that measures the net loans outstanding as a percentage of total assets. It is a proxy of the bank's asset risk and liquidity (Hanif et al., 2012). The higher the ratio is, the higher the degree of bank involvement in traditional activities is. ΔGDP represents the growth of real gross domestic product (GDP) per capita and is used to capture the effects of the economic performance at the provincial level (Zeng, 2019).

Table 1 reports the set of the variables used in this analysis as well as their detailed description and the data sources, whereas Table 2 shows the descriptive statistics of all the covariates employed in our benchmark model specification.

[Table 1 and Table 2 about here]

The dependent variables and the *Lerner* have been winsorized by limiting

[13] CCBs are often sanctioned because of weaknesses in their credit decision process. In our sample, more than the 70% of the fines imposed by supervisors are related to deficiency of the banks in their procedure for granting credit.

extreme values at 1 percent. Although the CCBs pursue mutual purposes, they have tax burden weight of about 21 percent of bank profit and 7 percent of operating cash flow. The high standard deviation for these two variables shows instances of taxation quite similar to profit–oriented companies. It is worth noting that our sample also includes CCBs with negative *ETR1* (140 cases) and *ETR2* (234 cases). Unlike in the empirical literature on firms' tax behavior, we keep these negative values, both because excluding just one year entails removing the banks from the dataset and because our dataset covers a period of severe economic downturn for Italian economics that caused losses for the banks. In addition, the panel structure of our dataset allows us to treat potential fiscal planning strategies from banks.[14] The remaining control variables present summary statistics similar to previous studies referring to Italian CCBs (e.g., Becchetti et al., 2016). Turning to the correlation matrix, the coefficients do not suggest multicollinearity issues among the variables.

3. Results and Discussion

In order to validate the use of spatial econometrics techniques, we ran three groups of Lagrange Multiplier (LM) tests to bring out the presence of serial correlation, spatial autocorrelation, and random effects in our data. Disregarding spatial dependence leads to inconsistent and misleading estimates (see Anselin and Florax, 1995; Bai and Kao, 2006; Kutlu and Nair-

[14]Indeed, the landmark paper of Zimmerman (1983), often cited to remove firms that present a negative value for tax avoidance proxy, is founded on a rationale that refers to cross–sectional data. In addition, its analysis does not hold for banks due to the actions of the banking supervisory.

Reichert, 2019).

Table 3 shows all the diagnostic tests.

[Table 3 about here]

The first group of LM tests verifies the existence of co–movement between units. The null hypothesis points out that the coefficients of spatial error autocorrelation and spatial lag autoregressive are equal to zero (Breusch and Pagan, 1980; Anselin, 1988). Thus, rejecting the null hypothesis enables us to infer the presence of spatial dependence. The result of the tests rejects the latter hypothesis.

The second set of diagnostic tests control for the presence of both spatial autocorrelation and random individual effects, via the joint and conditional LM tests proposed by Baltagi et al. (2003). The results of the tests denote that the null hypothesis of no spatial autocorrelation and no random effects is rejected for all the specifications of the test. In particular, the joint LM test claims that at least one factor, such as spatial autocorrelation and/or random effects, is present in the error term. Analogously, such spatial items are tested separately using the marginal LM tests. Test results reject the null hypothesis, confirming both the spatial autocorrelation and random effects.[15] Moreover, to reiterate the presence of spatial correlation and random effects, we also ran the conditional LM tests. In these cases as well, the test results reject the null hypothesis, showing the presence of both spatial autocorrelation and random individual effects.

The last range of tests, developed by Baltagi et al. (2007), check for serial

[15]Spatial autocorrelation is tested to enable the existence of random effects, and random individual effects are tested to allow the presence of spatial autocorrelation.

correlation, spatial autocorrelation, and random individual effects jointly and conditionally. These tests represent an extension of the earlier LM tests suggested by Baltagi et al. (2003). In particular, the joint LM test verifies the presence of serial, spatial correlation and random effects, whereas the conditional LM tests allow to derive the existence of each individual component, permitting the presence of the other two. The test results reject the null hypothesis, thus highlighting the presence of serial correlation and providing, once again, evidence of the existence of spatial correlation and random effects.[16]

All the tests mentioned so far are tied to the spatial matrix taken into consideration. Therefore, following several studies (e.g., Kar et al., 2011; Sarafidis and Wansbeek, 2012; Millo, 2017; Yang, 2021; Elhorst et al., 2020), we also ran, as a robustness check, the cross–sectional dependence (CD) tests proposed by Pesaran (2004) and Pesaran (2015) to reiterate interaction among panel units. Such tests check, respectively, for strong and weak cross–sectional dependence; that is, as stressed by Chudik et al. (2011) and Vega and Elhorst (2016), for unobserved common factors (strong cross–sectional dependence) and spatial dependence (weak cross–sectional dependence). Table 4 reports test the results and exhibits the presence of both strong and weak cross–sectional dependence.

[Table 4 about here]

[16] All the LM diagnostic tests were computed using the package splm written by Millo and Piras (2012). The test results reported in Table 3 are estimated by making use of the spatial weighting matrix $\boldsymbol{W}$ with the minimum bandwidth. These tests were also estimated using the other three matrices; however, since they show the same picture, we did not report them to save space. They can be supplied on request.

Tables 5 and 6 report the empirical estimates of the TSD regression model specified in Equation (1) for both the tax avoidance proxies, along with the results of the non–spatial model.

[Table 5 and Table 6 about here]

The empirical estimations present statistically significant results for both the two dependent variables and the distance–decay parameters.

The results of our estimates for both measures of ETRs show persistence in cooperative banks' tax planning strategies, as the coefficients of the time–lagged dependent variables are positive and statistically significant. Thus, the CCBs' tax policies tend to not change over time.

Before discussing the evidence for our estimated spatial effects, it must be noted that the CCBs operate in the same fiscal jurisdiction, which implies that they share many tax policies at the corporation level in common. This effect conditions our estimations on two profiles. In more detail, the neighboring effects do not disappear, even for the farthest distance decay parameter considered in our specifications (68.63 km), meaning that even for large distances, neighbor effects persist. Additionally, our models perform better in explaining the within–firm effects over time rather than the variation between banks.

Tables 5 and 6 report the estimation results of the TSD models to determine if a spatial model is more appropriate for estimation. We find that neighbors' tax behavior positively affects the i_{th} CCB tax management for the two proxies adopted and along the four dispersion parameters, with a statistical significance of 5% or less for the two spatial and spatial–temporal terms. Therefore, the neighboring CCBs' tax behavior matters in defining the fiscal strategy: as the nearby banks adopt tax avoidance behavior, the

i_{th} CCB tends to favor this behavior, and vice versa.

This effect could be charged to reputational concerns that arise for a local bank pursuing benefits that stress tax management strategies. In the niche market of local banks, depositors could impose a kind of market discipline by penalizing opportunistic fiscal behavior for a specific bank. Thus, firm tax behavior in a given area is determined by the characteristics of the area, but is also influenced by the characteristics of neighboring banks (e.g., Frank et al., 2009; Chen et al., 2010; Coccorese et al., 2016; Chen and Lin, 2017).

Tables 5 and 6 also show that the statistical and positive coefficients for the variable *Lerner* imply that less market competition reduces the tax avoidance strategies. Therefore, the monopoly rent decreases the incentive to use tax management behaviors. Although the relationship between bank competition (or market power) at the bank level and tax management strategies has not been sufficiently examined yet, similar results have been found for the firms market (e.g., Cai and Liu, 2009; Wang, 2012; Brown and Drake, 2014): more market competition stimulates greater tax avoidance behaviors.

The coefficients for the dummy variable *Post–Sanction* are not statistically significant for both the tax behavior proxies. Therefore, the sanctioned CCBs do not adopt different tax behaviors in the years after an administrative procedure.[17]

With regard to the effects of the size proxy (*Employee*) on tax behavior, we detect that the larger CCBs have greater possibilities to perform tax management strategies. Such effects concur with previous studies (e.g.,

[17] In separate specifications, we tested the effect of the sanction in the same year, but it was never significant.

Zimmerman, 1983; Rego, 2003; Hanlon et al., 2005; Kraft, 2014; Taylor and Richardson, 2013; Richardson et al., 2015) showing a significant positive relationship between company size and tax behavior.

The positive and statistically significant connection between *Loan to Assets* and both the dependent variables could reflect the reduced aptitude of the lending activities in fostering tax management from banks. On the contrary, more involvement in non–credit investments increases the tax avoidance activities. Finally, the negative and significant effects of the growth rate of GDP at the provincial level suggests that CCBs follow a cyclical pattern.

Finally, both specifications employ instruments for a total of less than one–fifth of the total number of groups, and the Hansen test statistic confirms the validity of these instruments. Additionally, by using Arellano–Bond first and second–order autocorrelation tests (AR–1 and AR–2), it is shown that the AR–1 null hypothesis is rejected whereas the AR–2 null hypothesis is not. With regard to the global stationarity condition, the sum of the coefficients incorporating serial, spatial, and spatial–time effects is less than one, excluding potential unit root concerns.

4. Conclusions

In this study, we applied a spatial econometrics approach to analyze the tax behavior of Italian small cooperative banks, proxied by two effective tax rates measures. Indeed, the economic and demographic disparities between Italian regions make CCBs an appropriate laboratory for testing the hypothesis that spatial dependency influences small banks' tax choices.

Our empirical results provide strong evidence regarding the existence of spatial autocorrelation in the tax avoidance variable of Italian CCBs. Including a spatial operator in the specification explaining local banks' tax behaviors improves its explanatory performance, which otherwise suffers from an omitted variable bias.

The spatial panel regression models show a positive and significant effect regarding the influence of the neighborhood on the tax management policies of small cooperative banks, along the dispersion parameters adopted. We interpret this result as evidence of the existence of reputational concerns that restrict small cooperative bank management in following tax avoidance policies. In our view, cooperative banks compete primarily among themselves, and spreading rumors about the opportunistic tax practices of a specific bank could induce its customers to withdraw deposits, thereby creating a kind of moral suasion against the adoption of such policies. Thus, tax–benefit strategies are pursued only under the condition of similar behaviors from their competitors, implying that the CCBs act as a network in their tax planning practices. In other words, the high expectations of the CCBs' customers regarding their bank's compliance with business ethics impose a constraint that appears to influence the CCBs' managerial decisions regarding tax avoidance behavior. We believe that this effect is less widespread among non–cooperative bank consumers, who have low expectations of profit–oriented institutions.

Additionally, we also find that a CCB's market power reduces its tax avoidance practices. Lower competition improves the capital structure of CCBs, discouraging bank management from pursuing tax avoidance practices. To put it plainly, we propose an explanation for the empirical evidence that is analogous to the competition–stability view (see, e.g., Boyd and De Nicolo, 2005; Fiordelisi and Mare, 2014; Berger et al., 2019), according to which greater market power ensures higher profit, lowering bank risk. Finally, administrative sanctions do not affect the CCBs' tax incidence.

Overall, the empirical results in this paper, highlighting the importance of considering the spatial co–movements of local banks for their tax planning activities, open avenues for further research in a cross–country context. Our empirical investigation has some limitations. Indeed, since we consider only small cooperative banks because of the unique relationship they have with their customers, our findings cannot be generalized to profit–oriented institutions, as their customers have lower expectations for the bank's implementation of opportunistic behaviors. Moreover, the lack of infra–annual data impairs the accuracy of the analysis regarding the tax strategies of local banks.

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Figure 1: Spatial distribution of Italian CCBs

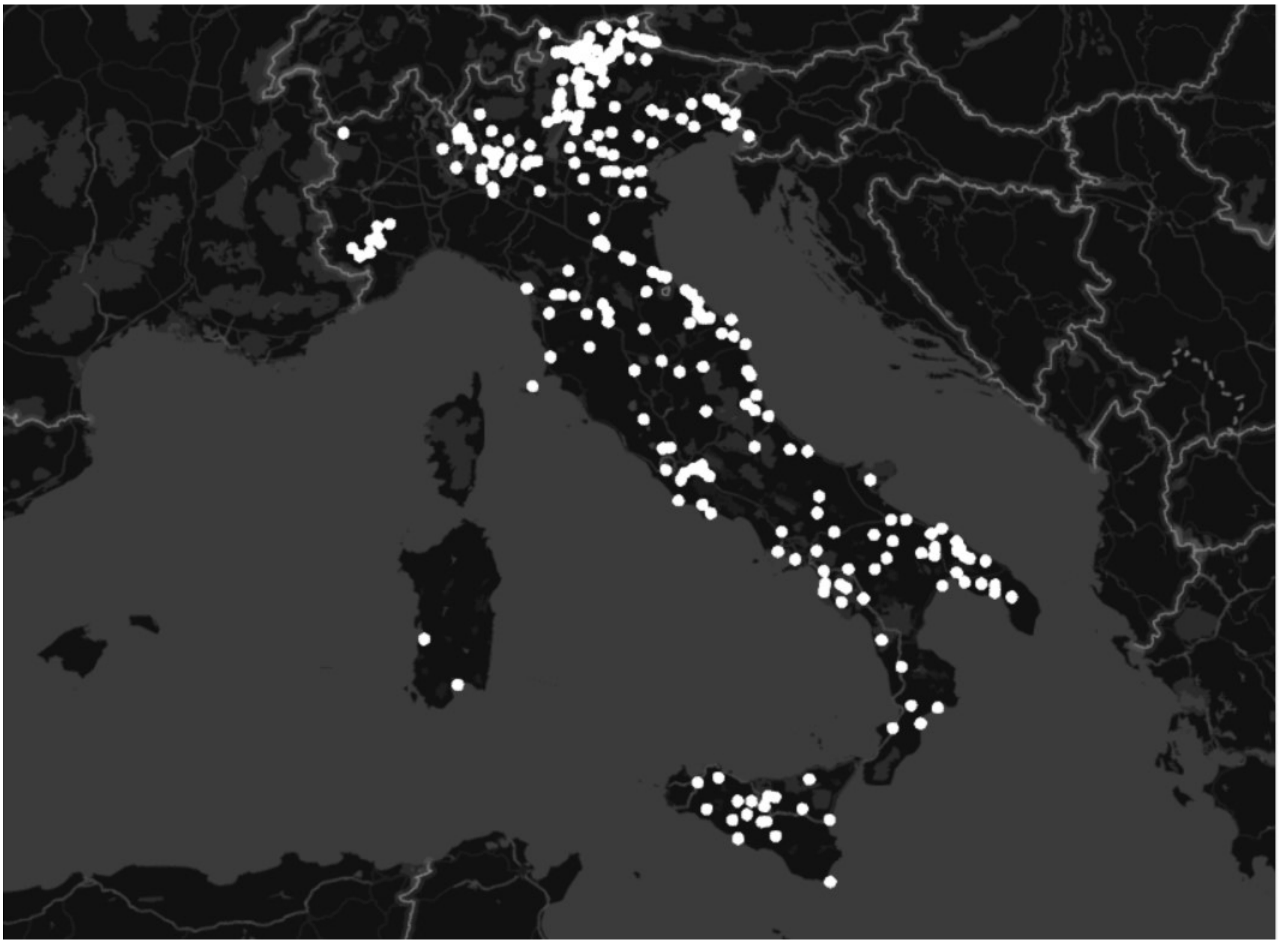

Table 1: List of variables

Variable	Description	Source
ETR1	Total tax expense/Pre–tax income	BankScope/BankFocus
ETR2	Total tax expense/Operating cash flows	BankScope/BankFocus
Lerner	Lerner Index	Authors' calculations
Post–Sanction	Dummy variable	Authors' calculations
Employees	Number of employes	BankScope/BankFocus
Loann to Assets	Net loans/Total assets	BankScope/BankFocus
ΔGDP	GDP growth rate	ISTAT
C	Sum of personnel expenses, other administrative expenses, and other operating expenses	BankScope/BankFocus
Q	Total bank assets	BankScope/BankFocus
P_1	Personnel expenses/Total assets	BankScope/BankFocus
P_2	(Other administrative expenses + Other operating expenses)/Total fixed assets	BankScope/BankFocus
P_3	Interest expenses/Total funds	BankScope/BankFocus
Price	Total revenue/Total assets	BankScope/BankFocus

Notes: This table provides a data description and the data sources.

Table 2: Bank–level variables and correlation matrix bank-level

Variables	Sample Averages			Correlations						
	No. Obs.	Mean	Std. Dev.	1.	2.	3.	4.	5.	6.	7.
1. *ETR1*	2,072	0.212	0.209							
2. *ETR2*	2,072	0.074	0.127	.35						
3. *Lerner*	2,072	0.333	0.122	.04	.03					
4. *Post–Sanction*	2,072	0.130	0.336	-.05	-.13	-.03				
5. *Employees*	2,072	99.70	118.4	-.00	-.14	.05	.04			
6. *Loan to Assets*	2,072	0.584	0.132	.03	.02	-.21	-.06	.17		
7. ΔGDP	2,072	0.004	0.106	-.12	-.11	.05	.04	.00	-.08	

Table 3: LM test for spatial, serial correlation and random effects

LM test description	*ETR1*		*ETR2*	
	Statistic	P–value	Statistic	P–value
Anselin (1988)				
Conditional test for spatial error autocorrelation				
(H_0: spatial error autoregressive coefficient equal to zero)	2.30	0.021	4.35	0.000
Conditional test for spatial lag autocorrelation				
(H_0: spatial lag autoregressive coefficient equal to zero)	6.22	0.000	6.10	0.000
Baltagi et al. (2003)				
Joint test (H_0: absence of random effects and spatial autocorrelation)	41.95	0.000	76.36	0.000
Marginal test of random effects (H_0: absence of random effects)	2.34	0.019	6.68	0.000
Marginal test of spatial autocorrelation (H_0: absence of spatial autocorrelation)	6.04	0.000	5.64	0.000
Conditional test of spatial autocorrelation (H_0: absence of spatial autocorrelation, assuming random effects are non null)	6.21	0.000	5.54	0.000
Conditional test of random effects (H_0: absence of random effects, assuming spatial autocorrelation may or may not be equal to 0)	2.96	0.003	6.60	0.000
Baltagi et al. (2007)				
Joint test (H_0: absence of serial or spatial error correlation or random effects)	79.30	0.000	134.01	0.000
One–dimensional conditional test (H_0: absence of spatial error correlation, assuming the existence of both serial correlation and random effects)	22.35	0.000	20.41	0.000
One–dimensional conditional test (H_0: absence of serial correlation, assuming the existence of both spatial error correlation and random effects)	26.01	0.000	56.88	0.000
One–dimensional conditional test (H_0: absence of random effects, assuming the existence of both serial and spatial error correlation)	133.8	0.000	140.4	0.000

Table 4: Testing for cross–sectional dependence

Test	Pesaran (2004)		Pesaran (2015)	
	ETR1	*ETR2*	*ETR1*	*ETR2*
CD	18.90	24.25	9.71	15.86
P–value	0.000	0.000	0.000	0.000

Notes: The tests measure strong and weak cross–sectional dependence under the null hypothesis of absence of it.

Table 5: Estimation results of dynamic and TSD model, using *ETR1* as dependent variable

ETR1	**Dynamic Model**	**Spatial Dynamic Models**			
		σ_1	σ_2	σ_3	σ_4
	(1)	(2)	(3)	(4)	(5)
$ETR1_{t-1}$	0.0874** (0.040)	0.0794** (0.035)	0.0782** (0.034)	0.0708** (0.032)	0.0635** (0.031)
$\boldsymbol{W}\times$ *ETR1*		0.1597*** (0.046)	0.2135*** (0.058)	0.2600*** (0.069)	0.4779*** (0.092)
$\boldsymbol{W}\times ETR1_{t-1}$		0.1913*** (0.070)	0.2614*** (0.083)	0.2659*** (0.100)	0.2404*** (0.089)
Lerner	0.8904*** (0.144)	0.5607*** (0.151)	0.4588*** (0.158)	0.4147** (0.169)	0.2484** (0.123)
Post–Sanction	0.1781 (0.114)	0.1268 (0.104)	0.1313 (0.106)	0.1297 (0.103)	0.0992 (0.073)
Employees	-0.0006*** (0.000)	-0.0003** (0.000)	-0.0003** (0.000)	-0.0003** (0.000)	-0.0002** (0.000)
Loann to Assets	0.7173*** (0.188)	0.4536*** (0.169)	0.4808*** (0.168)	0.4511** (0.181)	0.3853*** (0.133)
ΔGDP	-0.9857** (0.477)	-0.7350*** (0.269)	-0.5974** (0.244)	-0.6067** (0.259)	-0.8075*** (0.300)
No. Instruments	42	55	55	55	55
Years dummies	Yes	Yes	Yes	Yes	Yes
AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000
AR(2)	0.2671	0.1584	0.1568	0.1538	0.1516
Hansen test	0.2592	0.2301	0.1984	0.2012	0.2129

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Estimates rely on the use of the two–step system GMM estimator. All the models instrument as endogenous the dependent variable and all the explanatory variables. Time dummies are considered as strictly exogenous instruments in the level equations. Not reported constant and time dummies; p–values are indicated for Hansen, AR(1) and AR(2) tests. The estimates regard 259 banks for a total of 1,813 observations.

Table 6: Estimation results of dynamic and TSD model, using *ETR2* as dependent variable

ETR2	**Dynamic Model**	**Spatial Dynamic Models**			
		σ_1	σ_2	σ_3	σ_4
	(6)	(7)	(8)	(9)	(10)
ETR2	0.1599** (0.067)	0.1279** (0.049)	0.1589** (0.062)	0.1636** (0.071)	0.2214*** (0.074)
$\boldsymbol{W}\times$ *ETR2*		0.2673** (0.111)	0.5413*** (0.173)	0.3077*** (0.088)	0.4552*** (0.131)
$\boldsymbol{W}\times ETR2_{t-1}$		0.2030** (0.090)	0.2683** (0.126)	0.2323** (0.094)	0.2313** (0.111)
Lerner	0.3255** (0.131)	0.2342** (0.095)	0.1449** (0.063)	0.1806*** (0.069)	0.1637** (0.068)
Post–Sanction	0.0308 (0.045)	0.0484 (0.046)	-0.0162 (0.057)	-0.0366 (0.060)	0.0081 (0.059)
Employees	-0.0002*** (0.000)	-0.0001** (0.000)	-0.0001** (0.000)	-0.0002*** (0.000)	-0.0002** (0.000)
Loann to Assets	0.3038*** (0.115)	0.1212** (0.061)	0.1083** (0.051)	0.1648*** (0.044)	0.0996** (0.039)
ΔGDP	-0.2123 (0.141)	-0.0375 (0.053)	-0.0642 (0.072)	-0.0496 (0.079)	-0.0505 (0.070)
No. Instruments	35	45	45	45	45
Years dummies	Yes	Yes	Yes	Yes	Yes
AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000
AR(2)	0.4499	0.2333	0.2083	0.4356	0.7156
Hansen test	0.2598	0.3243	0.6842	0.2075	0.5816

Notes: Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Estimates rely on the use of the two–step system GMM estimator. All the models instrument as endogenous the dependent variable and all the explanatory variables. Time dummies are considered as strictly exogenous instruments in the level equations. Not reported constant and time dummies; p–values are indicated for Hansen, AR(1) and AR(2) tests. The estimates regard 259 banks for a total of 1,813 observations.