Proportional appropriation systems and financial statement quality in municipally owned entities: empirical evidence from Italy

Proportional Appropriation Systems and Financial Statements Quality in Municipally Owned Entities: Italian Empirical Evidence

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Abstract

Purpose – This paper examines how proportional appropriation systems affect the quality of financial reporting in entities controlled by local governments.

Design/methodology/approach – We examine this issue using the setting of Italian municipally owned entities (MOEs) following the implementation of a new accounting regulation that limits the spending power of the participating municipality when the owned entity reports losses. We apply Benford's law on net income figures using the Chi-square and Z-tests on the adjusted version of the Mean Absolute Deviation (MAD) criterion to spot any sign of low data quality. The sample, which consists of 2,120 MOEs, covers the years 2010-2019 and is evenly divided into the periods pre- and post- policy introduction.

Findings – Widespread data anomalies were detected following the introduction of the new regulation for MOEs controlled by local governments. Evidence is stronger for entities owned entirely by municipalities. Our results suggest that the extent of data manipulation grows as the municipality's ownership stake increases, consistent with the hypothesis that a decrease in spending power through the appropriation of financial resources affects earnings management practices in municipally controlled entities.

Practical and social implications – This paper sheds light on government-based accounting policies by documenting evidence of somewhat inefficient responses by those responsible for the preparation of financial statements on behalf of municipally owned entities, and, accordingly, insights are provided to help review these policies so as to forestall even indirectly detrimental repercussions on public services.

Originality/value – This paper extends prior research in public-sector earnings management by being the first to test whether MOEs manipulate their earnings as a consequence of participating municipalities' reduced spending capability. Understanding factors influencing earnings management practices driven by governments, other than political incentives, is still an open issue.

Keywords Benford's law, earnings management, public sector accounting, spending power hypothesis

1. Introduction

One of the issues of greatest concern in accounting literature is certainly the all-too-common practice of earnings management. While this has been exhaustively investigated in privately-owned companies, Bisogno and Donatella (2021) suggest that, more recently, this topic has become increasingly relevant within the public sector. A small but rich body of literature has examined the existence of earnings management practices in the context of public sector accounting; this includes studies investigating national governments (von Hagen & Wolff, 2006), sub-national governments (Clémenceau & Soguel, 2017), local governments (Beck, 2018; Cohen *et al.*, 2019; Cohen & Malkogianni, 2021; Ferreira *et al.*, 2013; Stalebrink, 2007), healthcare and non-profit organisations (Anagnostopoulou & Stavropoulou, 2021; Nguyen & Soobaroyen, 2019); hybrid entities (Capalbo *et al.*, 2023; Capalbo *et al.*, 2021; Ruggiero et al., 2021), and the difference between private and state-owned enterprises (Capalbo *et al.*, 2014; Ding *et al.*, 2007; Wang & Yung, 2011). These studies all document, albeit to varying degrees, that earnings management is also a common practice in public sector entities, hybrid, and non-profit organisations. This paper therefore aims to provide new empirical evidence on the issue of *earnings management* practices in *State-owned entities (SOEs).* This is achieved by examining the recent introduction of a new law creating a direct link between the accounting results published by municipally owned entities (MOEs) and the spending power of the local government controlling them, in terms of the impact this law has on the quality of financial statements issued by such entities.

A more recent strand of research has examined the relationship between politics and earnings management in the public sector. Kido *et al.* (2012) are the first to posit that governing authorities at sub-national levels may manipulate accounting numbers to present a healthier financial picture during election years, and they do find evidence consistent with their claim. Other studies examine the role of political factors in local government through elections (Cohen *et al.*, 2019), where earnings management is found to be greater when a mayor is re-elected rather than elected for the first time. Previous research has documented the manipulation of accounting data during election cycles in MOEs too, in both Italy (Capalbo *et al.*, 2023; Capalbo *et al*., 2021), focussing on utility entities, and Portugal (Serra Coelho, 2022). The studies cited all point in the same direction, focusing exclusively on election cycles as the primary context in which creative accounting practices in the public sector flourish. However, it is still an open question as to whether governments have other incentives which make them engage in, or have their owned entities engage in, earnings management practices, for example factors which influence their spending power. This paper therefore extends the previous studies mentioned above and enables us to test whether MOEs, regardless of the sector they operate in, manipulate their earnings as a consequence of participating municipalities' reduced spending capability.

In specific terms, we examine this issue in the framework of the introduction of a new accounting regulation regarding the appropriation of financial resources by local public administrations, introduced in 2016 (art. 21 of Italian legislative decree of 19 August 2016, n. 175 of the Consolidated Act). Italian Municipalities use a cash-based budget that, before 2016, was not affected by any impairment of the value of their financial assets resulting from losses suffered by the entities they owned. This implied that, no matter how large the losses

incurred by the entity owned, and thus the amount to be written off from the accounting value of the related financial asset, the municipality's spending power was not affected in the slightest until such time as a financial measure became necessary to deal with the insolvency that sooner or later would follow the losses. MOEs are typically used to provide services of economic and social relevance that cannot be interrupted, meaning that when these losses lead to insolvency, the municipality which owns the entity will have no choice other than to inject new capital to ensure the continuity of the entity. Under the new regulation, a direct process of appropriation of financial resources was introduced, stipulating that when the municipally owned entity publishes a negative income, the participating municipality is now required to insert a pro-rata appropriation in its financial budget, which in turn implies an immediate reduction in its spending power. The amount to be appropriated depends on both the extent of the reported loss and the percentage of the equity owned. While the regulation was designed to save the financial resources that might subsequently be needed to guarantee the continuity of the entity, and therefore stability in the provision of public services, it may also have the effect of increasing the incentive to engage in the manipulation of MOEs' published earnings in order to safeguard the spending power of the incumbent politicians. This legislative change therefore provides a setting which allows us to examine the effect that a new regulation, namely the introduction of a *compulsory proportional appropriation system* for local governments, has on the *quality of the financial statements published by MOEs*.

Answering this question is important, given that earnings management practices in MOEs represent a serious threat to transparency in the public sector. Previous literature has argued that states with strict budget restrictions have stronger incentives to use discretion over accounting figures to present a healthier financial picture (Kido *et al.*, 2012). Accordingly, we assume that the introduction of a direct link between the owned entities' financial results and the owning municipalities' spending power might create an incentive to engage in earnings management, thereby adjusting MOEs' financial results so as to preserve the spending power of incumbent politicians. Specifically, we conjecture that the extent of *self-serving* accounting discretion used by MOEs to manage their earnings depends on the scale of the financial resources which local governments would be forced to appropriate in the event that owned entities report losses. It follows that, the higher the total number of shares owned by the municipality (and consequently the larger the forced reduction in its spending power), the greater the incentive to engage in earnings management in order to adjust the positive or negative perception of their economic performance in the MOEs published financial results.

To test our conjecture, we use the Burgstahler and Dichev's (1997) approach and the Benford's (1938) law, and we examine whether there is data manipulation in the financial statements of Italian MOEs before and after the introduction of the new accounting regulation for local governments. Given the focus of local governments on the losses incurred by the entities they own, we analyse anomalies in the first digit of the net income of MOEs over a 10-year sample that is divided equally between the periods pre- and post- introduction of the new accounting regulation. We focus on municipalities with the largest ownership quota within the entity when two or more municipalities owned the same MOE. Following Cerqueti and Lupi (2021), we perform Chi-squared and Z-tests on the adjusted mean absolute deviation (MAD) of the empirical data from the Benford distribution. After examining all the entities in our sample, following the introduction of the accounting regulation we find evidence of a

significant decrease in the quality of the financial statements published by controlled MOEs (total shares owned >50%). More importantly, we also find that the extent of the data manipulation amplifies as the municipality's ownership stake rises (*i.e.*, 100% of total shares), when compared to entities over which the municipality does not have formal control. These findings are therefore consistent with the suggestion that a reduction in local governments' spending power due to the appropriation of financial resources affects earnings management practices in MOEs, at least to the extent that the latter engage in manipulation as a consequence of the stronger incentive for local governments to defend their spending power by making MOEs look financially healthier.

This paper is structured as follows. Section 2 contains an outline of the institutional and theoretical background. Section 3 describes the data and samples. Section 4 illustrates the empirical approach. Section 5 reports on the findings. Section 6 contains the conclusions and provides directions for future research.

2. Research Background

2.1. Theoretical Framework

Earnings management: the use of accounting discretion to intentionally influence the reported level of earnings (underlying economic performance) in order to meet specific financial objectives and obtain some private gain by misleading certain stakeholders or influencing contractual outcomes (Healy & Wahlen, 1999; Shipper, 1989), has been extensively studied in literature. The first theoretical element on which research in this area is based is the Positive Accounting Theory (PAT). The PAT paradigm, first introduced by Watts and Zimmerman (1986), posits that individuals and organizations choose accounting practices that align with their self-interest. Studies on earnings management using PAT have shown that managers are more likely to engage in self-serving use of accounting information when they have greater discretion over accounting choices, for example where audits are lower quality (Becker *et al.*, 1998) or there are rather vague accounting standards (Ewert & Wagenhofer, 2005). More importantly, previous research has found that managers are more likely to engage in earnings management when they are facing pressure to meet certain targets, such as those set by analysts or associated with stock prices (Abarbanell & Lehavy, 2003; Degeorge *et al.*, 1999). Overall, the theory highlights the importance of considering the views and the incentives driving managers who are willing to engage in data manipulation in order to achieve their own personal goals.

In the context of entities owned by the State or local authorities, PAT suggests that managers of these entities may use accounting discretion to present a healthier

financial picture to meet their own goals or to align with the goals of the government authorities.

Perhaps, however, the cornerstone which brings the theoretical framework in earnings management literature together is based on the well-known agency theory. In private companies, for example, corporate governance watches out for the potential misalignment that can arise in the agency relationship between the owners who are intent on maximizing profit and the company managers (Shleifer & Vishny, 1997). In SOEs though, the two actors serve a variety of additional purposes, including those related to matters of general public interest, such as ensuring services accessible to the whole community. The ultimate owner of a public entity - the community - exercises its prerogatives by delegating powers to other parties (politicians and bureaucrats); this leads to additional agency issues - between voters and politicians and between politicians and managers - compared to those that typically affect private companies (Mocetti & Roma, 2020). In this scenario, personal interests play a key role to the extent that any behaviour can be influenced by asymmetric information. As a matter of fact, looking at the relationship between voters and politicians, and assuming that the latter pursue a private goal, the literature argues that the presence of asymmetric information between voters and elected representatives may favour the improper use of SOEs, with negative repercussions on their management (Boycko *et al.*, 1996; Shapiro & Willig, 1990; Shleifer, 1998; Vickers & Yarrow, 1991). Furthermore, the distorted use of SOEs can also be facilitated by the convergence of (private) interests of politicians and administrators who enter into mutually beneficial agreements at the expense of the public interest and of efficiency in the management of SOEs (Boycko *et al.*, 1996; Shleifer & Vishny, 1994).[1] We thus conjecture that, *ceteris paribus*, both the managers of MOEs and the municipalities' incumbent officials are utility maximisers willing to exercise discretion with regard to accounting figures so as to meet their personal goals, which will very probably be aligned. We assume in this paper that the question of whether local government officials promote the use of discretion by their MOEs in order to present a healthier financial picture will very much depend on the incentives arising from the shared goals of both incumbent politicians and managers.

The use of the accounting theories on which we draw our conjectures creates a connection between local government and MOE management, creating a gateway for earnings management. This close link is usually two-fold: (i) local governments provide MOEs with the financial resources they need in order to operate; (ii) MOEs' managers are generally appointed by the incumbent politicians of the municipalities owning a majority share in the entity. As argued by Capalbo (2016), this is particularly true with reference to the specific case of Italian MOEs. Firstly, the municipality which

owns the entity is, in most cases, not just the majority shareholder but also the principal client providing a substantial part of the entity's revenue through a service contract, so any of its decisions can have a significant impact on the single MOE's financial position. Furthermore, given the labour-intensive nature of their operations, Italian MOEs' performance is perceived as a proxy for the risk of job cuts, which in turn increases their political sensitivity and thus the political costs for MOEs' executives. Many MOE managers have a political background, so they have a direct interest in politics and are therefore extremely sensitive to the decisions made by politicians. A further important point concerns the mayor, who officially has the authority to appoint and remove the managers of MOEs during his or her term of office, and in Italy, this authority may be exercised with a very high degree of discretion when the municipality owns more than half of the entity's total shares. The local mayor, a politician elected by the citizens, has a five-year mandate which is longer than that of the managers – three years – so the latter's term is likely to expire before a new mayor is elected.

Previous research also theorises that governments may manipulate accounts to present a healthier financial picture during election years, especially when they have strict budget restrictions, giving them a stronger incentive to use a certain discretion with regard to accounting figures (Kido *et al.*, 2012). Thanks to their spending power, municipalities provide MOEs with the financial resources they need in order to operate; any restriction in the budget capability of municipalities would consequently limit the resources available for these same MOEs. If this restriction is caused by the performance of MOEs, then both will see their resources being diminished. Therefore, in our empirical analysis we want to test the following prediction:

PREDICTION 1: earnings management in MOEs is positively associated with the introduction of strict budget regulations for the participating local governments.

The intuition that follows from this is that the greater the restriction of spending power for municipalities, the greater the incentive for incumbent local government officials to get MOE managers to present evidence of healthier financial performance to avoid being forced to allocate the resources necessary to make up for the entity's losses. Simultaneously, the greater the restriction of spending power for municipalities, the greater the incentives for MOE managers to engage in earnings management so as to avoid creating a cycle where their negative income (which deteriorates their finances) in turn limits the financial resources the municipality can provide to MOEs, which then leads to even weaker financial results. If we also take

the size of the municipality's stake in the entity into consideration, we can state that the more shares owned by the municipality, the greater the impact of the MOE's losses on the municipality's spending power, and the greater the incentive for both managers and officials to get MOEs to present a healthier financial picture. This ultimately brings us to the second prediction we want to test empirically:

PREDICTION 2: earnings management in MOEs' published financial statements increases as the proportional appropriation of financial resources for municipalities increases, which in turn is a function of the ownership quota the municipality holds in the entity.

2.2. Institutional Framework

Municipally Owned Entities (MOEs) in Italy are typically in charge of providing socially and economically relevant services, such as local public transport, water and waste management, utilities such as electricity and gas, local road maintenance, children's education, services for the elderly, disabled, and children, the municipal police force, building planning and control, recreation services, libraries, and cemeteries. Since the advent of New Public Management, municipalities have transferred control of the vast majority of the public services offered to their residents to the business enterprises they control or, at least in part, own (Grossi & Reichard, 2008). According to a recent report by Casamonti and Gottardo (2020) from the OCPI (Osservatorio dei Conti Pubblici Italiani) on "The dimensions of the Italian entrepreneurial State", from 1999 to 2019 the value of State investments in business enterprises increased over time in Italy, reaching nearly 10 percent of GDP. As of 2020, out of the active entities in which the State has a stake, the vast majority (nearly 67.5%) are *directly* owned by local governments (ISTAT, 2023). Interestingly, more than 60% of those active entities are entirely controlled by the State (over 50% of the total shares), of which 42.3% are controlled by local governments (ISTAT, 2023).

As mentioned above, actions taken by the municipality which owns the entity can have a considerable impact on the financial status of a single MOE, because the municipality is typically not only the majority shareholder but also the principal client, providing a significant portion of the entity's revenue through a service contract (Capalbo, 2016).[2] Until now, however, the reverse was not true, in that the actions taken by the entity, whether or not it registered negative results and thus worsened its income over the years of its operation, could not influence the financial circumstances of the municipality which owned it unless the latter was called upon to recapitalise the entity when it was no longer able to cover its costs.

In recent years, as highlighted by the Italian lower chamber (Camera dei Deputati) in 2023 in an internal communication on the "Monitoring and control of State-owned companies and recognition of the organizational structures", the regulatory environment surrounding these Italian entities has grown more complex, because the need to ensure the achievement of public finance targets has led to the establishment of strict financial containment and control measures on public enterprises. This question was most recently redefined by legislative decree no. 175 of 2016, containing the Consolidated Law on State-owned companies, which reorganised and formalised the matter within a systematic framework. In developing the reform, the aim of the Italian legislators was to ensure efficient, transparent management of State shareholdings, as well as the protection and promotion of competition across the market, while also contributing to the reduction of public expenditure through the implementation of new streamlining and review procedures designed to reduce the number of entities owned by the State (especially those owned by local governments). Essentially, the underlying objective of the reform was to avoid the distorted and excessive use of private company status by public administrations, which had previously used this structure to avoid the limitations and rules specific to the public sector such as compliance with budget constraints or rules on public recruitment and procurement.

The legislative decree also addressed the urgency to link the cash-based system of public administrations with the equity value of their controlled entities in order to overcome the existing indifference that the predominantly cash-based accounting systems of public administrations have with regard to the losses suffered by those entities (Capalbo, 2016).[3] Effective as of the 2015 financial statements, article 21 of this decree requires local and regional level governments to appropriate part of their resources every time an owned entity reports negative performance and as a result suffers a reduction in its equity, the appropriated amount is proportional to the share in the entity. The aim of the newly-introduced proportional appropriation system was essentially that of saving the financial resources needed to guarantee the continuity of the entities, but also, more importantly, to act on the spread of state-owned entities that are constantly running at a loss, which could represent a serious threat to public services nationwide. Nonetheless, the question naturally arises as to whether the new budget constraints might have had the unintended effect of increasing the incentive to report healthier financial results in SOEs' financial statements in order to defend the spending power of incumbent politicians. Taking this unique context, our research tests this proposition on entities owned by municipalities.

3. Description of Data and Sample

Our analysis uses yearly net income item data from the financial statements of Italian Municipally owned entities (MOEs) over a 10-year period from 2010 to 2019, sourced from the Bureau van Dijk AIDA database (Analisi Informatizzata delle Aziende Italiane). The Italian Ministry of Economics and Finance (MEF) Public Administration Shareholdings Open database, available through the Treasury Department website, provides us with 262,315 entities whose shareholdings and representatives are public bodies at any level of government. We extrapolated 9,091 sets of entities from the central government database for which an entity was owned by a municipality. The merged dataset consists of several balance sheet items, the reference calendar year, the name of the municipality owning the shares, each entity's Italian tax code and the percentage of the entity's shares owned by the municipality. As not all entities were included in AIDA, we focus on the financial statements of the remaining 6,495 MOEs on which we have complete information, resulting in a sample of 64,950 observations.

We sample data evenly, dividing the period in pre- and post- introduction of the accounting regulation and we only select the entities that are present in both periods with 5-year financial statement data, and which have net income information available for the entire sample period. This leaves us with 1,060 entities and consequently 10,600 net income observations. We further split the data to create two samples in which there are entities with a stake owned by the municipality that is respectively greater than 50% and equal to 100%, and two further samples within which there are MOEs with a direct quota owned by a municipality that is less than or equal to 50% and greater than 0%, the latter comprising the whole dataset. Although the latter includes entities subject to the regulation, they still provide some sort of control to test for our assumption.[4] In line with Mocetti and Roma (2020), in the event that two or more municipalities owned shares in the same entity, we selected the municipality with the largest percentage stake (*i.e.*, the largest shareholder) as it has more formal decision-making powers than the other owners.

Descriptive statistics for MOEs' net income are reported in Table I. However, before conducting any statistical tests, we look at what happened to the published financial results of MOEs before and after the introduction of article 21 of the regulation mentioned above. The sample considered consists of 8,350 observations of which only subsidiaries (*i.e.*, when the total number of shares owned by the municipality is greater than 50%) are selected. Here we compare the properties of the average net income (per MOE) in the two five-year periods 2010-2014 and 2015-2019 for entities that are observed in all ten years. The samples relating to the two five-year

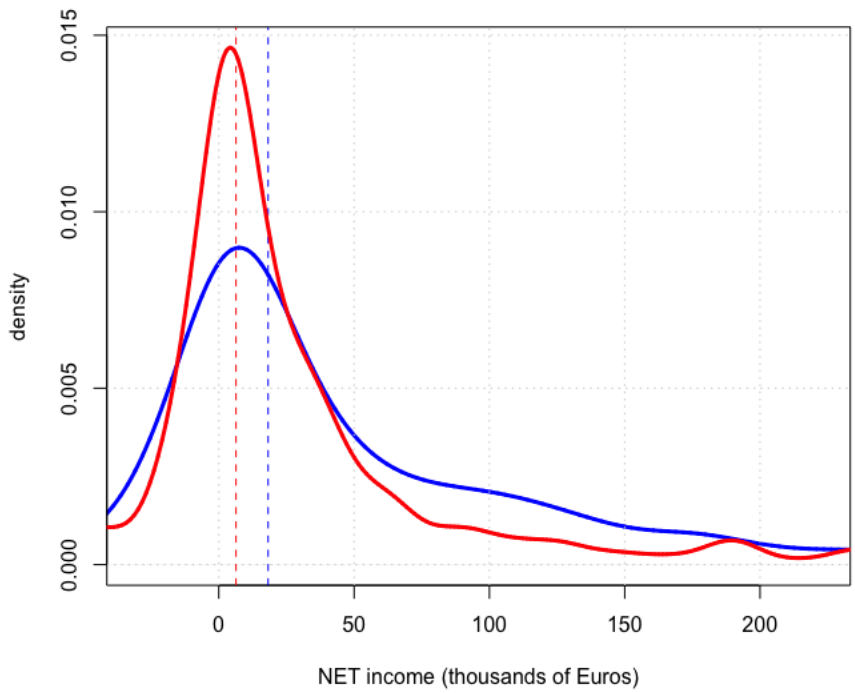
periods consist of the same 835 entities, so that any possible difference cannot be traced back to a different composition of the samples.

Table I Summary statistics of MOEs' net income

	Sample 1 (<=50%)	Sample 2 (>50%)	Sample 3 (>0%)	Sample 4 (=100%)
No. Obs.	12,850	8,350	21,200	4,640
Min.	-11,601,111,000	-319,109,625	-11,601,111,000	-319,109,625
1st Qu.	-6,350	-638	-4116	0
Median	2,987	7,146	4,554	5,746
Mean	-347,129	141,308	-158,004	-139,520
3rd Qu.	87,348	68,777	76,967	43,407
Max.	6,235,645,000	226,579,000	6,235,645,000	49,018,690
S.D.	138,619,467	6,545,239	108,588,820	6,264,588

Notes: The four samples are made of companies with the respective ownership quota, indicated in parentheses, of the municipality.

Figure 1 Net income distributions of MOEs (with municipality quota >50%)



Notes: The red curve represents the distribution of data for the period 2010–2014, the one in blue refers to the period 2015–2019. The vertical dotted lines represent the medians in the two five-year periods. For greater detail, the density, calculated using all the observations available for each period, is shown graphically only for a limited range of observations, trimming the most extreme tails (with an overall trimming of about 20%).

The average figure (expressed in thousands of Euros) for the period 2010-2014 is -45.6, while for the period 2015-2019 it is 466.4. Hence the 2015–2019 average is higher than the 2010–2014 average. However, the mean can be greatly affected by a few values in the tails of the distribution. If we look at the median, which is a more robust position indicator than the average in the presence of anomalous data, we note that the median in the period 2010–2014 is equal to 9.9, while for the period 2015–2019 it is 28.5. Figure 1 illustrates a comparison of the data distribution in the two periods analysed.

The two estimated densities (red and blue curve representing the distribution of MOEs' net income during the periods pre- and post- introduction of the new accounting regulation, respectively) appear to be quite different at first glance. If those differences are driven by accounting data manipulation, however, they need to be tested in terms of statistical significance, which will be the focus of the next sections. Considering the fraction of entities that record a loss in the two five-year periods, it can be observed that in the period 2010–2014 30.4% of entities recorded a loss. This becomes 22% in the period 2015-2019. It is therefore natural to question whether those differences were simply due to the efficacy of the new regulation or, more importantly, if well-intentioned government policies can backfire by in this case incentivising managers and incumbent politicians to manipulate accounting data so as to avoid budget restrictions. The introduction of the new policy provides us with an ideal setting to test this and find out whether accounting regulations impact management behaviour around reported earnings.

4. Empirical Method

From a statistical point of view, the null hypothesis related to PREDICTION 1, that we intend to test in the empirical analysis, is that there is no earning management after the introduction of the new regulations. In the same way, the statistical null hypothesis related to PREDICTION 2 is that there is no effect of the ownership quota the municipalities hold in the entities on earnings management in MOEs' published financial statements.

In keeping with the mainstream literature on earnings management, we adopt the Burgstahler and Dichev (1997) approach to look for anomalies in the distribution of net earnings. This method allows us to depict the change in the losses published by Italian MOEs before the introduction of the new accounting rule, compared to the losses reported after the implementation of the above-mentioned legislative decree. The graphical representation of net income distribution changes for each sample

divided by ownership quota gives us a first clue about the trend of whether increasingly fewer MOEs tended to report losses. Although this technique is mainstream within the literature on the detection of earnings management and it fits well with the aim of our study, the accuracy of the results it produces can be influenced by other confounding factors, such as economic cycles, unemployment, or natural disasters. Moreover, after looking at management behaviour in the presence of small reported losses and profits, this study focuses on data quality though the examination of earnings management practices during a period in which there are incentives to avoid reporting losses. For these reasons, this study employs Benford's law methodology so as to avoid confounding factor biases as well, which is also in line with Capalbo et al. (2023).[5]

The underlying concept behind Benford's law is that the leading digit of many real-world numerical data follow a precise logarithmic distribution. Accounting datasets have been proved to be a setting in which Benford's law is considered the norm (Nigrini, 2012) and to be appropriate candidates for such analysis (Durtschi et al., 2004; Hill, 1995). Therefore, the distribution of the leading digits of financial statement numbers are expected to obey the law so that any significant deviations are taken as manifestations of low data quality or symptoms of possible data manipulation. To implement this approach, we see abnormal digit occurrence in net income items as number-pattern anomalies and thus use earnings data quality as a proxy for earnings management. We focus on net income numbers, consistent with the literature (see, *e.g.*, Carslaw, 1988; Thomas, 1989), because it is a balance sheet item which is the result of mathematical aggregation of numbers from different distributions (*e.g.*, revenues, operating costs, taxes, *etc.*) and, therefore, more likely to be useful for a Benford's law-based analysis (Durtschi *et al.*, 2004). If PREDICTION 1 is valid, we should observe that the data do not comply with Benford's law after the introduction of the new regulations; if PREDICTION 2 is valid, we should observe that the deviation of the distribution of data from Benford's law increases with the share of ownership by municipalities.

There is, indeed, a large body of accounting literature concerned with the use of Benford's law to test cosmetic earnings management in financial statement items (Carslaw, 1988; Thomas, 1989; Van Caneghem, 2002, 2004), and this was also introduced in the context of public sector accounting (Rauch *et al.*, 2011; Rauch *et al.*, 2014). These studies all find that bias in the occurrence of net income (and other items) digits are the consequence of management incentives to round earnings and infer that Benford's law is a good analytical procedure to spot such manipulative behaviours. Furthermore, the chosen approach is particularly appropriate as per the high number

of different and independent companies analysed across various subsamples. As Hill (1995) argues, "if distributions are selected at random (in any "unbiased" way) and random samples are then taken from each of these distributions, the significant digits of the combined sample will converge to the logarithmic (Benford) distribution" (p. 354).

Benford's first digit law is also remarkably straightforward:

$$\Pr(X = d_i) = b_i = \log_{10}(1 + \frac{1}{d_i}) \quad (1)$$

where X denotes the first significant digit of the item and $d_i \in \{1, \ldots, 9\}$. While there are different ways to test data conformity with Benford's distribution (Cerqueti & Lupi, 2021; Nigrini, 2012), we adopt the most commonly used statistics, Pearson's chi-square:

$$\chi^2 = n \sum_{i=1}^{9} \frac{(p_i - b_i)^2}{b_i} \quad (2)$$

where n is the number of observations and p_i represents the proportion of the first digits (1, …, 9) in the sample.

Many studies in the accounting literature have also used the Mean Absolute Deviation (MAD) criterion, first advocated by Drake and Nigrini (2000) and Nigrini (2012) to address the "excess of power" issue of the chi-squared test when dealing with large datasets. This measures the average deviation in absolute terms of the empirical data analysed (financial statements numbers in the tested sample) and Benford's theoretical frequencies:

$$\text{MAD} = \frac{1}{9} \sum_{i=1}^{9} |p_i - b_i| \quad (3)$$

However, this criterion does not have a well-defined probability distribution and therefore lacks statistical foundations. To overcome this limitation, we follow Cerqueti and Lupi (2021), who propose a standard normal test of conformity based on a scaled version of the excess MAD, which in turn is defined as: :[6]

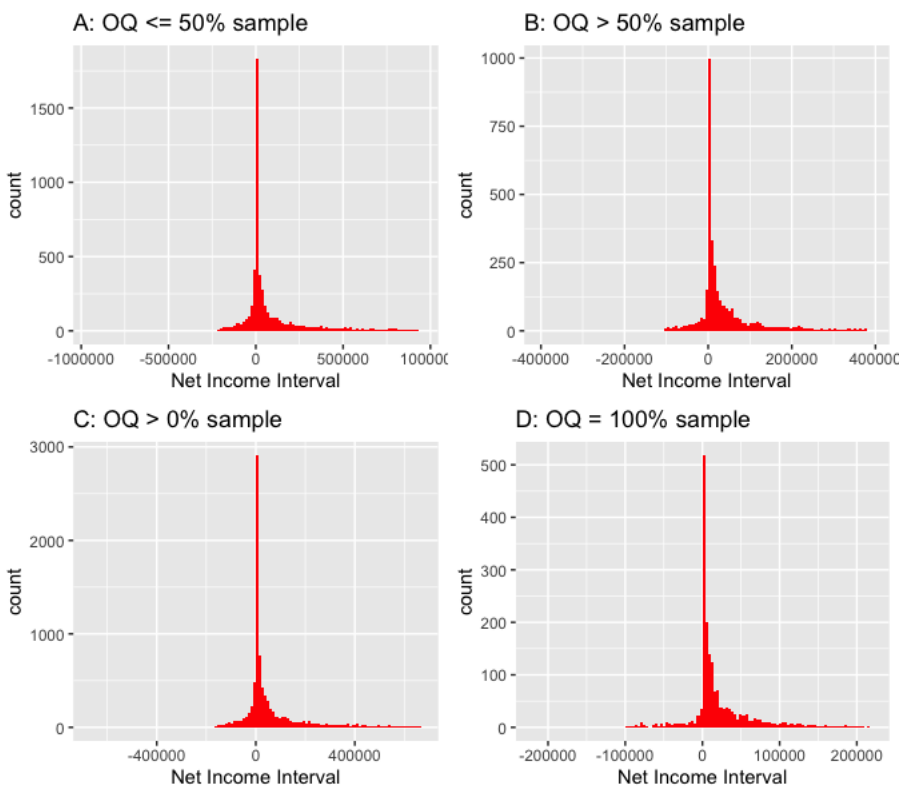
$$\delta_{n,9} = MAD_{n,9} - E(MAD_{n,9}) \quad (4)$$

where n is the number of observations, and $E(MAD_{n,9})$ is the expected mean absolute deviation on the first digit in the presence of n observations. Our approach starts from a visual comparison of the empirical and theoretical frequencies. Then we compute the χ^2 and the test based on the excess MADs for each subsample in our experiment to infer the impact of the introduction of the new accounting regulation for municipalities' budget in Italy on the quality of MOEs' financial statements data.

5. Results

In this paper, we focus on net income numbers (in line with Carslaw, 1988; and Thomas, 1989) of MOEs with varying levels of ownership by municipalities. The newly-introduced accounting rule does indeed look at the final results of those entities in order to calculate the proportional financial resource appropriation the municipality is forced to take into account the year following owned entity's reported losses. Regardless of whether the entities' results are positive or negative, we are mostly concerned with the quality of those accounting data after the introduction of the regulation. In untabulated tests, we also extract data from the sample entities operating solely in the utilities sector, which are shown to be more prone to engaging in accounting data manipulation (Capalbo *et al.*, 2023; Capalbo *et al.*, 2021), and find that those entities are not driving our main findings.

Figure 2 Distributions of net income during the pre- law introduction period

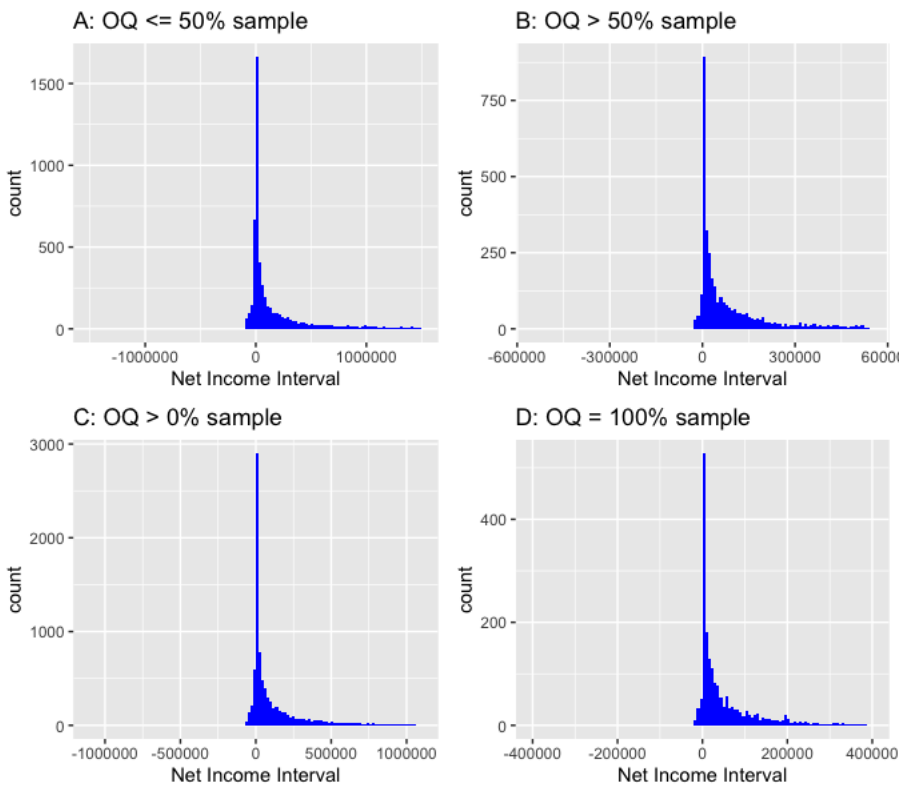


Notes: The figure reports the distributions of net income intervals following the approach in Burgstahler and Dichev (1997), which are divided according to the ownership quota (denoted as OQ), in each panel respectively.

We apply the Burgstahler and Dichev (1997) approach to look for anomalies in the distribution of net income numbers. Figures 2 and 3 depict those distributions for each subsample analysed in this study, showing overall that Italian MOEs are very likely to report small profits. Despite this significant spike around zero, which indicates an abnormal number of entities reporting small losses and even more with

small profits, the behaviour worth noting is the number of entities which, before the new accounting rule, were reporting losses. This number improved abruptly after the implementation of the new regulation. The distribution of negative net earnings changes sharply between the pre- and post- introduction period analysed, showing a substantial number of MOEs incongruously publishing positive earnings during the period in which the law was in force. By looking at the bars moving from the left- to the right-hand side of the charts, this is even more true for entities for which the share owned by the municipality is larger (*i.e.*, greater than 50% and equal to 100%), in these cases almost all of them change their earnings from negative to positive. Small changes can be seen in the distribution of net income for MOEs with a smaller local government ownership quota (*i.e.*, less than 50%) or in the overall sample. However, a potential drawback of Burgstahler and Dichev (1997) approach is that its results may be affected by changes in the macroeconomic situation that can affect company results, mainly in the same direction. Therefore, we resort to Benford's law analysis.

Figure 3 Distributions of net income during the post- law introduction period

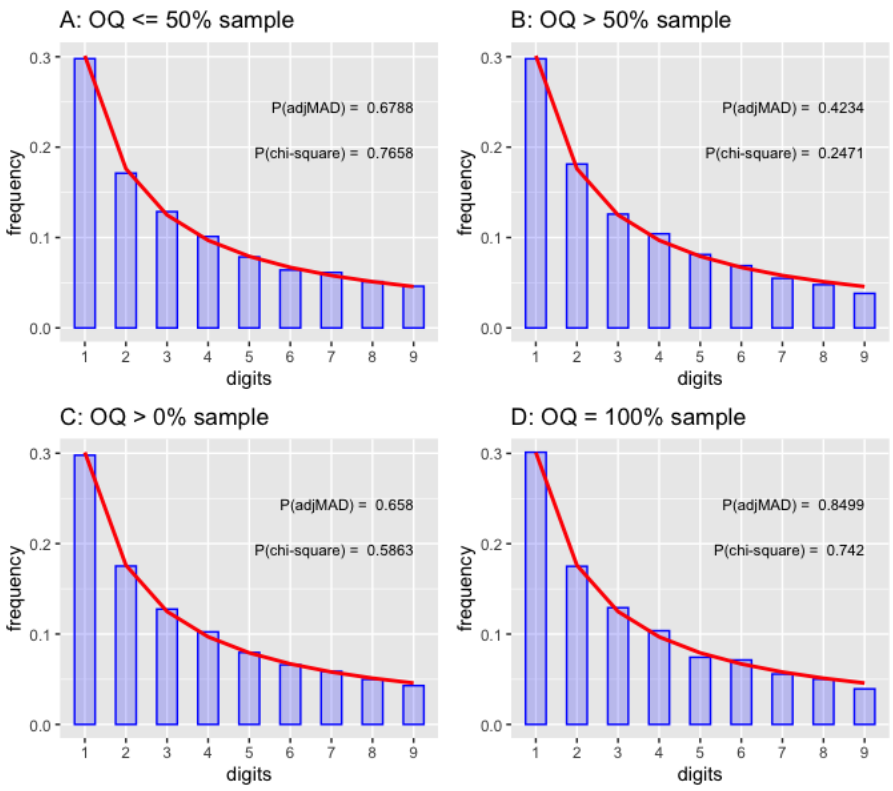


Notes: The figure reports the distributions of net income intervals following the approach in Burgstahler and Dichev (1997), which are divided according to the ownership quota (denoted as OQ), in each panel respectively.

In applying the digit-based procedure, we start with the results illustrated in figure 4 and 5, showing whether the distribution of the empirical data obey Benford's

law. Figure 4 shows the analysis carried out on the sub-sample of the period preceding the introduction of the new accounting regulation. The panels each correspond to the different sub-samples divided by the municipality's ownership quota (OQ), all show a perfect fit between the first digit distribution of MOEs' net income and Benford's distribution. This is the expected result in the absence of data manipulation. Figure 5, on the other hand, shows the samples relative to the period following the introduction of the new rule, with widespread irregularities in the distribution of net income figures for entities directly (OQ > 50%) or entirely (OQ = 100%) controlled by local governments. There seems to be an overuse of the number 1 and an underuse of the number 9 as the first digit of net income. This is consistent with the tendency to round off that is hypothesised in previous accounting research using Benford's law (Carslaw, 1988; Thomas, 1989), according to which managers round earnings off to the nearest cognitive reference point (*e.g.*, EUR 99,873 to EUR 100,000).

Figure 4 First-digit distributions of net income during the pre- law introduction period

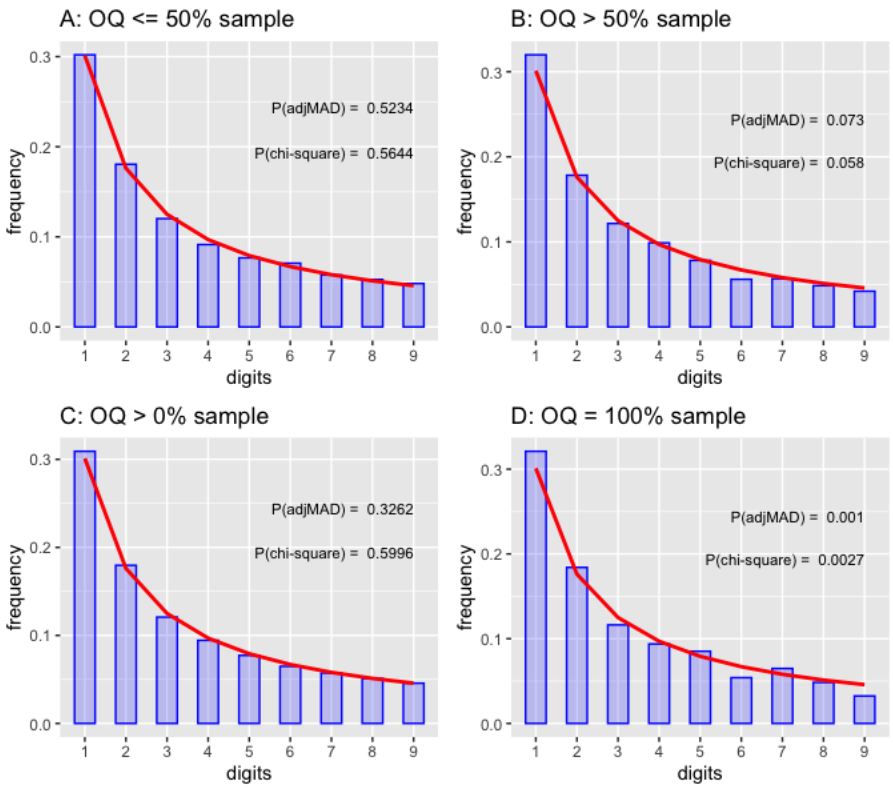


Notes: The figure reports the empirical (blue bars) and Benford's (red curves) values of the first digit frequencies for the four samples analysed, which are divided according to the ownership quota (denoted as OQ), in each panel respectively. P(•) denotes the *p* value of the corresponding test.

We then applied the standard χ^2 and the tests based on excess MAD to check conformity with Benford's first-digit law. Table II reports the results in terms of

conformity of the tests carried out on net income digits with respect to each subsample in both periods, pre- and post- introduction of the accounting regulation. Both statistical tests provide consistent results across all the samples and periods. There is no significant evidence of a decrease in data quality for entities where the quota owned by the municipality is less than or equal to 50%, neither in the period before the introduction of the regulation (from 2010 to 2014), nor in the period when the regulation was in force (from 2015 to 2019). In other words, the distribution of net income figures for MOEs within those subsamples conforms well to and obeys to Benford's law, supporting the belief that our dataset is an appropriate candidate for such analysis. This provides a control when examining entities with majority local government ownership (a share that is greater than 50%), which effectively show a statistically significant mean deviation of 1.5% from the expected distribution (at the 10% level) after the proportional appropriation system came into being. There is no evidence of data manipulation for the period prior to the introduction of the accounting regulation, which again provides further support for the applicability of the chosen method, given its conformity with Benford's law.

Figure 5 First-digit distribution of net income during the post- law introduction period



Notes: The figure reports the empirical (blue bars) and Benford's (red curves) values of the first digit frequencies for the four samples analysed, which are divided according to the ownership quota (denoted as OQ), in each panel respectively. P(•) denotes the *p* value of the corresponding test.

Lastly, we repeated the tests for the entire sample in the pre- and post-introduction periods and no irregularities were found in the distribution of the figures for net income. This supports the findings in the subsample for entities wholly controlled by the municipality (100% share), which show that the decrease in data quality in financial statements is indeed being driven by controlled entities. A possible explanation for the results might lie in the fact that MOEs in which the municipality has a smaller share (*i.e.*, <50%) have decreasing budget restrictions and thus incentives to make them look financially healthier, which in turn implies that as the local government ownership share increases, and consequently the budget restriction, so the self-serving use of accounting discretion in financial statements published by MOEs also increases. Local governments with less than 50% ownership also have no formal powers over the governance of the MOE. Despite being based on fewer observations, the evidence against Benford's distribution for both the χ^2 and the *Z*-tests based on the excess-MAD in those MOEs is even stronger (the test p values are below any conventional significance level), suggesting that the pervasiveness of anomalies grows with the municipalities' share of ownership. This conclusion is reinforced by the fact that the number of observations, in this case, is smaller, thus reducing the power of the test.

Table II Benford's law conformity tests on the first digit of net income numbers

quota	Chi-squared		excess MAD			
	pre	post	pre	Z-test	post	Z-test
<=50	4.92	6.74	-0.000385	-0.46	-0.000048	-0.06
	(0.7658)	(0.5644)	*6,425*	(0.6788)	*6,425*	(0.5234)
>50	10.26	15.06	0.000196	0.19	0.001480	1.45
	(0.2471)	(0.0579)	*4,175*	(0.4234)	*4,175*	(0.0729)
>0	6.55	6.43	0.000262	-0.41	0.000290	0.45
	(0.5863)	(0.5996)	*10,600*	(0.6580)	*10,600*	(0.3262)
=100	5.14	23.59	-0.001411	-1.04	0.004195	3.08
	(0.7420)	(0.0026)	*2,320*	(0.8499)	*2,320*	(0.0010)

Notes: The table reports the χ^2 and *Z*-tests for MOEs' net income numbers in each subsample divided by the ownership quota of the municipality. The chi-squared test is computed as $\chi^2 = n \sum_{i=1}^{9} \frac{(p_i - b_i)^2}{b_i}$, where n is the number of observations and p_i represents the proportion of the first digits (1, …, 9) in the sample. Whereas the *Z*-test is computed on the excess MAD calculated as $\delta_{n,9} = MAD_{n,9} - E(MAD_{n,9})$, where MAD = $\frac{1}{9} \sum_{i=1}^{9} |p_i - b_i|$ and $E(MAD_{n,9})$ is the expected mean absolute deviation on the first digit in the presence of n observations. Pre period goes from 2010 to 2014, while post period goes from 2015 to 2019. P-values are reported within parentheses below the tests and n number of observations for each sample in italics below the excess MADs.

For robustness, all the tests have been performed on different sampling procedures considering shorter time periods around the introduction of the accounting regulation (*e.g.*, 4 and 3 years before and after) from which we obtained qualitatively similar results. To summarise, our analysis confirms both our theoretical predictions. Firstly, the introduction of strict budget regulation for local governments is shown to be positively associated with earnings management practices in participating entities, as there is evidence of low quality in accounting data for the period following implementation of article 21 of legislative decree 175/2016, confirming PREDICTION 1. Thus, the first alternative hypothesis is not rejected. Secondly, the quality of MOEs' financial statements in the post-introduction period deteriorates even further when municipalities have to appropriate proportionally more resources to cover MOEs' losses, implying that local governments have increasing incentives to make their entity adjust published net income figures. This is consistent with our second prediction, related to the fact that a reduction in the spending power through financial resource appropriation for local governments increases the likelihood of earnings management practices in MOEs at an increasing rate, proportional to the municipality's ownership share. A policy that reduces spending for local governments if the financial performance of their MOEs suffers, encourages accounting data manipulation in these MOEs to ensure incumbent politicians can maintain their spending power. Predictably, this effect is more pronounced in those MOEs that are fully owned by these local governments.

6. Conclusions

This paper examined the unexplored issue of the impact of financial resource appropriation systems in local governments on the quality of MOEs' financial reporting. We find signs of accounting data manipulation upon the introduction of a new regulation that forces Italian municipalities to appropriate resources proportionally to their share of ownership in controlled entities when these report losses. Evidence of this manipulation is stronger as the ownership share increases, implying that as local governments face proportionally greater reductions in their spending power on the basis of their ownership share, they have greater incentives to get their entities to engage in the manipulation.

This study therefore contributes to the flourishing debate on earnings management practices in public sector accounting. It also extends the small body of literature examining political factors influencing the self-serving use of accounting techniques in public sector organisations by examining other influencing factors, such

as local government spending power. More importantly, we were able to develop new theoretical insights for earnings management in entities owned by governments which extend both positive accounting and agency theories. To the best of our knowledge, these predictions have no known parallel in the literature and the uniqueness of the setting analysed is an excellent opportunity to test them. Lastly, this paper sheds light on how well-intentioned government policies can backfire by incentivising municipalities and MOE executives to manipulate accounting data so as to avoid financial penalties. It thus suggests that reviewing these policies and taking the incentives of all actors into greater account may be appropriate.

Our results documented evidence of somewhat inefficient responses by those responsible for preparing the MOEs' financial statements also has major policy implications. Firstly, the activities of auditors are directly influenced given that, in the Italian context, auditors and forensic accountants will need to pay closer attention to the quality of MOEs' financial statements. At national level, stronger policies, both internal and external to the organization could help. Secondly, our empirical findings have clear implications in terms of MOE managers' reappointment and bonuses. It appears vital to shield managers from political influence, perhaps by implementing OECD recommendations and making the process of hiring managers more open. As a result, a sound strategy would ensure the independence of managers and managers while discouraging incumbent politicians from wielding control over them when the circumstances might favour such conduct. Thirdly, in light of the ongoing, recent debate over the adoption of accrual-based accounting by governments and state-owned enterprises, the quality of financial statements should always be at the heart of new international policies. The results of this study ultimately suggest that other similar major European countries, those which have more widespread development of SOEs in proportion to their GDP (Casamonti & Gottardo, 2020), should see our results as red flags and learn lessons from the Italian experience on how to prevent earnings management practices.

While the empirical approach used in this study can avoid the influence of other confounding factors on the results, such as economic cycles, the analysis can only be used to infer the quality of the accounting data itself, and not the direction (upward or downward) of the earnings management activities, or even the actual fraud. Another limitation of this study could lie in the interpretation of the empirical findings. The earnings management results are proxied by the quality of the MOEs' financial statements, which are the consequence of the anomalies and abnormal digit occurrence in net income figures. Any interpretation should remain confined to the quality of the accounting data or in symptoms of data manipulation, otherwise it

could be misleading. Possible alternative explanations can be processing inefficiency or errors, but the focus of this study remains that of accounting data quality. Further research could potentially investigate the issue examined in this study further with alternative mainstream approaches to spot any fraudulent behaviour more accurately. Moreover, the generalizability of the argumentation could be tested in other contexts with comparable institutional settings. Given the interesting results, it would also be worth further investigating the extent to which the accounting regulation analysed has had a genuine impact on reducing the losses of those particular entities and, in turn, has allowed local governments to save the financial resources that might be needed in the future to guarantee the continuity of the entities they own. A final avenue of research in the future can consist in verifying the active participation of incumbent politicians in the earnings management activities, based on Public Choice theory.

Notes

1. Such outcomes are more likely to occur in situations where corruption is tolerated to a greater extent.
2. On top of that, the mayor, whose term typically lasts longer than the manager's appointment, has complete authority and considerable discretion to appoint and remove MOE managers when the municipality's ownership stake exceeds 50% of the total shares.
3. Capalbo (2016) also discusses other reasons which motivated the legislator to intervene.
4. We acknowledge control samples should include untreated entities in order to compare results in our tests properly. However, selecting private companies that might be somewhat similar in terms of sector- or size-based criteria would severely hamper our ability to carry out the analysis, as there are significant differences in the way such businesses operate, are regulated, and prepare financial statements. Italian MOEs are quite unique and any comparison with other private-sector companies would produce misleading, or at least biased, results.
5. To understand why Benford's analysis is not affected by the possible presence of confounding factors, let us assume that we can express the effect Y of a stochastic confounding factor (the business cycle, say) on the variable of interest X in terms of percentage variation induced by the confounding factor itself. In other words, the effect of the confounding factor is multiplicative. Then, Berger and Hill (2011, Theorem 6.3) prove that under mild regularity conditions, if X is Benford, so is XY. This allows us to test statistical significance of accounting data manipulation over an extended period of time.
6. The importance of the excess MAD was already highlighted in Barney and Schulzke (2016). However, by deriving its asymptotic distribution, Cerqueti and Lupi (2021) could derive a formal test of conformity based on the excess MAD.

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