

# CYBER-ATTACKS AND EARNINGS MANAGEMENT IN THE PUBLIC SECTOR

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## Abstract

Cyber-attacks have inflicted significant harm on corporations, resulting in the theft of military secrets, the erosion of over \$100 billion in shareholder value, and the compromise of personal data for 150 million individuals, along with the shutdown of critical infrastructure. Academic research is recently growing to tackle the impact of cyber-attacks on companies. A stream of literature has focused on capital markets' reactions to information disclosure of cyber-attacked firms (Ettredge & Richardson, 2003; Hausken, 2007; Amir et al., 2018; Kamiya et al., 2021). Other existing studies have examined the impact of cyber-attacks on firms' performance (Ko & Dorantes, 2006; Ko et al., 2009) and earnings management (Xu et al., 2019; Jin et al., 2023; He et al., 2022), but all have predominantly looked at the United States and listed companies. Yet cyber-attacks remain a critically understudied threat to other countries with no evidence being provided on the impact of cyber threats on unlisted firms' performance and earnings management in the public sector. This research aims to fill these critical gaps in the literature and provide the first full look at the earnings quality effects of cyber-attacks across various affected unlisted state-owned companies, enabling

policymakers in the government and private sector to better understand and defend against cyber threats.

Earnings management is considered a common practice in the private sector, and numerous studies have been published to investigate this topic. More recently, earnings management has also been attracting the interest of scholars, conducting research in the public sector and other non-profit settings (Bisogno & Donatella, 2022). Several studies have explored earnings management practices within public sector contexts, encompassing 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 organizations (Anagnostopoulou & Stavropoulou, 2023; Nguyen & Soobaroyen, 2019), hybrid entities (Kido et al., 2012; Capalbo et al., 2021, 2023a, 2023b; Ruggiero et al., 2022; Serra Coelho, 2022), and comparisons between private and state-owned enterprises (Capalbo et al., 2014; Ding et al., 2007; Wang & Yung, 2011). These studies consistently reveal that earnings management practices are prevalent in public sector entities and non-profit organizations.

How do cyber-attacks affect the earnings management practices of unlisted firms in the public sector? Do managers in firms affected by cyber-attacks engage in earnings management activities to mitigate the negative impact of the attacks on their financial performance? How do the type of cyber-attack, disclosure delay, and external monitoring influence earnings management activities in the affected firms? How do earnings management activities impact the future performance of firms that have experienced cyber-attacks? This research aims to investigate the impact of cyber-attacks on earnings management practices of Italian unlisted firms in the public sector. Specifically, the study will focus on how cyber-attacks influence the decision-making process of managers in affected firms, leading to potential manipulation of earnings through earnings management. The research will build upon the existing literature on earnings management in the context of data security breaches and extend it to a public sector dimension.

On May 11, 2022, a cyber-attack disrupted several Italian institutional websites, including the Italian Senate, the Ministry of Defence, and the National Institute of Health. This marked the onset of a multi-day cyber onslaught affecting various Italian and international websites. Italian institutions predominantly rely on aging systems from common providers, heightening the systemic implications of such attacks. The concentration of risks within commonly used services presents the potential for sector-wide impacts, with high losses that could become macro-critical. Consequently, the context of Italian public sector entities provides the ideal setting on which to test the hypotheses of this study.

The research will employ Benford's (1938) law-based approach to spot earnings management activities, using a propensity score matched sample to compare the levels of earnings management between firms affected by cyber-attacks and their non-affected counterparts. The sample will consist of Italian unlisted firms in the public sector that have experienced cyber-attacks within a specified time frame. The study will also consider the role of corporate governance in mitigating earnings management practices in the context of cyber-attacks. The findings of this research will contribute to the existing literature on earnings management and data security breaches by providing new insights into the relationship between cyber-attacks and earnings management practices in the Italian public sector. Additionally, the study will offer valuable information for policymakers, regulators, and managers to develop effective strategies for mitigating the negative consequences of cyber-attacks on firms' financial performance and ensuring the integrity of financial reporting.

In conclusion, this research aims to fill a gap in the literature by examining the impact of cyber-attacks on earnings management practices in Italian unlisted public sector entities. The study will provide valuable insights into the decision-making process of managers in affected firms and the potential consequences of their actions on the firms' financial performance and future prospects. This, in turn, will benefit both public sector transparency and efficiency, a major concern for the society at large.

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