Taxation Digitalization, Earnings Management Trade-off and Firm Value: Evidence from Golden Tax Phase III

Abstract: This paper empirically examines the impact of taxation digitalization on earnings management trade-off strategies and firm value of China's A-share listed firms from 2008 to 2019. By leveraging the natural experiment of the phased implementation of the "Golden Tax Phase III" (GTP III) project across China, our results indicate that affected firms experienced a significant increase in real earnings management (REM) levels by 1.9%, while accrual-based earnings management (AEM) levels decreased significantly by 0.6%, leading to an overall rise in total earnings management levels. This effect is more pronounced in regions with higher marketization levels and industries characterized by intense competition. The results suggest that taxation digitalization raises the costs of accrual-based strategies, prompting firms to substitute with REM, which ultimately lowers firm value. Our findings fill a critical literature gap by exploring the nuanced effects of taxation digitalization on earnings management trade-off strategies and its impact on firm value. It offers valuable insights into corporate behavior and the effectiveness of regulatory reforms in promoting financial transparency and accountability.

Keywords: Taxation Digitalization; GTP III; Earnings Management Trade-off; Firm Value

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1. Introduction

This study examines the impact of taxation digitalization on earnings management trade-off strategy and firm value, in the context of China's "Golden Tax Phase III". While taxation digitalization has been recognized for enhancing governance and oversight, the broader implications on corporate financial behavior, specifically on earnings management, have yet to be fully explored. By conducting an-in-depth analysis in this under-researched area, this study sheds new insights on corporate financial practices and regulatory impacts.

As one of the key initiatives to achieve taxation digitalization, in 2013 the Chinese tax authorities introduced the "Golden Tax Phase III" (hereafter GTP III) in China. Taxation digitalization not only promotes tax management services, collection quality and efficiency, and the tax governance system, but can also have a profound impact on company behaviours. The GTP III, characterized by the integration of big data and cloud computing, has enhanced the transparency and efficiency of tax-related information supervision and management (Li et al., 2020a; Li et al., 2020b). However, prior literature shows earnings management is not limited to accounting methods. Listed firms can also achieve earnings management by distorting real business activities, called "real earnings management" (hereafter REM), and the two methods are substitutable. When the cost and difficulty of one method increase, listed firms may opt to use the other method (Zang, 2012; Ahmed et al., 2022). Therefore, to fully understand the impact of taxation digitalization on earnings management, and address a gap in the literature, it is imperative to examine how it affects the trade-off and choice between

the two earnings management methods, and its impact on firm value.

This paper mainly examines the impact of taxation digitalization on company's alternative earnings management strategies and its economic consequences. To the author's knowledge, this is the first paper to investigate the topic. The most common way of earnings management is to adjust accruals while following accounting standards to achieve accrual-based earnings manipulation. Another way for earnings management is by manipulating the real economic activities, for example, reducing R&D expenses, advertising expenses, delaying new projects or overproducing inventory (Roychowdhury 2006; Cunningham et al., 2020). Graham et al. (2005) finds that about 80% of the CFOs surveyed would reduce R&D expenses, advertising expenses, and maintenance expenses to increase earnings, while 55% of them would adjust current earnings by delaying new projects (Graham et al., 2005; Zang 2012). REM is more difficult to detect than AEM. Auditors can detect traces of AEM by scrutinizing and analysing a company's accounting records, but it is difficult to challenge earnings manipulation by changing its real operating activities within its normal range (Graham et al., 2005). As a result, more and more listed firms are managing earnings by manipulating real economic activities (Roychowdhury, 2006; Zang, 2012; Amin & Cumming, 2021). For example, by bundling video membership service and smart TV hardware, LeTV[1] transfered the hardware sales revenue of its subsidiary to the parent company as membership service revenue, which is a typical case of REM.

[1] LeTV (300104), as the world's first listed video website enterprise, was listed on China's Growth Enterprise Market in August 2010, and was terminated by Shenzhen Stock Exchange in May 2020 (Li and Guo, 2018) and fined 240 million yuan by the Beijing Securities Regulatory Bureau for its financial fraud. LeTV Zhixin, a subsidiary of LeTV, was mainly engaged in the sales of smart TV sets.

In addition, listed firms trade off between REM and AEM. When the cost and difficulty of one type of earnings management increases, listed firms will switch to the other type of earnings management (Cunningham et al., 2020; Zang 2012; Ho et al., 2015; Ahmed et al., 2022). In particular, when accounting standards become more sophisticated and external regulation is strengthened, listed firms are more inclined to reduce AEM and increase REM. Cohen et al. (2008) report that the implementation of the SOX Act strengthened the accounting regulation and prompted firms to shifted away from AEM to REM. Kim et al. (2019) found that in the quasi-natural experiment of implementation of the extensible Business Reporting Language (XBRL) enforced by the US Securities and Exchange Commission (SEC), the AEM of listed companies was inhibited through a reduction of discretionary accruals. Consistent with Cohen's perspective, as constraints on AEM grew, firms turned to REM as an alternative strategy, resulting in an increase in REM following the adoption of XBRL (Kim et al., 2019). Ho et al. (2015) find similar results in China, that is, after adopting the more stringent IFRS accounting standards, listed firms significantly increased the degree of REM. In addition, Cohen and Zarowin (2010) and Cunningham et al. (2020) note that listed firms are more inclined to adopt REM as an alternative to AEM when they are subject to more stringent audits during Seasoned Equity Offerings, and when they are scrutinised by the SEC after receiving the SEC comment letters. In this regard, Ahmed et al. (2022) pointed out that the political connections of listed companies alter the impact of SEC enforcement on the trade-off between accrual and REM strategies.

In recent years, the corporate governance role of tax administration has attracted

significant interest from scholars (Desai, 2004). When corporate behavior undermines income tax collection, tax authorities have strong incentives to monitor corporate behavior and prevent its insiders from exploiting company resources for personal gain. However, unlike other minority shareholders, the tax authorities have a more specialized team and information network, making it one of the most specialized external monitoring forces with significant influence on corporate financial behavior (Hanlon et al., 2014). It has been shown that strengthening of government tax collection and administration will reduce the majority shareholders "tunnelling behavior, improve the quality of listed firms" financial reporting and reduce earnings management (Hanlon et al., 2014; Blaylock et al., 2015; Cazier et al., 2015). With the expansion of the GTP III, the improvement in the taxation digitalization level enables the tax authorities to check the listed firms' financial records more efficiently and quickly using big data. The tax administrators can compare the income tax, taxable income, and other data such as costs, profits and inventory, to tell whether the company expenses are abnormal or not, by combining with the industry data and historical data, and find traces of AEM. Therefore, we predict that in the context of taxation digitalization, the complexity and expenses associated with AEM will increase significantly, and listed firms will reduce AEM and increasingly tend to replace AEM with more discreet REM.

We employ a difference-in-differences (DID) model to test the impact of taxation digitalization on corporate earnings management trade-off strategies. The staggered implementation of the GTP III across the country provides a quasi-natural experiment setting. Using Chinese A-share firms listed on the Shanghai and Shenzhen stock

exchanges from 2008 to 2019, our study finds that taxation digitalization significantly changes the earnings management strategies of listed firms. Our analysis reveals significant differences in earnings management strategies between firms in regions that have implemented the GTP III and those in regions that have not. Specifically, listed companies in GTP III regions exhibit a 0.6% decrease in AEM compared to their counterparts in non-GTP III regions. Conversely, these same firms show a 1.9% increase in REM activities. Our findings indicate a strategic shift in earnings management practices as the complexity and expenses associated with AEM rise. Companies appear to be pivoting towards REM as an alternative approach. Notably, this transition is not one-for-one. The observed increase in REM activities substantially outweighs the decrease in AEM, resulting in a net elevation of overall earnings management. This asymmetry in the trade-off between AEM and REM suggests that firms are not merely substituting one practice for another, but potentially expanding their earnings management efforts. The disproportionate rise in REM implies that companies may find these methods more feasible or less detectable under increased scrutiny, despite their potential for greater operational impact. This result holds for the sample of "suspicious" firms and satisfies various robustness tests. Heterogeneity tests suggest that this substitution effect is more pronounced in the more market-oriented and less competitive listed firms.

Our mechanism analysis reveals that taxation digitalization, particularly the implementation of the GTP III, increases the complexity and costs associated with AEM. In response, firms are shifting towards REM strategies. This transition is more

pronounced in companies that previously found AEM less challenging and costly, suggesting these firms are more sensitive to the new regulatory environment. Further investigation demonstrates that this shift in earnings management tactics has significant implications for firm performance. The increase in REM and overall earnings management activities correlates with a decline in firm value, as evidenced by decreases in both Tobin's Q and Return on Assets (ROA). These findings underscore the unintended consequences of taxation digitalization on corporate financial practices. While designed to enhance transparency and compliance, these measures appear to be inadvertently pushing firms towards potentially more disruptive forms of earnings management, ultimately impacting their financial health and firm value.

Our paper makes important contributions to the literature. First, we address a crucial gap in the literature by examining the impact of taxation digitization on corporate earnings management strategies, providing a comprehensive understanding of corporate behavior. This adds original contributions to this line of literature. Our study reveals that post the implementation of taxation digitalization, the listed firms take an alternative strategy of increasing REM, with the AEM decreasing. This strategy shows that firms fully weigh the costs and complexities of earnings management, and shift to the more covert and imperceptible REM (Zang 2012). This finding enhances the theoretical understanding of how taxation policies shape corporate financial behavior, unpacking the true discourse on the role of taxation digitalization in corporate strategy.

Secondly, our paper examines the corporate impacts of the digital government from

the perspective of taxation digitization, which advances the digital government literature in the emerging economy context. Results from this paper suggest whilst the taxation digitization improves the data transparency and the regulatory governance based on big data, company managers may shift their earnings management method to achieve their creative accounting goals. This suggests the importance of other additional measures to mitigate the agency problem. For example, boards of directors, institutional investors, and other stakeholders may consider establishing long-term interest alignment incentive to encourage managers to pursue the firm's long-term goals.

Third, our study advances the literature on earnings management strategies by being among the first to examine the impact of taxation digitalization on these strategies. Although existing literature (Cohen et al., 2008; Cunningham et al., 2019; Ho, 2015) has shown that stricter regulatory environment lead firms to shift from AEM to REM, these studies mainly focus on securities regulations, such as Sarbanes-Oxley Act (SOX), SEC comment letters and the adoption of International Financial Reporting Standards (IFRS). Our paper, however, focuses on the digital reform of taxation, namely the GTP III, and investigates its impact on earnings management strategies of listed firms, providing fresh insights into how digital transformation affects earnings management strategies.

Lastly, our study provides novel empirical evidence on the economic consequences of earnings management strategies driven by taxation digitalization, an area that has received limited attention in existing literature. While previous research has primarily focused on detecting and preventing earnings management, our work illuminates the

financial implications of these practices in the context of evolving tax systems. We find that the shift from AEM to REM, prompted by increased tax scrutiny, negatively impacts firm value. This is evidenced by significant declines in both Tobin's Q and ROA. These findings challenge the assumption that enhanced tax oversight invariably leads to improved corporate performance and higher firm value. Our results suggest that despite increased transparency in tax reporting, underlying agency issues persist. Moreover, the broad stakeholders appear to recognize and respond to these concerns, as reflected in the reduced firm value and market valuations. This insight broadens our understanding of how taxation digitalization affects corporate behavior and market perceptions. By highlighting these unintended consequences, our research offers valuable insights for both academic researchers and practitioners. It underscores the need for a more nuanced approach to tax policy and corporate governance, one that considers the complex interplay between regulatory changes, management strategies, and market reactions.

The rest of the paper is organized as follows: Section 2 explains the institutional background, literature review and develops hypotheses, Section 3 describes the research design, followed by the empirical results and analysis in Section 4. Sections 5 and 6 conduct the heterogeneity test and the mechanism test. Section 7 examines the economic consequences and the final section concludes the paper.

2. Institutional Background, Literature Review and Hypotheses

2.1. Institutional Background

Taxation digitalization is a central part of China’s tax modernization efforts. The

Golden Tax project, launched in 1994 to address Value Added Tax (VAT) fraud, faced initial challenges but eventually established a comprehensive VAT system over two decades. Since 2013, Phase III of the project has incorporated advanced technologies like big data and cloud computing, enhancing tax collection, management, and governance to modernize the system. GTP III, one of the key projects in China's national e-government strategy, was approved by the State Council to drive tax modernization. Its objective is to create a unified platform with two levels of data processing (national and provincial), covering all tax types and integrating national and local taxes. The system is built around four core functions: tax collection, administrative management, external information, and decision-making support.

After the evolution and experience gained from the Phase I and Phase II projects, the State Administration of Taxation (SAT) proposed the construction concept of GTP III as early as 2001. The overall objective of GTP III is to establish "one platform, two levels of processing, three covers, and four systems". The "one platform" refers to a unified technical infrastructure platform comprising network hardware and foundational software. "Two levels of processing" involve enabling data transmission and centralized processing at both the General Administration and provincial levels, utilizing the unified technical infrastructure platform. "Three covers" refer to the gradual inclusion of application content for all tax types, all work segments, both national and local taxes, and networking with relevant departments. The "four systems" indicate the development of GTP III through the reorganization, optimization, and standardization of business operations. These four systems encompass an integrated

application system software primarily based on the levy management business system, as well as administrative management, external information, and decision-making support. The overall scale and complexity of GTP III are unprecedented in the realm of domestic e-government.

On September 7, 2005, the State Council reviewed and approved the GTP III project proposal. In 2009, the SAT launched the first phase of GTP III and gradually organized the implementation of its information system. The SAT managed the development and testing of the GTP III information system, while also overseeing the construction of a national wide-area network (WAN) and the infrastructure of pilot units, including computing, storage, and security systems.

From June 2012 to October 2013, a pilot for the GTP III system was conducted in three provinces/municipalities—Chongqing, Shanxi, and Shandong—to test and optimize the software's performance. By the end of 2013, drawing from the initial pilot experience, and considering recent tax reforms and the evolving requirements of the SAT, GTP III adopted a model of "production data residing at provincial bureaus, with centralized data processing and application at the SAT," further improving its performance.

In 2015, the SAT expanded the GTP III system to 14 provinces and autonomous regions, including Hebei, Ningxia, and Guizhou. This effort continued into 2016, when another 14 provinces, including Hebei, Ningxia, and Guizhou, adopted the system. By October 2016, the SAT had completed the rollout of the GTP III system in 16 additional provinces/municipalities, such as Liaoning, Jiangxi, and Fujian. With this, the GTP III

became fully operational nationwide, marking the establishment of the first nationally unified tax collection and management system with comprehensive coverage across all tax authorities.

In 2018, the national and local tax systems were merged, resolving the issue of parallel tax systems and further advancing taxation digitalization. By 2024, GTP III had fully centralized tax data, standardized law enforcement, improved tax management capabilities, and significantly reduced tax collection costs, marking a major milestone in China's tax modernization. The implementation of GTPIII constitutes a quasi-natural experiment, enabling us to empirically examine the impact of taxation digitalization on the earnings management tradeoff and the firm value.

Table 1 outlines the four phases of the GTP III project across the country.

[Insert Table 1 about here]

2.2. Literature Review

Information technology is transforming the way tax collection authorities operate, improving both the efficiency of processes and the quality of services. Simultaneously, taxation digitalization has had a profound impact on corporate behavior. Existing studies suggest that tax-related technology enhancements positively affect corporate behavior, particularly in increasing tax compliance. For example, Fan et al. (2018) analyzed the dynamic impact of VAT e-invoicing on tax revenues and corporate tax payment behaviors using balanced panel data of Chinese manufacturing listed firms from 1998 to 2007. They found that the e-invoicing accounted for 14.38% of cumulative VAT revenue and increased the effective average tax rate by 4.7% to 14%

over seven years. Similarly, Bellon et al. (2019) investigated the impact of tax digitalization in Peru, focusing on the VAT e-invoicing reform. They found that e-invoicing adoption increased firms" declared value-added, VAT liabilities, and payments by more than 10%. Ali et al. (2015) used the VAT invoicing reform in Ethiopia as a natural experiment and found that electronic tax systems (ETS) significantly increased firms" VAT payments and raised government revenues. Most of these studies focused on the early stages of VAT tax collection technology.

Some emerging studies explored the impact of the GTP III on listed firms in China. Cheng and Wei (2024) revealed that the introduction of the GTP III significantly enhanced corporate job creation, particularly in large-scale and non-state-owned enterprises. Cheng et al. (2024) examined the impact of the GTP III on local government debt, finding that it significantly reduced debt levels, especially in the eastern regions and areas with higher levels of informatization. Hai et al. (2024) explored the impact of the GTP III on corporate ESG performance, concluding that digitalized tax administration signficantly improved ESG performance by enhancing the external information environment of firms. From a corporate performance perspective, He and Yi (2023) discovered that the implementation of the GTP III significantly diminished corporate performance by increasing tax burdens, reducing the scale of new investments, and exacerbating financial issues. While these studies offer valuable insights, they have not yet ventured into the realm of exploring the effects of taxation digitalization on earnings management strategies and firm value.

The rise in tax-related digitalization systems can also lead businesses to adjust their

strategies. On one hand, the improvement of taxation digitalization increases tax authorities' monitoring capabilities, prompting listed firms to adjust their behavior in monitored areas, such as reducing tax avoidance. On the other hand, listed firms may adjust in unmonitored areas, which could offset the positive effects of taxation digitalization. For instance, Carrillo et al. (2017) studied the impact of third-party information reporting in Ecuador and found that listed firms adjusted their declared income when discrepancies were identified between declared and third-party reported income. However, the increase in declared income also raised those listed firms' filing costs, thus offsetting the benefits of increased reporting. Beyond tax filing, taxation digitalization may also impact broader business strategies. Fan et al. (2020) examined China's VAT invoicing reform and found that listed firms reduced domestic sales and increased exports when faced with the reform.

Although scholars have examined the economic consequences of taxation digitalization, several areas remain underexplored. First, the impact of taxation digitalization on micro-corporate behavior requires further investigation. Much of the existing research focuses on tax compliance, with only limited studies examining its impact on business strategy, primarily on export behaviors so far. Given the importance of taxation digitalization, its impact on business strategies warrants deeper analysis. Second, there is no consensus on the relationship between taxation digitalization and corporate behavior. Some studies suggest that taxation digitalization positively influences corporate behavior, while others argue that taxation digitalization can prompt businesses to adjust their strategies, thus neutralizing the positive effects from it. Third,

the implications of emerging technologies like big data and cloud computing in the tax sector and their corporate level impact require further discussion.

Meanwhile, existing literature has examined the impact of regulatory measures on earnings management strategies, i.e. the tradeoff between AEM and REM, mostly in western countries. Their findings generally reveal that regulatory measures restrict firms' ability to engage in AEM, while simultaneously driving an increase in REM following the regulatory implementation due to heightened costs associated with AEM. Cohen et al. (2008) found that after the implementation of SOX, companies shifted from AEM to REM. This finding provides an initial clue to our prediction of the impact of tax digitalization on earnings management strategies. Cunningham et al. (2019) focused on the impact of comment letters from the Securities and Exchange Commission (SEC) on corporate earnings management. They find that firms receiving SEC comment letters significantly decrease their use of AEM and increase their reliance on REM. Similarly, Ho (2015) studied the impact of the adoption of IFRS in Chinese A-share listed companies on earnings management, finding that after the IFRS adoption, AEM levels of firms decreased significantly, while REM levels increased.

Though findings in the existing literature suggest that a more stringent regulatory environment leads firms to shift from AEM to REM, providing a valuable theoretical and empirical foundation, few studies examine the impact of digital transformation on corporate earnings management strategies. Only one study, Kim et al. (2019), provides insights on how the enforcement of eXtensible Business Reporting Language (XBRL) by the US SEC affects corporate earnings management strategies by adopting the DID

design. They documented that the adoption of XBRL significantly reduced the level of AEM and increased the level of REM in firms. Unlike Kim et al. (2021), our study focuses specifically on taxation digitalization reform, using the GTP III project as a natural experiment to expand existing research on the impacts of taxation digitalisation on corporate behavior. In summary, our findings reflect trade-offs after accounting for changes in the regulatory environment and tax costs. Our paper also explores how taxation digitalization impacts corporate earnings strategies and, in turn, affects firm value. Additionally, it discusses how businesses should respond to the challenges presented by the information era.

2.3. Theoretical Framework and Hypothesis Development

This study develops an integrated theoretical framework to examine how taxation digitalization influences firms' earnings management strategies and firm value. Specifically, we propose that taxation digitalization increases regulatory scrutiny and detection capabilities, leading firms to shift from accrual-based earnings management (AEM) to real earnings management (REM) strategies, ultimately affecting firm value. We conceptualise the process through which taxation digitalization affects earnings management choices as occurring in three distinct yet interrelated stages. This sequential framework is grounded in the underlying theoretical perspectives guiding our study.

The first stage involves increased regulatory pressure and scrutiny. The implementation of GTP III represents a significant enhancement in tax authorities' monitoring capabilities through big data analytics and cloud computing (Desai et al.,

2007; Hanlon et al., 2014). This digital transformation enables tax authorities to more efficiently detect accounting anomalies and suspicious financial reporting patterns, particularly for firms with varying levels of regulatory intensity and accounting flexibility. The increased detection probability fundamentally alters the risk-reward calculus for firms engaging in earnings management, especially for AEM which leaves more traceable evidence in financial records.

The second stage relates to changes in the relative costs and challenges of different earnings management strategies. As taxation digitalization increases the costs and complexity of executing AEM, firms rationally evaluate alternative approaches to achieve their earnings management objectives (Cohen & Zarowin, 2010). This cost-benefit recalibration is particularly salient for firms with varying degrees of accounting flexibility and regulatory oversight. REM, while potentially more costly in terms of operational impact, becomes relatively more attractive due to its lower detection risk under enhanced digital monitoring. This strategic adaptation reflects firms' rational response to the changed regulatory environment (Zang, 2012).

The third stage involves performance feedback and value implications. When firms increase their reliance on REM in response to enhanced digital monitoring, they accept greater operational inefficiencies that can negatively impact firm value (Cohen et al., 2008). The substitution of AEM with more opaque but operationally disruptive REM strategies creates a feedback loop where earnings management choices affect future firm performance. This relationship is particularly pronounced in environments with varying levels of market development and competitive intensity, reflecting the complex

interplay between regulatory pressure and market forces. Building on this three-stage theoretical framework, we develop our main hypotheses:

First, with the implementation of the GTP III, the tax authority, using big data, can check the financials of listed firms more efficiently and quickly, comparing the actual tax amount, tax revenue, costs, profits and inventories, and judging whether the company's expenses are abnormal or not by benchmarking with the industry data and historical data. Therefore, the tax authority is more likely to find traces of AEM as excessive differences between accounting profit and taxable income. This will directly lead to a rise in the cost of AEM (Cunningham et al., 2020). In addition, other regulators (e.g., the SEC and the Stock Exchanges) and auditors may also focus and target their investigations on corporate financial information based on the issues identified by the tax review in order to identify and assess the risk of misstatement of corporate disclosures. This additional scrutiny triggered by tax regulation will indirectly increase the regulatory pressure faced by listed firms and further increase the cost of AEM (Cunningham et al., 2020). Enhanced digital monitoring capabilities increase both the detection probability and costs associated with AEM, making it less attractive as an earnings management strategy. Prior research has shown that increased regulatory scrutiny tends to reduce firms' reliance on accounting-based manipulation strategies (Kim et al., 2019). Therefore, we propose:

Hypothesis 1 (H1): The implementation of taxation digitalization (GTP III) is negatively associated with firms’ level of accrual-based earnings management.

Second,compared with AEM, REM mainly realizes earnings management by

changing the actual operating activities, and it is difficult for the regulators to distinguish whether the real purpose of changing the operating activities is to manipulate the earnings or to maximize the firm value. Since the manipulation method is more discreet, the likelihood of detection by the tax authority is reduced. In addition, auditors can find traces of AEM through rigorous review and reasoning of accounting policies, but it is difficult to challenge the changes in earnings caused by changes in the company's operating activities within the normal range (Graham et al., 2005). Based on these characteristics of REM, company executives have intensified their use of REM in recent years (Graham et al., 2005). In addition, listed firms will make a trade-off between REM and AEM, and when the cost of one type of earnings management increases, listed firms will switch to the other type of earnings management (Cunningham et al., 2020; Zang 2012; Ho et al., 2015). Especially when the accounting regulatory environment becomes more stringent (e.g., enhanced external auditing and governmental regulation), it is more difficult for listed firms to manipulate the accrued earnings, and they are more inclined to reduce the AEM and increase the REM (Cohen et al., 2008; Kim et al., 2019). Accordingly, we hypothesize:

Hypothesis 2 (H2): The implementation of taxation digitalization (GTP III) is positively associated with firms' level of real earnings management.

Lastly, as firms substitute AEM with REM in response to taxation digitalization, they incur real operational costs through suboptimal business decisions. While REM may be less detectable under enhanced digital monitoring, it often involves departures from optimal operational practices, such as reducing R&D investments, cutting

discretionary expenses, or overproducing inventory (Cohen & Zarowin, 2010). These operational distortions can significantly impair firm efficiency and long-term value creation. Moreover, market participants may recognize and penalize firms for engaging in value-destroying REM activities (Kothari et al., 2016). Therefore, we hypothesize:

Hypothesis 3 (H3): The implementation of taxation digitalization (GTP III) leads to decreased firm value.

3. Research Design

3.1. Sample Selection and Data Source

Our sample consists of A-share firms listed in the Shanghai and Shenzhen Stock exchange markets. We restrict the sample period from 2008 to 2019 to avoid potential impacts from the COVID-19 pandemic. All financial data employed in our analysis are derived from the CSMAR database, while the marketization index data are sourced from the Marketization Index of China's Provinces: NERI Report 2018 compiled by Wang et al. (2019). Guided by existing studies, we adopt the following data treatment procedures: (1) Exclusion of firms operating in the financial sector; (2) Removal of firms under special conditions such as ST, *ST, or those that have suspended or ceased listing; (3) Exclusion of firms with missing data in key variables; (4) To mitigate the impact of outliers, we perform 1% winsorization at both ends of the distribution for all continuous variables.

3.2. Research Design

We exploit China's Golden Tax Project Phase III (GTP III) implementation as our empirical setting. The GTP III was rolled out gradually across different regions in China

starting from 2013. This staggered implementation creates variation in both timing and geographic coverage, providing an ideal quasi-natural experimental setting to examine how enhanced tax monitoring through digitalization affects firms' earnings management behaviors. We employ a staggered difference-in-differences (DID) design to capture this variation in our empirical analysis.:

$$\mathrm{EM}_{i,t} = \alpha_0 + \beta_1 GTP_{i,t} + \beta_2 Controls_{i,t} + \gamma_t + \delta_i + \varepsilon_{i,t} \quad (1)$$

where$\mathrm{EM}_{i,t}$represents earnings management, encompassing both AEM (*AEM*) and REM (*REM*), *GTP* is a dummy variable representing the implementation of the GTP III project, which reflects changes in taxation digitalization across different regions. It is assigned a value of 1 if the project was launched in the company's location in year t, and 0 otherwise. This variable functions similarly to the interaction term in a traditional Difference-in-Differences approach. The treatment group includes listed firms in regions where the GTP III was implemented, while the control group consists of listed firms in regions where the project had not yet been implemented during the sample period. The term *Controls* refers to a set of variables that include market share, financial status, institutional holdings, Big Four accounting firms, auditor qualifications, net operating assets, business cycle, company size, return on net assets, and book-to-market ratio. The specific definitions of these variables will be detailed later. Additionally, we control for time-fixed effects (γ_t) and firm-fixed effects (δ_i) to account for changes in macro factors over time and firm-level heterogeneity that remains constant. Finally, we perform clustering at the firm level to address potential intra-firm correlations.

3.3. PSM Sample Construction

We use Propensity Score Matching (PSM) to identify a control group of firms with characteristics similar to those of the treatment group. This method helps minimize differences between the two groups, reducing estimation bias from time trends (Heckman et al., 1997; Heckman et al, 1998). Specifically, we estimate the following probit model:

$$P(GTP = 1)_{i,t} = \alpha_0 + \beta_1 Controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

The matching process involves several steps: (1) Random Sorting: to mitigate order effects, we randomly sort all variables before matching (Dehejia, 2005). (2) Probit Model Estimation: using the probit model, we estimate the propensity score for each observation, with *GTP* as the dependent variable and all control variables from model (1) as explanatory variables. (3) Repeated Matching: following a repeated, replaceable matching method based on propensity scores, we match each firm that implemented the GPT III project with the nearest non-implementing firm in a 1:1 ratio. After these steps, we obtain a PSM sample of 9006 firm-year observations, which will be used for subsequent analyses.

3.4. Variable Definition

3.4.1. Taxation Digitalization

Our core explanatory variable is the dummy variable *GTP* for the GTP III project, which measures changes in the degree of taxation digitalization. If a company's location piloted the GTP III project in year t, *GTP* is assigned a value of 1; otherwise, it is 0. Regions that commenced the project in the latter half of the year are treated as initiating

the pilot in the subsequent year.

3.4.2. Earnings Management

(1) AEM

Following the existing literature, we use the modified Jones model to measure the level of AEM (Johns, 1991; Dechow et al., 1995). Specifically, we calculate discretionary accruals using the following regression model:

$$\frac{TAC_{i,t}}{TA_{i,t-1}} = \alpha_0 + \alpha\frac{1}{TA_{i,t-1}} + \alpha_2\frac{\Delta Sales_{i,t}}{TA_{i,t-1}} + \alpha_3\frac{PPE_{i,t}}{TA_{i,t-1}} + \alpha_4 ROA_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

where i represents the listed company, t represents the year, total accruals (*TAC*) is "net profit minus cash flow from operating activities", *TA* is total assets, $\Delta Sales$ is the change in operating income, *PPE* is fixed assets, and *ROA* is the return on assets. For each industry and accounting year, we use model (3) to calculate the residual (ε), and use the residual (ε) to measure the level of AEM (*AEM*). Following Johns (1991), we take the absolute value of *AEM* in the regression model as a proxy for AEM.

(2) REM

Following Roychowdhury (2006) and Cohen and Zarowin (2010), we measure REM using abnormal operating cash flow (*AbCFO*), abnormal production costs (*AbPROD*), and abnormal discretionary expenses (*AbDISEXP*). We first estimate the normal values of operating cash flow, production costs, and discretionary expenses through linear regression, then subtract these normal values from the actual amounts for the current year to obtain the abnormal values. Based on these calculations, we construct a composite indicator of REM (*REM*).

Model (4) estimates the firm's abnormal net operating cash flow (*AbCFO*):

$$\frac{NCFO_{i,t}}{TA_{i,t-1}} = \alpha_0 + \alpha\frac{1}{TA_{i,t-1}} + \alpha_2\frac{Sales_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (4)$$

where *NCFO* is the net cash flow from operating activities, *TA* is total assets, and *Sales* is operating income. For each industry and accounting year, model (4) is used to estimate and obtain the residual (ε), which is the abnormal net operating cash flow (*AbCFO*) of each firm. A smaller *AbCFO* indicates a higher level of *REM*.

Model (5) estimates the firm's abnormal production costs (*AbPROD*):

$$\frac{Prod_{i,t}}{TA_{i,t-1}} = \alpha_0 + \alpha\frac{1}{TA_{i,t-1}} + \alpha_2\frac{Sales_{i,t}}{TA_{i,t-1}} + \alpha_3\frac{\Delta Sales_{i,t}}{TA_{i,t-1}} + \alpha_4\frac{\Delta Sales_{i,t-1}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (5)$$

where *Prod* is production cost, including the cost of sales and changes in inventory, and $\Delta Sales$ is the change in operating income. For each industry and accounting year, we use model (5) to estimate and obtain the residual (ϵ), representing the abnormal production cost (*AbPROD*) for each firm. A larger *AbPROD* indicates a higher level of *REM*.

Model (6) estimates the firm's abnormal discretionary expenses (*AbDISEXP*):

$$\frac{Disexp_{i,t}}{TA_{i,t-1}} = \alpha_0 + \alpha\frac{1}{TA_{i,t-1}} + \alpha_2\frac{Sales_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t} \quad (6)$$

where *Disexp* is production cost, including administrative expenses and sales expenses, and $\Delta Sales$ is the change in operating income. For each industry and accounting year, we use model (6) to estimate and obtain the residual (ε) , representing the abnormal discretionary expense (*AbDISEXP*) for each firm. A smaller *AbDISEXP* indicates a higher level of *REM*.

$$REM_{i,t} = AbPROD_{i,t} - AbCFO_{i,t} - AbDISEXP_{i,t} \quad (7)$$

(3) Total Earnings Management

Finally, following Zang (2012), we use the sum of *AEM* and *REM* to measure total

earnings management (*TotalEM*), as calculated in model (8).

$$TotalEM_{i,t} = AEM_{i,t} + REM_{i,t} \quad (8)$$

where *AEM* is the accrual-based earnings level estimated and obtained through model (3), and *REM* is the real earnings level calculated through model (7).[2]

3.4.3. Control Variables

Following Zang (2012), we control for the following firm characteristics in our model: industry-adjusted firm size (*Asst_Indadj*), return on net assets (*ROA*), and book-to-market ratio (*MB*). Additionally, we account for cost factors that influence different types of earnings management. Specifically, we control for the following cost factors affecting *REM*: market share (*Market_Share*), financial condition (*Z_Score*), and institutional ownership ratio (*Insti*). For AEM, we control for: Big 4 accounting firms (*Big4*), auditor tenure (*Audit_Tun*), net operating assets (NOA), and operating cycle (*Cycle*).

Moreover, consistent with Zang (2012), we control for the level of abnormal REM (*Unpred_REM*) in the model where AEM (*AEM*) is the dependent variable. In models where REM (*REM*) and total earnings management (*TotalEM*) are the dependent variables, we further control for earnings management targets (*Earn*). The specific definitions of the main variables are provided in Table 2.

[Insert Table 2 about here]

3.5. Descriptive Statistics

Table 3 presents the descriptive statistics of the key variables. Panel A provides the

[2] When assessing the total level of earnings management, this study adopts the methodology of Zang (2012), combining AEM and REM without applying absolute values to either.

descriptive statistics for the full sample. The mean of *GTP* is 0.410, indicating that 41% of the listed firms in the sample are in the treatment group. Additionally, the mean values for AEM (*AEM*) and REM (*REM*) are 0.060 and 0.006, respectively. This indicates that in the sample, the degree of AEM of listed firms is higher than that of REM. Finally, there are no outliers in the statistical distributions of the control variables such as firm size (*Asset_Indadj*) and profitability (*ROA*), indicating that the winsorization of the variables is effective.

Panel B compares the mean differences in firm characteristics between the treatment and control groups in the full sample, revealing significant differences between the two groups. To mitigate bias arising from these differences, we employ the PSM method to neutralize these effects.

Panel C examines the mean differences in firm characteristics between the treatment and control groups within the PSM sample. The results indicate that the matching process effectively eliminates the differences in firm characteristics. Subsequent regression analyses will be conducted using this matched sample.

Panel D compares the mean differences in corporate earnings management levels between listed firms in regions where the GTP III system has been launched and those where it has not. The findings show that listed firms in regions without the GTP III exhibit significantly higher levels of AEM than those in regions with the system. This suggests that the implementation of the GTP III may reduce AEM in the treatment group, providing preliminary support for Hypothesis 1. However, further empirical testing is required to confirm this conclusion. Additionally, there are no significant differences in

REM and total earnings management levels between the two groups, necessitating further empirical analysis to test Hypothesis 2.

[Insert Table 3 about here]

4. Empirical Results and Analysis

4.1. Baseline Results

A regression based on model (1) is used to test the impact of the GTP III project on corporate earnings management. Table 4 presents the basic regression results. In column (1), the regression coefficient of GTP is -0.006, significant at the 5% level; in column (2), the regression coefficient of *GTP* is 0.019, also significant at the 5% level. These results indicate that, compared to listed firms in regions where the GTP III project has not been implemented, listed firms in regions with the project have significantly reduced their levels of AEM (*AEM*) and significantly increased their levels of REM (*REM)*. This suggests that, following the implementation of the GTP III, listed firms have deliberately reduced AEM and instead shifted towards REM. These findings are consistent with Hypotheses 1 and 2. Furthermore, the coefficients of *GTP* in columns (1) and (2) reveal that the increase in REM is greater than the decrease in AEM. Therefore, we further investigate the impact of the GTP III project on the total earnings management level of listed firms.

The results in column (3) show that, the total earnings management level of listed firms has significantly increased. This indicates that although the GTP III project has curbed accrual-based earnings manipulation to some extent, it has "forced" listed firms

to adopt more REM. Consequently, the total earnings management level has not decreased but increased. This suggests that the increase in REM due to enhanced taxation digitalization has offset the positive impact of taxation digitalization on AEM (Carrillo et al., 2017).

From an economic significance perspective, the coefficient of GTP in column (1) indicates that, after the implementation of the GTP III, the AEM of listed firms decreases by 60 basis points, equivalent to 18.2% of the median net income of listed firms in the sample (0.006/0.033) [3]. The coefficient of GTP in column (2) indicates that REM increases by 190 basis points, or 57.6% of the median net income of listed firms in the sample (0.019/0.033). These coefficients are highly significant in economic terms compared to commonly used measurement standards by auditors, such as 50 basis points of total assets or 20% of net income (Eilifsen and Messier, 2015).

The basic tests show that taxation digitalization has strengthened supervision over listed firms and standardized corporate financial behavior, thereby increasing the cost of AEM and reducing its level. However, considering only AEM does not fully capture the adjustment in a company's overall earnings management strategy. When incorporating REM into the analytical framework, we find that taxation digitalization leads managers to adopt more covert REM to replace AEM, and this effect is asymmetric, increasing the overall earnings management level. When a company engages in AEM, it can make equal and opposite adjustments in subsequent years. In contrast, REM involves altering real business activities, making precise adjustments

[3] Where 0.033 represents the median of corporate net income.

difficult to achieve, with only the direction and approximate range being controllable. To ensure the adjustment range of REM is not less than the decrease in AEM, listed firms may increase REM to a greater extent than the decrease in AEM.

[Insert Table 4 about here]

4.2. Robustness Tests

In this section, we implement a series of robustness tests to further verify the main results.

4.2.1. Parallel Trend Test

The difference-in-differences (DID) method relies on the parallel trend assumption, which posits that, before the policy shock, the earnings management levels of the experimental and control groups follow a parallel trend. We adopt the method of Li et al. (2018) to test this assumption. The model is specified as follows:

$$\mathrm{EM_{i,t}} = \alpha_0 + \beta_1 Before2_{i,t} + \beta_2 Before1_{i,t} + \beta_3 Currrent_{i,t} + \beta_4 After1_{i,t} +$$

$$\beta_5 After2_{i,t} + \beta_6 Controls_{i,t} + \gamma_t + \delta_i + \varepsilon_{i,t} \qquad (9)$$

where *Before2*, *Before1*, *Current*, *After1*, *After2* are time dummy variables representing the periods 2 years before, 1 year before, the year of, 1 year after, and 2 years after the implementation of the GTP III project, respectively. These variables are assigned a value of 1 if the observation falls within the respective period, and 0 otherwise. The definition of other variables is the same as model (1).

Figure 1 presents the estimation results of the coefficients for the time dummy variables *Before2*, *Before1*, *Current*, *After1*, *After2*, within a 95% confidence interval. Figure 1(a) shows the parallel trend test for *AEM*, and Figure 1(b) shows the parallel

trend test for *REM*. In Figure 1(a) and Figure 1(b), the coefficients for *Before2* and *Before1* are not significant, indicating no significant difference in the level of earnings management between the treatment and control groups before the implementation of the GTP III project, thereby satisfying the parallel trend assumption. Additionally, in Figure 1(a), the estimated coefficient becomes significantly negative from the implementation year (*Current*) onwards, indicating that listed firms reduced the level of AEM following the GTP III. In Figure 1(b), the estimated coefficient becomes significantly positive from the implementation year (*Current*) onwards, indicating that listed firms increased REM following the GTP III project.

[Insert Figure 1 about here]

4.2.2. Placebo Test

We conduct a placebo test by randomly assigning pilot years (Cai et al.,2016). Each region within the sample range is randomly assigned an implementation year for the GTP III project, assuming it was implemented thereafter. Random sampling ensures that the constructed independent variable (*GTP_f*) has no effect on corporate earnings management. Thus, any significant findings would suggest bias in the regression results of this study. We perform 500 random samplings and conduct benchmark regressions on *AEM* and *REM* using model (1). Figure 2 presents the mean of the regression estimates after 500 random assignments. We observe that the mean of the estimated coefficients for (*GTP_f*) is nearly zero. Additionally, we plot the distribution of the 500 estimated coefficients and their corresponding p-values. The blue dotted curve indicates that the distribution of the estimated coefficients for (*GTP_f*) centers around zero, with

most p-values exceeding 0.1. Moreover, the actual estimated coefficients from this study (columns (1) and (2) of Table 4) are clear outliers in the placebo test. These results collectively suggest that the estimated outcomes of this study are unlikely to be driven by other unobservable factors at the province-year level.

[Insert Figure 2 about here]

4.2.3. Adding Fixed Effects

To mitigate the influence of unobservable variables at the industry level, we augment our analysis by introducing fixed effects that capture the interaction between industry and time trends. This approach allows us to control for variations in industry development and composition over time. Columns (1)-(3) of Table 5 present the results, which remain consistent with our basic regression, affirming the robustness of our findings even after accounting for industry-level factors.

4.2.4. Replacement of Earnings Management Indicators

To mitigate potential measurement errors, we have recalibrated the earnings management indicators used in this study. Specifically, we employed estimates from the DD model (Dechow and Dichev, 2002) for AEM (*AEM_1*) and re-estimated model (1). Additionally, we utilized abnormal operating cash flow (*AbCFO*), abnormal production costs (*AbPROD*), and abnormal discretionary expenses (*AbDISEXP*) as proxies for REM, and re-estimated the basic model (1) accordingly.

Column (4) of Table 5 presents the regression results for AEM (*AEM_1*), showing that the coefficient of *GTP* is significantly negative at the 5% level. This indicates that

listed firms in regions where the GTP III has been implemented reduced the level of *AEM* compared to those in non-implemented regions. In column (5), the coefficient of *GTP* is positive but not statistically significant. However, in columns (6) and (7), which examine *REM* using *AbCFO* and *AbDISEXP* respectively, the coefficients of *GTP* are significantly negative at the 5% and 10% levels. Notably, lower values of *AbCFO* and *AbDISEXP* indicate higher levels of *REM*, suggesting that listed firms favored sales manipulation and expense manipulation post-implementation of the GTP III. These findings underscore the robustness of our results across different measurement methods for earnings management indicators, affirming the consistency of our conclusions.

4.2.5. Adding Other Control Variables

To address potential biases from omitted variables, we have incorporated additional control variables related to corporate governance and earnings management motivation into our model. These variables aim to capture influences such as agency problems and specific motivations for earnings management, which may affect the estimation results (Zang, 2012).

In columns (8)-(10) of Table 5, we present the regression results after including these variables. Specifically, we control for the shareholding ratio of the largest shareholder (*Largest*), the combination of chairman and general manager roles (*Dual*), the proportion of independent directors on the board (*Dratio*), whether the company issued additional shares (*Add_share*), and whether the company met analyst consensus forecasts (*HabitualBeater*).

Our findings indicate that even after accounting for these corporate governance and

earnings management motivation factors, the basic results of this study remain robust. The coefficients associated with the implementation of the GTP III continue to show significant effects on both AEM and REM levels, affirming the consistency and reliability of our conclusions across different sets of controls.

[Insert Table 5 about here]

4.2.6. Analysis Using Parent Company Financial Statements

Given that listed firms operate across various regions and their parent and subsidiary entities may be situated in different provinces, encountering diverse tax collection environments, using consolidated financial statements for analysis could introduce estimation biases. To address this concern, we conducted additional robustness tests focusing solely on the financial statements of the parent company. The regression outcomes presented in Table 6 affirm the robustness of our core finding.

[Insert Table 6 about here]

4.2.7. Analysis Using "Suspicious" Listed Firms

In this section, we extend our analysis to examine the core findings using listed firms identified as "suspicious" in their earnings management practices. Prior research identifies these firms as having motivations such as avoiding losses, achieving prior year profit levels, and meeting analyst forecasts through earnings management strategies (Degeorge, 1999; Brown and Caylor, 2005; Roychowdhury, 2006; Cunningham et al., 2020). If the GTP III significantly influences earnings management

strategies of listed firms, this effect should be more pronounced among these "suspicious" entities.

Following the criteria outlined by Cohen et al. (2008), "suspicious" listed firms are identified based on three indicators: narrowly avoiding losses ($0 \leq$ ordinary loss/total assets < 0.005), just reaching prior year profit levels ($0 \leq$ change in ordinary loss/total assets < 0.005), and closely meeting analyst forecasted earnings per share ($0 \leq$ actual earnings per share - consensus forecast < 0.01) (Cohen et al., 2008). Using these criteria, we compare the earnings management behaviors between "suspicious" and non-"suspicious" listed firms. If there are significant changes in AEM (*AEM*) and REM (*REM*) levels among "suspicious" listed firms after the implementation of the GTP III, it would further validate our initial hypotheses.

Table 7 presents the differences in AEM between "suspicious" and non-"suspicious" listed firms before and after the implementation of the GTP III project. Panels A, B, and C respectively use the criteria for measuring "suspicious" listed firms based on (1) narrowly avoiding losses, (2) just reaching prior year profit levels, and (3) closely meeting analyst forecasts. The findings indicate the following: First, compared to non-"suspicious" listed firms, "suspicious" firms exhibit reduced reliance on AEM, likely due to heightened regulatory scrutiny. Second, the *AEM* of "suspicious" listed firms significantly decreases after the implementation of the GTP III system, whereas non-"suspicious" listed firms do not show significant changes. Overall, post-implementation of the system, the *AEM* of "suspicious" listed firms declines significantly relative to non-"suspicious" ones, suggesting that taxation digitalization has a greater impact on

curbing AEM practices among “suspicious” firms.

[Insert Table 7 about here]

Table 8 presents the differences in REM between “suspicious” and “non-suspicious” listed firms before and after the implementation of the GTP III. Similar to the previous table, Panels A, B, and C respectively categorize listed firms based on: (1) just avoiding losses, (2) just reaching previous year's profit levels, and (3) just meeting analyst forecasts to define “suspicious” listed firms. The findings indicate the following: First, compared to non-“suspicious” listed firms, “suspicious” listed firms employ REM strategies more frequently. Second, the REM of “suspicious” listed firms showed a post-implementation increase under the GTP III, though not statistically significant, likely due to their already higher adoption of such practices. Conversely, non-“suspicious” listed firms did not exhibit significant changes in REM after the system's implementation. Overall, compared to pre-implementation levels, “suspicious” listed firms significantly increased their REM relative to non-“suspicious” listed firms after the system was launched, indicating that taxation digitalization has prompted “suspicious” listed firms to engage in more real earnings manipulation. In summary, the foundational assumptions of this paper are validated particularly among “suspicious” listed firms.

[Insert Table 8 about here]

5. Moderating Effects

This section further investigates the conditions under which the GTP III

significantly influences corporate earnings management strategies. First, we divide the sample into sub-samples based on factors that may affect the relationship between the GTP III project and corporate earnings management levels, followed by regression analyses within these sub-samples. Drawing on existing research, we primarily examine the impact of the GTP III project on corporate earnings management strategies across different levels of marketization and industry competition.

5.1. Level of Marketization

Existing research indicates that the effectiveness of government policy regulation is influenced by the local level of marketization (Tyrrall et al., 2007; Daske et al., 2008). Higher levels of marketization facilitate more effective law enforcement (Degeorge et al., 1999). For instance, Daske et al. (2008) found that the benefits of mandatory International Financial Reporting Standards (IFRS) adoption to capital markets only manifest in countries with stronger transparency incentives and robust law enforcemen (Tyrrall et al., 2007). Similarly, Ho et al. (2015) demonstrated that stricter financial reporting standards significantly reduce AEM in regions with high marketization levels but have no significant impact in low marketization areas. In this study, the pilot implementation of the GTP III project across various regions is also influenced by local marketization levels. Listed firms in regions with higher marketization face greater policy implementation intensity and thorough enforcement, raising the cost and difficulty of AEM and prompting a shift towards real earnings manipulation.

Drawing from Ho et al. (2015), we use two indicators to measure marketization levels. The first is the "Development of Market Intermediary Organizations and Legal

System Environment" indicator from the Marketization Index of China's Provinces: NERI Report (2018) compiled by Wang et al. (2019). The corresponding descriptive statistics reveal stable relative positions of marketization levels during the sample period[4]. Listed firms located in regions with marketization indices above the sample median are classified as having higher marketization levels, while those below the median are classified as having lower marketization levels. We then estimate model (1) within these sub-samples. The second indicator is the geographic location of the company. The central and western regions, being more remote and less economically developed compared to the eastern regions, have fewer investors and stakeholders (such as institutional investors, auditors, analysts, and mainstream media), exacerbating information asymmetry. Consequently, listed firms in the central and western regions experience lower marketization levels. We categorize listed firms based on their registered locations into central/western and eastern regions and perform regressions on these sub-samples.

The results in columns (1)-(3) in Panel A and Panel B of Table 9 indicate no significant changes in corporate earnings manipulation strategies in regions with low marketization levels. Conversely, columns (4)-(6) reveal that in high marketization regions, the GTP III significantly reduces AEM, increases REM, and overall earnings management levels. These findings align with our expectations.

[Insert Table 9 about here]

[4] Given that the data from the Marketization Index of China's Provinces: NERI Report (2018) only covers up to 2016, and assuming the external governance environment remains stable, we substitute the missing data for the years 2017, 2018, and 2019 with the latest available information.

5.2. Industry Competition Level

The impact of the GTP III on corporate earnings management practices might be influenced by the level of industry competition. In highly competitive industry environments, listed firms experience significant fluctuations in performance, facing heightened market pressures and challenges in meeting performance expectations (Dechow et al., 1995). Consequently, there is greater motivation for listed firms to engage in earnings management activities (Dechow et al., 1995). Simultaneously, the effectiveness of enhanced regulatory oversight may diminish. Given these factors, we anticipate that in competitive industries, the influence of the GTP III on corporate earnings management strategies would be attenuated.

We use the Herfindahl-Hirschman Index (HHI) to gauge the competitive intensity within the industries where listed firms operate. Industries with an HHI below the median are categorized as competitive, while those above are considered non-competitive. Subsequently, we apply model (1) to the respective sub-samples for analysis. Additionally, following Ho et al. (2015) and the 2012 CSRC industry classification standard, the manufacturing sector is identified as competitive, with other sectors classified as non-competitive. Listed firms are then segregated into these categories for further analysis using model (1).

The findings presented in columns (1)-(3) of Panel A and Panel B in Table 10 demonstrate that in low-competition industries, the implementation of the GTP III leads to a notable reduction in AEM, alongside a significant enhancement in REM and overall

earnings management levels. Conversely, results in columns (4)-(6) indicate that the implementation of the GTP III in high-competition industries does not yield significant changes in corporate earnings management strategies. These outcomes align closely with our initial hypotheses.

[Insert Table 10 about here]

6. Mechanism Analysis

This section investigates the mechanism through which the implementation of the GTP III affects corporate earnings management strategies. Previous research suggests a substitution effect between AEM (*AEM*) and REM (*REM*) within firms (Cunningham et al, 2020), influenced by the costs associated with these strategies (Zang, 2012). As firms face heightened regulatory scrutiny and reduced accounting flexibility, the costs and challenges of executing AEM increase, leading to a greater reliance on REM (Zang, 2012). In our study context, the implementation of the GTP III intensifies taxation digitalization, amplifying regulatory pressures and constraining accounting flexibility. Consequently, firms experience increased costs and challenges in executing AEM, which results in reduced levels of AEM and increased levels of REM.

Building on prior research documenting substitution between accrual-based (AEM) and real earnings management (REM) (Cunningham et al., 2020; Zang, 2012), we analyze how taxation digitalization influences this trade-off through two key channels: regulatory intensity and accounting flexibility.

To test these channels, we examine firms with varying exposure to regulatory

oversight and accounting constraints. For regulatory intensity, we follow Zang (2012) using Big Four auditor status (*Big4*) and auditor tenure (*Audit_Tenure*) as proxies. Firms with initially lower regulatory oversight (non-Big Four auditors, shorter auditor tenure) are expected to show stronger responses to GTP III implementation, manifesting as larger decreases in AEM and increases in REM. This expectation stems from these firms' greater sensitivity to regulatory changes - while they previously operated under relatively lenient oversight, the introduction of GTP III represents a more substantial increase in monitoring intensity for them compared to firms already subject to stringent oversight from Big Four auditors or long-tenured auditors.

For accounting flexibility, we use net operating assets (*NOA*) and operating cycle length (*Cycle*) as measures. Firms with greater initial flexibility (lower net operating assets, longer operating cycles) are expected to demonstrate more pronounced shifts in earnings management strategies following GTP III adoption. This prediction is based on the understanding that firms with higher accounting flexibility initially faced fewer constraints in implementing AEM strategies. However, when GTP III introduces enhanced digital monitoring, these previously flexible firms experience a more dramatic reduction in their ability to manipulate accruals, making them more likely to shift towards REM as an alternative strategy compared to firms that already operated under tighter accounting constraints.

To further examine the mechanisms through which the implementation of the GTP III affects corporate earnings management strategies, we conduct a series of tests focusing on regulatory intensity and accounting flexibility. The findings are presented

in Table 11.

Regulatory Intensity

Columns (1) and (2) of Table 11 investigate the role of regulatory intensity, proxied by auditor type (Big4). The coefficient on the interaction term *non-Big4 ×GTP* is -0.011 for *AEM* and *0.037* for REM, both significant at the 10% level. This suggests that, following the implementation of the GTP III, firms with lower initial regulatory oversight (i.e., those audited by non-Big Four firms) exhibit a more pronounced decrease in AEM and a greater increase in REM, compared to their counterparts with higher regulatory intensity (Big Four auditors).

Similar findings are observed in columns (3) and (4) when using auditor tenure (*Audit_Tenure ×GTP*) as an alternative measure of regulatory intensity. Firms facing lower regulatory pressure, as indicated by shorter auditor tenure, experience more substantial declines in AEM and more pronounced increases in REM after the GTP III implementation. These results imply that the impact of taxation digitalization on firms' earnings management strategies is more significant when the costs and challenges of executing AEM are more heavily influenced by the GTP III.

Accounting Flexibility

Columns (5) to (8) of Table 11 focus on the role of accounting flexibility. The coefficient on the interaction term *NOA ×GTP* in column (5) is 0.006, significant at the 10% level, suggesting that firms with greater initial flexibility in their net operating assets (higher NOA) exhibit a more pronounced decrease in AEM following the implementation of the GTP III. Furthermore, the coefficient on *Cycle ×GTP* in column

(8) is 0.020, significant at the 5% level, indicating that firms with longer operating cycles (higher accounting flexibility) demonstrate a more substantial increase in REM after the GTP III reform. These findings imply that in firms where executing AEM is initially less challenging due to greater accounting flexibility (higher NOA and longer operating cycles), the impact of the GTP III is more pronounced, leading to a significant decrease in AEM and a concomitant increase in REM.

Columns (9) and (10) of Table 11 incorporate the interaction terms of both regulatory intensity and accounting flexibility indicators with GTP simultaneously, yielding consistent results.

In summary, the evidence suggests that the implementation of the GTP III alters listed firms' earnings management strategies by influencing the costs and challenges associated with AEM. Firms facing lower initial regulatory pressure and greater accounting flexibility exhibit more significant decreases in AEM and more pronounced increases in REM in response to the GTP III reform.

[Insert Table 11 about here]

7. The Effect of GTP III Project on Firm Value

In our next analysis, we examine how the shift in earnings management strategies, driven by the implementation of the GTP III, affects firm value. Our baseline regression indicates that following the implementation of the GTP III, firms have reduced their levels of AEM while increasing their levels of REM. Existing literature suggests that, although REM is more difficult to detect, it imposes significant costs on firms, leading

to a decline in future firm value (Cohen and Zarowin, 2010; Kothari et al., 2016; Christensen et al., 2017). A central research question in our study is whether the implementation of the GTP III project could harm firm value in the long run by increasing levels of real and total earnings management.

In line with Daske et al. (2008), Ho et al. (2015), and Cunningham et al. (2020), we measure firm value using Tobin's Q and ROA of year t+1 and construct model (10).

$$Firm\_value_{i,t+1} = \alpha_0 + \beta_1 GTP_{i,t} \times REM_{i,t}(\mathrm{TotalEM_{i,t}}) + \beta_2 GTP_{i,t} + \beta_3 REM_{i,t}(\mathrm{TotalEM_{i,t}}) + \beta_4 Asset\_adj_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Asset\_g_{i,t} + \beta_7 IndQ + \gamma_t + \delta_i + \varepsilon_{i,t} \quad (10)$$

where *Firm_value* is either Tobin's Q or ROA, *GTP×REM* and *GTP×TotalEM* are interaction terms, *Asset_Indadj* is the natural logarithm of total assets adjusted for industry, *Lev* is the leverage ratio, defined as total book liabilities divided by total book assets, *Asset_growth* is the total asset growth rate, calculated as (total assets in year t - total assets in year t-1) divided by total assets in year t-1, *IndQ* is the median Tobin's Q in the same industry. To mitigate the impact of unobservable year and firm-level omitted variables, we include year fixed effects (γ_t) and firm fixed effects (δ_i).

Table 12 presents the regression results. We estimate model (8) in two steps: first, columns (1) and (5) examine the relationship between REM and firm value without interaction terms; second, columns (2) and (6) incorporate the interaction term *GTP× REM* to assess whether the relationship between REM and firm value changes with the implementation of the GTP III project. In columns (1) and (5), the negative and significant coefficient of *REM* indicates a negative relationship between REM and firm

value. The coefficients in columns (2) and (6) suggest that the GTP III project, which increases REM, significantly reduces firm value.

Following a similar approach, columns (3), (7), (4), and (8) assess the impact of total earnings management (*TotalEM* = *AEM* + *REM*) on firm value due to the GTP III. In columns (3) and (7), the negative and significant coefficient of *TotalEM* indicates a significant negative association between *TotalEM* and future firm performance. In columns (4) and (8), the negative and significant coefficient of the interaction term *GTP* ×*TotalEM* implies that the rise in overall earnings management levels, due to the GTP III project, significantly reduces firm value.

[Insert Table 12 about here]

In conclusion, the implementation of the GTP III project increases external regulatory pressure on firms, leading to higher costs and challenges in AEM. Consequently, firms substitute AEM with REM, resulting in an overall increase in earnings management levels. However, this substitution effect ultimately harms firm value in the long run.

8. Conclusion

We utilize a quasi-experimental setting, the GTP III to estimate the effects of taxation digitalization on earnings management strategies in China. Our findings indicate that taxation digitalization significantly alters the earnings management strategies of listed firms: listed firms in regions where GTP III has been implemented experience a 0.6% decrease in AEM and a 1.9% increase in REM compared to listed

firms in regions without the system. This suggests that as the difficulty and cost of AEM rise, firms substitute it with real earnings manipulation. These results are robust across various checks and hold even within the sample of "suspicious" firms. Heterogeneity tests reveal that the impact of taxation digitalization is more pronounced in regions with higher marketization and lower industry competition. Mechanism tests show that taxation digitalization increases the cost and difficulty of AEM, prompting firms to adopt REM as a substitute. Notably, the increase in REM exceeds the decrease in AEM, leading to a significant rise in total earnings management. Further analysis indicates that both accrual-based and overall earnings management significantly harm future firm value. However, these findings do not advocate against taxation digitalization. Rather, it underscores the need for corporate boards and institutional investors to develop management incentive contracts suited to the information age, ensuring that managerial behavior aligns with the long-term value of the enterprise. Tax authorities may need to gauge more comprehensive metrics to detect REM based on big data.

Our study makes important contributions to the literature by providing a more comprehensive understanding of earnings management. It not only addresses the role of taxation digitalization in limiting AEM, but also highlights the fact that listed firms adjust their behavior by engaging in REM, thus offering a more complete picture of corporate responses to increased regulatory oversight. Furthermore, our study's findings have significant implications for policymakers. It reveals the ways in which listed firms navigate between AEM and REM, and provides insights that could lead to more effective regulations and policies that address both types of earnings management,

ensuring that tax reforms do not unintentionally encourage shifts to less transparent methods of financial manipulation. Additionally, although our study focuses on China, its findings are relevant for other countries undergoing similar taxation digitalization reforms. The insights from our research can inform comparative studies and guide international policymakers as they consider the broader impacts of digital tax systems on corporate financial behavior. By examining these dynamics, our study not only contributes to the understanding of earnings management but also provides a foundation for developing more nuanced and effective regulatory frameworks on a global scale.

Overall, our study fills a critical gap in the literature by exploring the nuanced effects of Taxation digitalization on the trade-offs between different forms of earnings management and the impact on firm value. It offers valuable insights into both corporate behavior and the effectiveness of regulatory reforms in promoting financial transparency and accountability.

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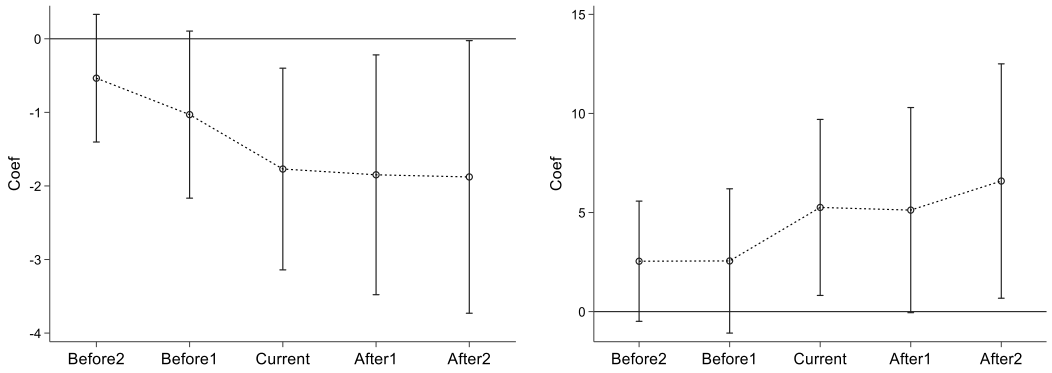
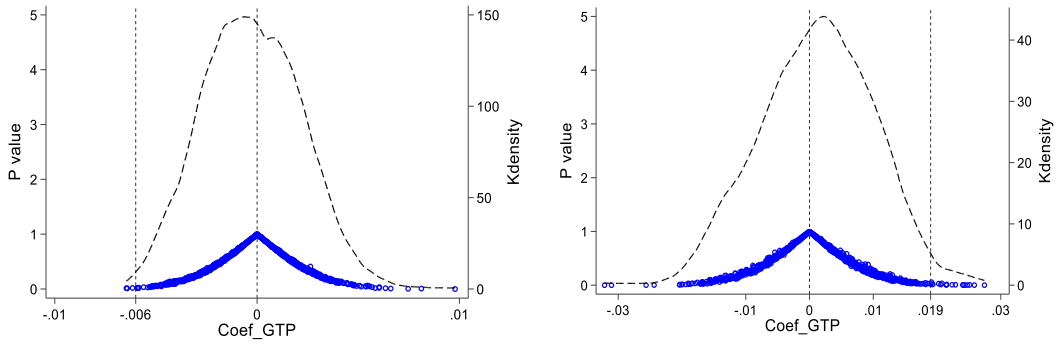


(a) AEM (b) REM

Fig.1. Parallel trend test. Note: Fig.1 depicts the estimated coefficients for the time dummy variables *Before2*, *Before1*, *Current*, *After1*, and *After2* within 95% confidence interval, with (a) and (b) respectively for *AEM* and *REM* being the dependent variables. The horizontal axis shows the year interval relative to the year when the GTP III project policy was implemented.



(a) AEM (b) REM

Fig. 2. Placebo test. Note: Fig.2 depicts the estimated coefficients for *GTP* by regression after 500 random assignments as well as their responding p-value, with (a) and (b) respectively for *AEM* and *REM* being the dependent variables.

Table 1

Phases of the GTP III.

Pilot phase	Pilot coverage
Phase I (2012-2013)	Chongqing, Shanxi, Shandong
Phase II (2014-2015)	Inner Mongolia, Henan, Guangdong
Phase III (2015)	Hebei, Ningxia, Guizhou, Yunnan, Guangxi, Hunan, Qinghai, Hainan, Tibet, Gansu, Anhui, Xinjiang, Sichuan, Jilin
Phase IV (2016)	Liaoning, Jiangxi, Fujian, Shanghai, Qingdao, Xiamen, Beijing, Tianjin, Heilongjiang, Hubei, Shaanxi, Dalian, Jiangsu, Zhejiang, Ningbo, Shenzhen

Table 2

Variable definitions.

Variable	Definition
Dependent Variables	
AEM	The AEM indicator calculated according to model (3).
REM	The REM indicator calculated according to model (7).
Explanatory Variables	
GTP	Dummy variable, assigned a value of 1 when the region where the company is located launches the "GTP III" system in year t, otherwise it is 0.
Control Variables	
Asset_Indadj	Firm size, equal to the natural logarithm of the firm's total assets after industry adjustment in year t.
ROA	Return on net assets, equal to the ratio of the firm's net profit to total assets in year t.
MB	Market-to-book ratio, equal to the ratio of the firm's market value to total book assets in year t.
Market_Share	Market share, equal to the ratio of the firm's operating income in year t-1 to the total operating income of firms in the same industry.
Z_Score	Financial condition, equal to the Z-score calculated according to Altman (2013) for the firm in year t-1.
Insti	Institutional ownership, equal to the shareholding ratio of institutional investors in the firm in year t-1.
Big4	Auditing firm, assigned a value of 1 when the firm's annual financial report in year t is audited by one of the "Big Four" auditing firms, otherwise it is 0.
Audit_Tenure	Auditor tenure, assigned a value of 1 when the firm's auditor in year t has audited the firm for more years than the median number of years of continuous auditing by all auditors, otherwise it is 0.
NOA	Net operating assets, assigned a value of 1 when the ratio of the firm's net operating assets in year t-1 to total assets in year t-2 is greater than the median ratio of firms in the same industry, otherwise it is 0.
Cycle	Cycle Operating cycle, equal to the sum of the firm's inventory turnover days and accounts receivable turnover days in year t-1.
Unpred_REM	Unpred_REM Abnormal REM, equal to the residual of model (1) estimated for the firm in year t.
Earn	Earn Earnings management target, equal to the pre-managed earnings calculated for the firm in year t according to Beatty et al. (1995) and Hunt et al. (1996).

Table 3

Descriptive statistics.

Panel A: Descriptive Statistics for the Full Sample

Variables	N	Mean	St.Dev	p25	Median	p75
AEM	24494	0.060	0.064	0.018	0.041	0.078
REM	24579	0.006	0.198	-0.071	-0.001	0.065
TotalEM	24494	0.005	0.241	-0.105	-0.008	0.088
GTP	24579	0.410	0.492	0	0	1
Asset_Indadj	24579	0.127	1.180	-0.662	0.029	0.819
ROA	24579	0.034	0.067	0.012	0.033	0.062
MB	24579	2.585	1.868	1.398	1.995	3.061
Market_Share	24579	0.007	0.022	0	0.001	0.004
Z_Score	24579	5.487	5.781	2.316	3.622	6.146
Insti	24579	0.269	0.242	0.062	0.195	0.441
Big4	24579	0.057	0.232	0	0	0
Audit_Tenure	24579	0.694	0.461	0	1	1
NOA	24579	0.473	0.499	0	0	1
Cycle	24579	254.233	247.199	94.194	174.261	309.399
Unpred_REM	24579	0	0.193	-0.074	-0.007	0.058
Earn	24579	0.044	0.189	0.004	0.040	0.092

Panel B: The Mean Differences in Firm Characteristics for the Full Sample

Variables	Non-GTP		GTP		Mean-Diff
	N	Mean	N	Mean	
Asset_Indadj	14503	0.113	10076	0.148	-0.035**
ROA	14503	0.032	10076	0.036	-0.004***
MB	14503	2.618	10076	2.538	0.081***
Market_Share	14503	0.008	10076	0.005	0.003***
Z_Score	14503	5.376	10076	5.647	-0.271***
Insti	14503	0.181	10076	0.397	-0.217***
Big4	14503	0.060	10076	0.054	0.006**
Audit_Tenure	14503	0.694	10076	0.693	0.001
NOA	14503	0.476	10076	0.469	0.008
Cycle	14503	302.012	10076	300.231	1.781
Unpred_REM	14503	0.000	10076	0.000	0.000
Earn	14503	0.043	10076	0.047	-0.004

Panel C: Descriptive Statistics for the PSM Sample

Variables	Non-GTP		GTP		Mean-Diff
	N	Mean	N	Mean	
Asset_Indadj	4468	0.110	4538	0.089	0.022
ROA	4468	0.033	4538	0.033	0.000
MB	4468	2.659	4538	2.691	-0.031
Market_Share	4468	0.006	4538	0.005	0.000
Z_Score	4468	5.669	4538	5.715	-0.046
Insti	4468	0.277	4538	0.265	0.012**
Big4	4468	0.053	4538	0.052	0.001
Audit_Tenure	4468	0.704	4538	0.702	0.002
NOA	4468	0.472	4538	0.464	0.008
Cycle	4468	305.733	4538	299.094	6.639
Unpred_REM	4468	-0.003	4538	-0.001	-0.001
Earn	4468	0.042	4538	0.044	-0.002

Panel D: The Mean Differences in Firm Characteristics for the PSM Sample

Variables	Non-GTP	GTP	Mean-Diff
AM	0.063	0.059	0.004***
RM	0.005	0.006	-0.001
TotalEM	-0.001	0.005	-0.006

Notes: This table presents the descriptive statistics of the key variables and the mean differences in firm characteristics between the treatment and control groups. Panel A provides the descriptive statistics for the full sample. Panel B compares the mean differences in firm characteristics between the treatment and control groups in the full sample. Panel C presents the descriptive statistics for the full sample. Panel D presents the mean differences in firm characteristics between the treatment and control groups for the PSM sample. *, **, and *** represent the 10%, 5%, and 1% significance levels, respectively. (In the table below, the presentation format of significance levels and the meaning of the numbers in parentheses are the same as in Table 3.)

Table 4.

Baseline results.

	(1) AEM	(2) REM	(3) TotalEM
GTP	-0.006**	0.019**	0.027**
	(-1.984)	(2.018)	(2.268)
Asset_Indadj	-0.002	0.012	0.023**
	(-0.533)	(1.208)	(2.010)
ROA	-0.172***	-0.290***	0.439***
	(-7.339)	(-6.046)	(7.505)
MB	0.005***	-0.005	0.001
	(4.555)	(-1.383)	(0.118)
Market_Share	-0.067	0.029	-0.145
	(-0.946)	(0.106)	(-0.440)
Z_Score	-0.001**	0.001	0.000
	(-2.427)	(0.554)	(0.091)
Insti	-0.005	-0.004	-0.002
	(-0.841)	(-0.249)	(-0.107)
Big4	-0.008	-0.041	-0.057
	(-0.891)	(-1.334)	(-1.414)
Audit_Tenure	-0.003	0.007	0.009
	(-1.515)	(1.178)	(1.262)
NOA	0.001	0.010	0.010
	(0.486)	(1.346)	(1.051)
Cycle	-0.000	-0.000***	-0.000***
	(-0.442)	(-3.897)	(-4.286)
Unpred_REM	0.011		
	(1.572)		
Earn		0.015	0.016
		(0.921)	(0.801)
Constant	0.071***	0.023	-0.022
	(13.395)	(1.462)	(-1.111)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
N	9006	9006	9006
adj. R^2	0.046	0.039	0.037

Notes: This table presents the findings derived from the foundational regression analyses. GTP denotes the proxy variable for the Golden Tax Phase III policy to indicate the taxation digitalization. AEM denotes the proxy variable for AEM. REM denotes the proxy variable for REM. REM denotes the proxy variable for total earnings management. Standard errors clustered at the firm level are in parentheses.

Table 5

Robustness tests: sensitivity tests.

	(1) AEM	(2) REM	(3) TotalEM	(4) AEM_1	(5) ABcfo	(6) ABprod	(7) ABdisexp	(8) AEM	(9) REM	(10) TotalEM
GTP	-0.006**	0.019**	0.027**	-0.008**	-0.009**	-0.000	-0.007**	-0.005**	0.018*	0.028**
	(-1.972)	(2.081)	(2.246)	(-2.031)	(-1.995)	(-0.021)	(-2.278)	(-2.440)	(1.867)	(2.270)
Largest								0.002**	-0.001	0.001
								(2.429)	(-0.441)	(0.281)
Dual								0.005	-0.013	-0.018
								(1.496)	(-1.074)	(-1.224)
Independence								0.010	-0.023	-0.026
								(0.546)	(-0.336)	(-0.344)
Add_Share								0.002	0.005	-0.001
								(0.663)	(0.453)	(-0.096)
HabitualBeater								0.025	-0.024	-0.021
								(0.927)	(-0.265)	(-0.186)
Constant	0.017	-0.132	-0.227	0.065***	-0.007	0.006	-0.013***	0.039***	0.031	-0.014
	(0.956)	(-0.943)	(-1.552)	(9.790)	(-0.949)	(0.572)	(-2.679)	(2.814)	(0.626)	(-0.236)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind & Ind*Year	Yes	Yes	Yes	No	No	No	No	No	No	No
N	9006	9006	9006	7879	9006	9006	9006	7184	7184	7184
adj. R^2	0.066	0.185	0.141	0.137	0.037	0.036	0.090	0.059	0.058	0.035

Notes: The table shows a series of sensitivity tests, including replacement of the replacement of variable indicators and adjustment of the model settings. Columns (1)-(3) denotes the results of including industry-year interaction fixed effects in the benchmark model. Columns (4)-(7) displays the results with AEM estimated from the DD model (Dechow and Dichev, 2002). Columns (8)-(10) denotes the results with the inclusion of the proxy variables characterizing corporate governance and earnings management motivation.

Table 6

Robustness tests: using parent company financial statements

	(1) AEM	(2) REM	(3) TotalEM
GTP	-0.005**	0.016***	0.021***
	(-2.258)	(2.800)	(2.617)
Asset_Indadj	-0.001	0.006	0.011*
	(-0.667)	(1.241)	(1.744)
ROA	-0.079***	-0.207***	0.402***
	(-7.215)	(-7.559)	(10.146)
MB	0.003***	-0.004**	-0.001
	(4.297)	(-1.978)	(-0.552)
Market_Share	-0.001	0.006	0.011*
	(-0.626)	(-1.068)	(-1.212)
Z_Score	-0.000**	0.001	0.000
	(-2.012)	(0.938)	(0.365)
Insti	-0.002	0.001	0.007
	(-0.612)	(0.053)	(0.478)
Big4	-0.004	-0.021	-0.033
	(-0.626)	(-1.068)	(-1.212)
Audit_Tenure	-0.001	0.002	0.004
	(-1.071)	(0.702)	(0.936)
NOA	0.002	0.008*	0.007
	(1.373)	(1.690)	(1.073)
Cycle	-0.000	-0.000***	-0.000***
	(-0.488)	(-5.631)	(-5.027)
Unpred_REM	0.002		
	(0.553)		
Earn		0.003	0.008
		(0.299)	(0.579)
Constant	0.055***	0.015*	-0.021
	(16.142)	(1.660)	(-1.585)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
N	9006	9006	9006
adj. R^2	0.031	0.036	0.041

Notes: The table displays the robustness test results that using parent company financial statements.

Table 7

Changes in AEM before and after the implementation of the GTP III for "suspicious" and non-"suspicious" listed firms

	(1) Pre-GTP (AEM)	(2) After-GTP (AEM)	(2) - (1) Difference
Panel A: Just Avoiding Losses			
Suspicious	0.054	0.048	-0.007***
N	2612	2778	
Non-Suspicious	0.074	0.077	0.002
N	1856	1760	
Difference	-0.020***	-0.029***	-0.009***
Panel B: Just Reaching Prior Year Profit Levels			
Suspicious	0.058	0.049	-0.010***
N	1849	2046	
Non-Suspicious	0.066	0.067	0.002
N	2619	2942	
Difference	-0.007***	-0.019***	-0.011***
Panel C: Just Meeting Analyst Forecasts			
Suspicious	0.062	0.037	-0.025***
N	87	77	
Non-Suspicious	0.063	0.059	-0.003
N	4381	4461	
Difference	-0.001	-0.023***	-0.022**

Notes: This table reports the changes in AEM before and after the implementation of the Golden Tax Phase III system for "suspicious" and non-"suspicious" listed firms. Panel A identifies "suspicious" listed firms based on narrowly avoiding losses ($0 \leq$ ordinary loss/total assets < 0.005). Panel B identifies "suspicious" listed firms based on just reaching prior year profit levels ($0 \leq$ change in ordinary loss/total assets < 0.005). Panel C identifies "suspicious" listed firms based on closely meeting analyst forecasts ($0 \leq$ actual earnings per share -consensus forecast < 0.01).

Table 8

Changes in REM before and after the implementation of the GTP III for "suspicious" and "non-suspicious" listed firms

	(1) Pre-GTP (REM)	(2) After-GTP (REM)	(2) - (1) Difference
Panel A: Just Avoiding Losses			
Suspicious	0.012	0.019	0.008
N	2612	2778	
Non-Suspicious	-0.005	-0.015	-0.010
N	1856	1760	
Difference	0.017***	0.035***	0.018**
Panel B: Just Reaching Prior Year Profit Levels			
Suspicious	-0.022	-0.008	0.015
N	1849	2046	
Non-Suspicious	0.024	0.017	-0.007
N	2619	2942	
Difference	-0.046***	-0.024***	0.021***
Panel C: Just Meeting Analyst Forecasts			
Suspicious	-0.023	-0.003	0.020
N	87	77	
Non-Suspicious	0.005	0.006	0.001
N	4381	4461	
Difference	-0.028	-0.009	0.019

Notes: This table reports the changes in REM (AEM) before and after the implementation of the Golden Tax Phase III system for "suspicious" and non-"suspicious" listed firms. Panel A identifies "suspicious" listed firms based on narrowly avoiding losses ($0 \leq$ ordinary loss/total assets < 0.005). Panel B identifies "suspicious" listed firms based on just reaching prior year profit levels ($0 \leq$ change in ordinary loss/total assets < 0.005). Panel C identifies "suspicious" listed firms based on closely meeting analyst forecasts ($0 \leq$ actual earnings per share -consensus forecast < 0.01).

Table 9

Heterogeneity test: level of marketization

	(1)	(2)	(3)	(4)	(5)	(6)
	Low Marketization Level			High Marketization Level		
	AEM	REM	TotalEM	AEM	REM	TotalEM
Panel A: Measuring Level of Marketization Using Marketization Index						
GTP	0.001	0.018	0.003	-0.015***	0.032**	0.012**
	(0.206)	(1.368)	(0.717)	(-2.846)	(2.472)	(2.207)
Constant	0.055***	0.016	0.012	0.084***	0.034	-0.018*
	(7.048)	(0.693)	(1.576)	(10.301)	(1.555)	(-1.861)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4535	4535	4535	4471	4471	4471
adj. R^2	0.039	0.055	0.898	0.064	0.049	0.903
Panel B: Measuring Level of Marketization Using Geographic Location						
GTP	-0.008	-0.007	0.024**	-0.006*	0.024**	0.017***
	(-0.719)	(-0.233)	(2.242)	(-1.685)	(2.349)	(4.145)
Constant	0.067***	0.071*	-0.005	0.072***	0.013	-0.016**
	(4.286)	(1.683)	(-0.332)	(12.474)	(0.766)	(-2.194)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1359	1359	1359	7647	7647	7647
adj. R^2	0.008	0.056	0.909	0.056	0.041	0.906

Notes: The table displays the heterogeneity test results for level of marketization. We measure the level of marketization in two ways. The first uses the "Development of Market Intermediary Organizations and Legal System Environment" indicator from the Marketization Index of China's Provinces: NERI Report (2018) compiled by Wang et al. (2019). Listed firms in regions with marketization indices above the sample median are classified as facing higher marketization levels, while those below the median are classified as facing lower marketization levels. The corresponding regression results are shown in Panel A. Second, we consider the geographic location of the company. Listed firms registered in eastern regions are categorized as having a high level of marketization, while those in other regions are categorized as having a low level of marketization. The corresponding regression results are shown in Panel B.

Table 10

Heterogeneity test: industry competition.

	(1)	(2)	(3)	(4)	(5)	(6)
	Non-Competitive			Competitive		
	AEM	REM	TotalEM	AEM	REM	TotalEM
Panel A: Measuring Industry Competition Level Using Herfindahl-Hirschman Index						
GTP	-0.009*	0.034**	0.019***	-0.008	0.015	0.015**
	(-1.731)	(2.319)	(3.343)	(-1.615)	(1.018)	(2.568)
Constant	0.069***	-0.017	-0.010	0.074***	0.053**	-0.005
	(7.033)	(-0.614)	(-0.789)	(9.506)	(2.242)	(-0.583)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4472	4472	4472	4534	4534	4534
adj. R^2	0.069	0.034	0.906	0.040	0.152	0.915
Panel B: Measuring Industry Competition Level Using Industry Categories						
GTP	-0.014**	0.049**	0.030***	-0.005	0.005	0.010**
	(-2.533)	(2.528)	(4.497)	(-1.307)	(0.509)	(2.156)
Constant	0.078***	-0.013	-0.008	0.068***	0.045**	-0.014*
	(8.208)	(-0.422)	(-0.632)	(10.474)	(2.447)	(-1.738)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3069	3069	3069	5937	5937	5937
adj. R^2	0.061	0.039	0.906	0.050	0.095	0.910

Notes: The table displays the heterogeneity test results for industry competition level. We measure the industry competition level in two ways. We first use the Herfindahl-Hirschman Index (HHI) to gauge the competitive intensity within the industries where listed firms operate. Industries with an HHI below the median are categorized as competitive, while those above are considered non-competitive. The corresponding regression results are shown in Panel A. Second, following the 2012 CSRC industry classification standard, the manufacturing sector is identified as competitive, with other sectors classified as non-competitive. The corresponding regression results are shown in Panel B.

Table 11

Mechanism tests.

	(1) AEM	(2) REM	(3) AEM	(4) REM	(5) AEM	(6) REM	(7) AEM	(8) REM	(9) AEM	(10) REM
Non-Big4×GTP	-0.011*	0.037*							-0.012**	0.032
	(-1.816)	(1.877)							(-2.024)	(1.623)
Audit_Tenure×GTP			0.005	-0.001					-0.005	0.001
			(-1.247)	(0.111)					(-1.350)	(0.119)
NOA×GTP					0.006*	0.008			-0.006*	-0.005
					(-1.674)	(-0.766)			(-1.833)	(-0.431)
Cycle×GTP							0.001	0.020**	0.001	0.018**
							(0.170)	(2.251)	(0.258)	(2.061)
GTP	0.005	-0.020	-0.003	0.018	0.002	0.031*	-0.007	0.048***	0.018*	0.018
	(0.711)	(-0.853)	(-0.624)	(1.413)	(0.362)	(1.681)	(-1.272)	(2.934)	(1.730)	(0.519)
Big4	-0.000	-0.067*	-0.008	-0.041	-0.007	-0.040	-0.008	-0.042	0.001	-0.064*
	(-0.040)	(-1.765)	(-0.943)	(-1.328)	(-0.818)	(-1.302)	(-0.889)	(-1.358)	(0.054)	(-1.669)
NOA	0.001	0.011	0.001	0.010	0.004	0.014	0.001	0.010	0.004	0.013
	(0.472)	(1.363)	(0.502)	(1.345)	(1.332)	(1.330)	(0.488)	(1.326)	(1.427)	(1.171)
Audit_Tenure	-0.003	0.007	-0.001	0.006	-0.003	0.007	-0.003	0.007	-0.000	0.006
	(-1.519)	(1.181)	(-0.221)	(0.678)	(-1.511)	(1.181)	(-1.514)	(1.173)	(-0.150)	(0.672)
Cycle	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***	-0.000	-0.000***
	(-0.441)	(-3.900)	(-0.435)	(-3.900)	(-0.428)	(-3.888)	(-0.449)	(-3.724)	(-0.434)	(-3.737)
Constant	0.071***	0.024	0.069***	0.023	0.070***	0.021	0.071***	0.025	0.067***	0.025
	(13.279)	(1.538)	(12.785)	(1.395)	(13.195)	(1.329)	(13.436)	(1.585)	(12.460)	(1.474)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9006	9006	9006	9006	9006	9006	9006	9006	9006	9006
adj. R^2	0.046	0.040	0.046	0.039	0.046	0.039	0.046	0.040	0.047	0.040

Notes: The table displays the mechanism test results for regulatory intensity and accounting flexibility. We use Big Four accounting firms (Big4) and auditor tenure (Audit_Tenure) to gauge regulatory intensity, and net operating assets (NOA) and operating cycle (Cycle) to measure accounting flexibility.

Table 12

GTP III, earnings management trade-off and firm value.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tobin's Q_{t+1}				ROA_{t+1}			
REM	-0.179**	-0.102			-0.012***	-0.010**		
	(-2.289)	(-1.287)			(-2.711)	(-2.170)		
GTP×REM		-0.500*				-0.014		
		(-1.916)				(-0.847)		
TotalEM			-0.140**	-0.048			-0.011***	-0.006*
			(-2.139)	(-0.690)			(-3.054)	(-1.657)
GTP×TotalEM				-0.441**				-0.024*
				(-2.568)				(-1.942)
GTP		-0.153**		-0.156**		-0.001		-0.001
		(-2.505)		(-2.550)		(-0.415)		(-0.405)
Asset_Indadj	-0.938***	-0.939***	-0.936***	-0.932***	-0.019***	-0.019***	-0.019***	-0.019***
	(-14.098)	(-14.217)	(-14.062)	(-14.109)	(-5.320)	(-5.319)	(-5.319)	(-5.193)
Lev	0.102	0.117	0.080	0.085	0.005	0.005	0.005	0.003
	(0.459)	(0.527)	(0.362)	(0.384)	(0.358)	(0.391)	(0.391)	(0.239)
Asset_growth	0.074***	0.078***	0.076***	0.081***	0.003*	0.003*	0.003*	0.003*
	(2.692)	(2.757)	(2.741)	(2.854)	(1.713)	(1.726)	(1.726)	(1.804)
IndQ	0.307***	0.308***	0.306***	0.305***	0.012***	0.012***	0.012***	0.011***
	(5.661)	(5.686)	(5.640)	(5.643)	(4.151)	(4.160)	(4.160)	(4.089)
cons	1.691***	1.834***	1.700***	1.848***	0.035***	-0.019***	0.036***	0.037***
	(12.586)	(12.719)	(12.650)	(12.817)	(4.406)	(-5.319)	(4.313)	(4.420)
Yea FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	7673	7673	7673	7673	7852	7852	7852	7852
adj. R^2	0.334	0.336	0.334	0.336	0.066	0.066	0.066	0.068

Notes: This table shows the results of the economic consequence analysis of firm value. We first use Tobin's Q_{t+1} to measure firm value. The corresponding regression results are shown in columns (1)-(4). We also use ROA_{t+1} to measure firm value. The corresponding results are shown in columns (5)-(8).