Shifting from Illegal to Legal:
Marijuana Liberalization and Material Misstatements[1]

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ABSTRACT

Exploiting the staggered passage of state-level medical marijuana legalizations (MMLs) in the United States as adverse shocks to social capital, we find that MMLs significantly increase the likelihood of material misstatements, especially in states experiencing a larger increase in marijuana consumption. Supplemental analyses suggest that this effect is primarily driven by increased marijuana use rather than shifts in alcohol consumption. Furthermore, we find that MMLs elevate the risk of material misstatements both directly and indirectly through the deterioration of internal controls. Our results are robust across various falsification and sensitivity tests designed to address measurement errors. Additional analyses reveal that the effect is more pronounced for firms located in states likely to experience greater deterioration in social capital, those with a larger marijuana-using population, higher usage frequency, or greater increases in suicide attempts. The impact is also stronger for firms where information sharing is critical and those operating in labor-intensive industries. Finally, we find that legalizing recreational marijuana further increases the risk of material misstatements. Collectively, our findings suggest that MMLs have significant workforce implications that, in turn, induce financial misreporting.

JEL classification: M4, M41, M48

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1. Introduction

The quality of financial statements is shaped by a series of interrelated accounting processes, including the recognition of economic transactions, the operation of accounting systems, the effectiveness of internal controls, and the execution of audit procedures. These processes rely on the effective execution of various personnel and stakeholders, such as accountants, auditors, directors, employees, and managers (Call et al. 2016, 2017; Chen et al. 2021a; Dey et al. 2021; Dyck et al. 2010; Francis 2011; Guo et al. 2016; Hoopes et al. 2018; Mammadov and Bhandari 2023; PCAOB 2010; SEC 2022; Stubben and Welch 2020).[2] Prior literature highlights that the ethical beliefs and behaviors of individuals and organizations are influenced by regional social capital, which in turn affects the quality of financial statements (e.g., Berglund and Kang 2013; Chen et al. 2018; Garrett et al. 2014; Jha 2019; Jha and Chen 2015). We extend this literature by investigating how a public health regulation that plausibly impair social capital in affected regions impacts the incidence of corporate financial misreporting.

To examine the effects of social capital, a commonly used approach in the literature is to proxy for social capital using the number of social organizations and entities within a region (e.g., Hoi et al. 2019; Rupasingha et al. 2006). However, this approach faces limitations, as the number of such organizations is relatively static and may reflect other regional characteristics,

[2] In addition to employees inside the accounting function, employees outside the accounting function also play an important role in shaping financial reporting quality. For example, Call et al. (2017) mention that "We do not assume that a firm's workforce needs a working knowledge of generally accepted accounting principles (GAAP) to improve reporting outcomes. Employees from outside the accounting function provide information that is relevant to the ultimate reporting decision made by senior management"…and that "Further, employees need not understand the rules surrounding revenue recognition to recognize when production and ship- ping activities are abnormal (i.e., concentrated at the end of the quarter, shipped without a purchase order), when standard procedures are bypassed (i.e., reduction in quality-control checks, skipping planned maintenance), or when product returns are abnormal. An employee who does not understand the nuances of GAAP but who understands when something is amiss can elevate the issue to a superior who is more likely to be financially sophisticated and have an understanding of GAAP."

such as wealth, political inclination, or demographic composition. In this study, we exploit the staggered implementation of medical marijuana legalizations (MMLs) across U.S. states as plausibly exogenous shocks to social capital. A key advantage of using MMLs is that they are exogenous and not directly related to firms' decision-making, yet exert meaningful social and cultural influence on local communities. Prior studies suggest that MMLs reduce individuals' perceptions of marijuana's legal risks, thereby increasing illicit and adolescent use and facilitating the use of other hard drugs (Cheng et al. 2023; Goyena 2014; Pacula et al. 2015; Schlinkmann 2010; Wen et al. 2015). MMLs also have been associated with increases in crime rates, unprotected sexual activities, and traffic fatalities (Baggio et al. 2020; Klas 2014; Li et al. 2013), as well as weakened controls and regulatory oversight (Gershman 2012). These patterns collectively suggest that MMLs may adversely impact regional culture and social capital (e.g., Schlinkmann 2010), with potential downstream effects on financial reporting.

We exploit the staggered legalization of medical marijuana across U.S. states to examine how changes in social capital influence financial misreporting. Specifically, we use a difference-in-differences (DID) framework to identify the causal effect (Bertrand and Mullainathan 2003).[3] Drawing on prior literature, we posit that firms headquartered in states enacting MMLs are more likely to experience adverse shocks to social capital. To estimate the effect of this reduction in social capital on financial misreporting, we compare these treated firms with control firms located in states that have not implemented MMLs.

Consistent with our conjecture, we find that the legalization of medical marijuana is associated with a significant increase in financial misreporting. Specifically, firms headquartered in states that legalize medical marijuana experience, on average, a 25 percent increase in the odds of material misstatements. To further attribute this increase to MMLs, we compare states with greater increases in marijuana use following legalization, indicative of a

[3] See Cheng et al. (2023) for a detailed summary of federal-level marijuana prohibition and state-level MMLs.

stronger erosion of social capital, to those with smaller increases. Our analysis shows that firms in the former group are more likely to report material misstatements than those in the latter. Importantly, while MMLs significantly increase marijuana consumption, we find no corresponding rise in alcohol consumption, mitigating concerns that the observed effects are driven by changes in other substance use.

A key identification assumption underlying our DID framework is that, absent MMLs, treatment firms and control firms would have followed parallel trends in material misstatements. To validate this assumption, we conduct a parallel trend analysis and find no significant differences in the likelihood of material misstatements between the two groups prior to legalization. Moreover, the risk of material misstatements significantly increases only after MMLs are enacted, supporting a causal interpretation. Our results are robust to several additional tests, including placebo tests, approximate randomization tests, a stacked DID approach, alternative measures of financial misreporting, and alternative sample periods.

One mechanism through which MMLs influence the likelihood of material misstatements is their impact on internal control effectiveness. Material misstatements are often accompanied by internal control deficiencies (EY 2015; Lee et al. 2022), and prior research suggests that MMLs may weaken these controls (Gershman 2012). To examine this channel, we conduct a path analysis and find that MMLs have both a direct effect on the likelihood of material misstatements and an indirect effect through the deterioration of internal controls. These findings align with the established importance of internal controls in ensuring financial reporting quality (Doyle et al. 2007; PCAOB 2004). Collectively, our results suggest that a key channel through which MMLs contribute to financial misreporting is via their adverse effect on the workforce and internal control environment.

To further strengthen our inferences, we conduct three cross-sectional analyses. We find that the impact of MMLs on material misstatements is more pronounced in states with higher marijuana consumption, more frequent usage, and a greater prevalence of suicide attempts,

conditions indicative of a greater decline in social capital. In addition, we perform two further cross-sectional analyses to explore factors that may amplify or mitigate this effect. Our results indicate that the impact of MMLs is stronger for firms where information production and sharing are critical, and for those operating in labor-intensive industries, where social capital likely play a more important role in financial reporting. Finally, we find that the legalization of recreational marijuana, alongside medical marijuana, further increases the likelihood of material misstatements. Overall, these findings provide evidence that MMLs increase the risk of material misstatements through their adverse effects on social capital.

Our research makes important contributions to the literature. First, we contribute to the growing literature examining the role of ethics and social capital in financial reporting. High-quality financial reporting depends heavily on the ethical conduct of the individuals involved in executing accounting processes (Francis 2011; Hoopes et al. 2018). While prior studies have primarily explored professional characteristics, such as work experience, equity compensation, and educational background, as determinants of financial reporting quality (Call et al. 2017; Feng et al. 2011; Kim et al. 2022; Lisic et al. 2019b), our study extends this body of work by showing that adverse shocks to social capital, induced by MMLs, can impair ethical norms and increase the likelihood of material misstatements. Our research also contributes to the literature on the importance of ethics and social capital in financial reporting (e.g., Berglund and Kang 2013; Chen 2010; Chen et al. 2018; Coates et al. 2002; Garrett et al. 2014; Jha 2019; Jha and Chen 2015; Shafer 2002; Staubus 2005) by providing novel evidence that public health policies, though not directly related to financial reporting, can influence reporting outcomes by altering the social and ethical environment in which firms operate.

Second, our study contributes to the literature on the effects of public policies on financial reporting. Prior research in this area has predominantly focused on capital market regulations, such as the Sarbanes-Oxley Act, stock exchange listing rules, and PCAOB disciplinary orders (Boone et al. 2015; Cohen et al. 2008; Kim and Klein 2017). We broaden this line of work by

showing that public health regulations, specifically MMLs, can also generate significant spillover effects on financial reporting. This highlights a broader set of regulatory influences, beyond those directly targeting financial markets, that can shape corporate reporting behaviors.

Third, our research informs the ongoing policy debate surrounding marijuana legalization. While 36 states have legalized the medical use of marijuana, legislators in the remaining states are still debating whether to follow or not. The legalization of recreational marijuana also remains controversial. At the federal level, the Senate continues to discuss the proposed Cannabis Administration and Opportunity Act, which seeks to remove marijuana from the Schedule of Controlled Substances. Existing studies on the consequences of marijuana legalization have primarily focused on its implications for individuals, banks, and local governments (e.g., Anderson et al. 2013; Baggio et al. 2020; Brushwood et al. 2020; Cheng et al. 2023; Dragone et al. 2019). Our research extends this burgeoning literature by documenting an underexplored cost, that is, the adverse impact of MMLs on the financial reporting quality of local businesses.

The remainder of this paper proceeds as follows. Section 2 reviews prior literature and develops hypotheses. Section 3 describes our variable construction and sample formation. Section 4 reports descriptive statistics and empirical regression results. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 Medical Marijuana Legalizations

Since 1996, U.S. states have begun legalizing the medical use of marijuana. While marijuana remains illegal at the federal level, by 2022, 36 states had legalized its medical use.[4] The staggered implementation of MMLs across these states has led to increased marijuana consumption (Cheng et al. 2023; Dragone et al. 2019), raising both public concern and academic interest. Although MMLs are intended to permit marijuana use for medical purposes

[4] See https://www.forbes.com/sites/willyakowicz/2022/04/01/us-house-of-representatives-pass-federal-cannabis-legalization-bill-more-act/?sh=c12201566d7f.

only, economic theory on substance use (Becker and Murphy 1988; Grossman 2005) suggests that such liberalization, even for medical reasons, could foster illicit use as well. Wen et al. (2015) identify four key reasons why MMLs may contribute to increased recreational use: (1) the broad and clinically challenging definition of "chronic pain," which allows for medical marijuana prescriptions; (2) lax enforcement of patient eligibility in some states; (3) expanded marijuana supply through retail dispensaries and home cultivation; and (4) shifts in social norms and public attitudes toward marijuana use. Consistent with these arguments, some studies document that MMLs increase both the availability and usage of marijuana, both medical and illicit (Dragone et al. 2019; Hasin et al. 2017; Pacula et al. 2015; Sabia and Nguyen 2018; Wen et al. 2015). Today, marijuana is arguably the most widely used and controversial illicit drug in the U.S.,[5] with 19 percent of the U.S. population aged twelve and older reporting marijuana use in the past twelve months, according to the 2021 U.S. National Survey on Drug Use and Health.[6]

Regardless of whether the marijuana is used for medical or illicit purposes, the increased availability and consumption of the drug, if any, alongside the passage of MMLs, raise public concerns. Specifically, marijuana usage can lead to dizziness, hallucinations, and slower reaction times, and it has been shown to negatively impact attention, psychomotor task performance, and short-term memory (Andrade 2016; Sagie et al. 2013). While still debated, some studies suggest that marijuana impairs various cognitive functions, including learning and memory, working memory, attentional control, motor inhibition, cognitive biases, emotion processing, and decision-making (see Kroon et al. 2021). These adverse effects are particularly concerning in the workplace. Using phone interview data collected between January 2002 to June 2003, Frone (2006) reports that marijuana is the most commonly used illicit drug among

[5] For example, when the U.S. congress discusses a bill that would make marijuana legal at the federal level, the bill receives 220 votes for yes and 204 votes for no. For more details, see https://www.congress.gov/bill/117th-congress/house-bill/3617/actions.

[6] See https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021NSDUHFFRRev010323.pdf.

the workforce, with 11.33 percent (around 14.2 million workers) using marijuana in the past twelve months, and 10.57 percent (around 13.3 million workers) using it to get high or stoned. As MMLs increase the availability of marijuana and reduce the perceived risks of its usage, these figures have been rising over time. According to the 2021 U.S. National Survey on Drug Use and Health, 20.9 percent of adults employed full-time and 24.9 percent of adults employed part-time report using marijuana in the past year. Another Statista survey indicates that in 2016, 16 percent of U.S. adults reported regular marijuana use, rather than merely having tried it at some point.[7] In addition, Saeedy (2024) highlights the prevalence of substance abuse among professionals on Wall Street.

One significant side effect of MMLs is their potential to adversely affect social capital and individuals' ethical beliefs. For example, Cheng et al. (2023) show that, post-legalization, residents perceive marijuana's health and legal risks as lower, leading to increased marijuana use. As a result, MMLs have been shown to increase illicit and adolescent use of marijuana and other hard drugs (Goyena 2014; Pacula et al. 2015; Schlinkmann 2010; Wen et al. 2015). Beyond just the rise in marijuana consumption, MMLs have been linked to other serious societal consequences. Klas (2014) documents an increase in crime rates following MML implementation, while Gershman (2012) finds that MMLs lead to weakened controls and regulatory oversight. Other studies report increases in unprotected sex and traffic fatalities after MMLs (Baggio et al. 2020; Li et al. 2013). Taken together, these findings suggest that MMLs have a significant and detrimental impact on both the culture and social capital of a region (e.g., Schlinkmann 2010).

Overall, a growing body of research has explored the impact of MMLs on individuals, banks, and local governments (e.g., Baggio et al. 2020; Brushwood et al. 2020; Cheng et al.

[7] See https://www.statista.com/chart/25579/share-us-adults-who-tried-marijuana-cannabis/?utm_source=Statista+Newsletters&utm_campaign=8d959a54a1-All_InfographTicker_daily_COM_PM_KW16_2023_We_COPY&utm_medium=email&utm_term=0_662f7ed75e-8d959a54a1-329461994.

2023; Dragone et al. 2019). However, little attention has been given to their potential effects on businesses. This study takes an early step in addressing this gap by examining whether and how MMLs influence the likelihood of material misstatements in corporate financial reporting.

2.2 Social Capital, Ethical Beliefs, and Financial Misreporting

Material misstatements occur when financial statements contain errors or fraudulent reporting that remain undetected and uncorrected within accounting processes (Lennox and Li 2014). When subsequently revealed through restatements, these misstatements can lead to substantial investor losses and significant economic consequences for managers, auditors, and those involved parties (Government Accountability Office [GAO] 2006; Hennes et al. 2008; Johnson et al. 2007; Palmrose and Scholz 2004; Palmrose et al. 2004; Srinivasan 2005). Given these high stakes, prior research has extensively explored the role of auditors, directors, employees, managers, and regulators in contributing to or detecting material misstatements (e.g., Call et al. 2016, 2017; Keune and Johnstone 2012; Lamoreaux et al. 2023).

One stream of literature focuses on the role of social capital in shaping individuals' ethical beliefs, which in turn influences ethical behaviors and financial reporting (e.g., Berglund and Kang 2013; Chen 2010; Chen et al. 2018; Coates et al. 2002; Garrett et al. 2014; Jha 2019; Jha and Chen 2015; Shafer 2002; Staubus 2005). Javakhadze et al. (2016) argue that social capital fosters transparency, contract enforcement, and managerial decision-making efficiency, finding that it reduces firms' reliance on internal funds and improves investment sensitivity to cash flows. Similarly, Gao et al. (2021) report that firms located in regions with higher social capital use corporate resources more efficiently. Hoi et al. (2019) show that social capital surrounding corporate headquarters is negatively associated with CEO compensation, suggesting that it mitigates agency problems by restraining managerial rent extraction. In line with the view that higher social capital is associated with lower audit risk, Chen et al. (2018) find that firms in high-trust regions are less likely to receive modified audit opinions, while Jha and Chen (2015) report that auditors charge lower fees for clients headquartered in these regions. Similarly,

Cheng et al. (2017) and Hasan et al. (2017) show that higher social capital is associated with lower bank loan spreads, suggesting that social capital constrains opportunistic behaviors in debt contracting. Amiraslani et al. (2023) further highlight that social capital plays a more significant role in debt contracting during the global financial crisis, especially for firms with higher agency costs of debt.

Prior studies also provide direct evidence that social capital promotes ethical behaviors, suggesting that prosocial individuals are less likely to engage in misconduct (e.g., Bereskin et al. 2020). For example, Hasan et al. (2017) find that firms headquartered in regions with higher levels of social capital are less likely to engage in tax avoidance, while Hoi et al. (2018) show that social capital fosters greater corporate social responsibilities. Moreover, Jha (2019) reports that financial reporting quality is higher when firms are located in regions with higher social capital, while Bai et al. (2022) find that social capital constrains financial advisors' misconduct. In terms of economic outcomes, Lins et al. (2017) document that firms with higher social capital enjoy greater trust among stakeholders and investors, and perform better during the global financial crisis, as evidenced by higher stock returns, profitability, growth, and sales per employee.

Overall, prior studies suggest that social capital plays a critical role in shaping individuals' ethical beliefs and behaviors. While prior studies have primarily focused on the effects of capital market regulations on financial misreporting (e.g., Boone et al. 2015; Cohen et al. 2008; Kim and Klein 2017), other forms of public policy, beyond capital market regulation, may also have important consequences for the individuals involved in accounting processes, the broader workforce, and the quality of financial reporting. This paper contributes to this literature by examining whether the staggered implementation of MMLs serves as an exogenous shock to social capital that increases the likelihood of financial misreporting.

2.3 Medical Marijuana Legalizations and Financial Misreporting

Drawing on the social capital literature, we posit that MMLs increase the likelihood of material misstatements. Individuals such as accountants, auditors, directors, employee, and managers play a crucial role in ensuring financial reporting quality and uncovering misstatements. The passage of MMLs may influence these individuals' ethical beliefs and behaviors. Prior studies suggest that MMLs lead to broader social consequences, including higher crime rates (Klas 2014), increased illicit use of marijuana and other hard drugs (Schlinkmann 2010), weakened controls and regulatory oversight (Gershman 2012), and a rise in traffic fatalities (Li et al. 2013). In addition, MMLs have been shown to reduce individuals' perceived health and legal risks associated with marijuana use (Cheng et al. 2023). These societal shifts may erode ethical norms among directors, employees, and managers, making financial misreporting more easily rationalized. Similarly, if MMLs impair auditors' ethical standards or diminish their incentives to perform high-quality audits, the risk of material misstatements may further increase.

Moreover, MMLs may alter individuals' risk attitudes and promote opportunistic behaviors. Lane et al. (2005) find that acute marijuana users are more inclined to engage in financial risk-taking, while Fridberg et al. (2010) report that chronic users exhibit greater risk-taking tendencies in gambling tasks. As risk-averse personnel are generally more vigilant in detecting accounting irregularities and enforcing internal controls (Liang et al. 2022), a shift towards risk-seeking behaviors induced by MMLs could undermine these safeguards. Consequently, this creates both greater incentives and opportunities for fraudulent activities, thereby increasing the likelihood of material misstatements.

Collectively, considering both preparer and auditor perspectives, the above discussion suggests that the legalization of medical marijuana may increase the risk of material misstatements. This leads to the following hypothesis.

H1: The legalization of medical marijuana increases the likelihood of material misstatements.

It is important to emphasize that our arguments do not hinge on the assumption that MMLs increase marijuana use in the workplace. Rather, our theoretical foundation rests on the notion that MMLs influence regional social capital and individuals' ethical beliefs. Nevertheless, our hypothesis is not without tension. Prior literature indicates that marijuana may alleviate chronic pain (Lynch and Campbell 2011; Lynch and Ware 2015; Whiting et al. 2015), potentially enhancing work productivity. For example, Garthwaite (2012) shows that limited access to painkillers reduces workforce participation, while Bütikofer and Skira (2018) find that access to pain-relief medication reduces sick leave. Improved health and increased availability for work may better position personnel involved in financial reporting to detect and prevent errors (Lopez and Peters 2012; McDaniel 1990). Moreover, marijuana has been identified as a substitute for more harmful substances such as heroin and cocaine (Jansen 2023; Powell et al. 2018). This substitution effect may reduce crime rates (Chu 2015; Dragone et al. 2019; Gavrilova et al. 2019), which in turn could increase the visibility of corporate misconduct (Glaeser et al. 1996) and facilitate the allocation of public resources towards enforcement and oversight (Sah 1991). These dynamics may discourage financial misreporting. Collectively, these conflicting arguments suggest that the overall effect of MMLs on financial misreporting is theoretically ambiguous and therefore remains an empirical question.

We focus on material misstatements, particularly income-increasing ones, for several reasons. First, managers and auditors are responsible for ensuring that financial statements are free from material misstatements (PCAOB 2010; SEC 2022). Second, managers have strong incentives to meet and beat performance expectations using income-increasing tactics (Bartov et al. 2002; Graham et al. 2005), while auditors are especially vigilant towards such misstatements due to asymmetric litigation and reputational risks (Braun 2001; Heninger 2001; Joe et al. 2011; Kinney and Martin 1994; Lennox et al. 2016; Nelson et al. 2002, 2005; Pittman

and Zhao 2021).[8] Third, material misstatements revealed through restatements are widely viewed as the most visible indicator of financial misreporting by investors and regulators (Aobdia 2019; Christensen et al. 2016; Schroeder 2001). These restatements carry significant economic consequences, including investor wealth losses and penalties for auditors and managers (GAO 2006; Hennes et al. 2008; Johnson et al. 2007; Palmrose and Scholz 2004; Palmrose et al. 2004; Srinivasan 2005). Particularly, income-decreasing misstatements often trigger particularly severe market reactions and lawsuits, as they provide concrete evidence for litigation (Hennes et al. 2008; Johnson et al. 2007; Palmrose and Scholz 2004; Palmrose et al. 2004). Finally, financial reporting quality relies on inputs and efforts of various professionals involved in the accounting processes (Francis 2011; Hoopes et al. 2018). These individuals engage in strategic interactions that jointly determine the quality of financial statements (see Lennox and Li 2014). As MMLs may influence these individuals' ethical beliefs and behaviors, examining material misstatements enables us to capture the effects of MMLs from both preparer and monitor perspectives. In additional analyses, we also employ alternative measures of material misstatements and financial misreporting, which are discussed later in the paper.

3. Research Designs

3.1 Empirical Model

To investigate whether and how MMLs affect the likelihood of material misstatements, we adopt a DID research design and estimate the following linear probability regression model[9]:

$$RES = \beta_0 + \beta_1 MARIJUANA + \beta_2 FOREIGN + \beta_3 LNTA + \beta_4 SEGGEO + \beta_5 SEGBUS + \beta_6 STDCFO + \beta_7 CFO + \beta_8 ABSTACC + \beta_9 ROA + \beta_{10} GROWTH + \beta_{11} MB + \beta_{12} LEV + \beta_{13} DECEMBER + \beta_{14} BIGN + \beta_{15} LNPOP + \beta_{16} LNPI + \beta_{17} COLLEGE + \beta_{18} VOTE$$

[8] For example, Lennox et al. (2016) indicate that income-decreasing audit adjustments far exceed income-increasing ones.

[9] Because firm fixed effects are included, we follow Chen et al. (2021b) and estimate a linear probability regression model to avoid the incidental parameter problem, which biases estimates when including a large number of fixed effects in a nonlinear model (Lancaster 2000).

$$+ \beta_{19} ALCOHOL + FIRM + YEAR + \varepsilon^{10} \quad (1)$$

Following prior studies (e.g., Dou et al. 2016; Francis and Michas 2013; Lee et al. 2022; Li et al. 2017), we use "Big R" income-decreasing restatements to measure material misstatements because our predication focuses on material misstatements and "Big R" income-decreasing restatements provide clear evidence that financial statements issued previously consisted of material misstatements. Restatements are a leading indicator of financial misstatements (Christensen et al. 2016) and have been widely used in numerous academic papers (e.g., Aobdia 2019; Beardsley et al. 2019; Cheng et al. 2019; Lee et al. 2022; Lisic et al. 2019a). The dependent variable (*RES*) equals 1 if a firm engages in "Big R" income-decreasing financial restatements, and 0 otherwise. We explore alternative specifications of material misstatements later and find consistent results.

The key variable of interest, *MARIJUANA*, is an indicator variable that equals 1 if a firm is headquartered in a state that has adopted MMLs by the end of fiscal year *t*, and 0 otherwise. We identify firms' headquarters locations based on the addresses reported in their 10-K filings on EDGAR (Jennings et al. 2020).[11] To control for intertemporal changes in the likelihood of material misstatements, we include year fixed effects (*YEAR*). We also incorporate firm fixed effects (*FIRM*) to account for time-invariant differences in the likelihood of material misstatements across firms. As a result, *MARIJUANA* captures the change in the likelihood of material misstatements for firms in states that legalize medical marijuana, relative to firms in states that do not. This DID approach is widely used to evaluate the impact of policy implementations (Cheng et al. 2013; Dhaliwal et al. 2011). If MMLs lead to an increase in material misstatements, we expect β_1 to be positive.

We include several control variables that influence the likelihood of material misstatements documented in the literature (e.g., Aobdia 2019; Francis and Michas 2013;

[10] We use robust standard errors, with clustering along the region and year dimensions.
[11] The results are similar when using the current location data retrieved from Compustat.

Gaver and Utke 2019). Specifically, we include foreign operations (*FOREIGN*), firm size (*LNTA*), geographic segments (*SEGGEO*), business segments (*SEGBUS*), standard deviation of operating cash flow (*STDCFO*), cash flow from operations (*CFO*), lagged absolute total accruals (*LAGTACC*), return on assets (*ROA*), sales growth (*GROWTH*), market-to-book ratio of equity (*MB*), leverage (*LEV*), December fiscal year-end (*DECEMBER*), and Big N auditors (*BIGN*). We further control for state-level characteristics by including population (*LNPOP*), per capita income (*LNPI*), education (*COLLEGE*), political inclination (*VOTE*), and alcohol consumption (*ALCOHOL*). All continuous variables are winsorized at the 1st and 99th percentiles. Appendix 1 provides detailed variable definitions.

3.2 Data and Sample Selection

We collect financial and audit data from Compustat and Audit Analytics, respectively. We obtain population and per capita income data from the Bureau of Economic Analysis, education data from IPUMS database (Flood et al. 2018), political inclination data from The Green Papers, and alcohol consumption data from the Substance Abuse and Mental Health Data Archive (SAMHDA). Following prior research on marijuana laws (e.g., Cheng et al. 2023; Chu and Townsend 2019), we collect data on the passage years of MMLs from ProCon.org, a non-profit, non-partisan public charity that documents state-level marijuana legislation.[12] Figure 1 labels the states that had adopted MMLs by the end of our sample period. Our sample begins with all non-financial firm-year observations from Compustat from 1991 through 2019. We begin our sample in 1991, as it is the earliest year for which financial statements of our sample firms were subsequently restated.[13] The sample period ends in 2019 to ensure sufficient time has

[12] For the details of states' marijuana laws, see https://medicalmarijuana.procon.org/legal-medical-marijuana-states-and-dc/.

[13] Audit Analytics has been collecting restatements from electronic filings made by SEC registrants since January 1, 2000. Notably, a restatement announced in 2000 may cover financial reporting periods prior to that year. This allows us to identify restatements from before 2000, thereby expanding our dataset. Starting our sample period in 1991 enhances our coverage and ensures comparability with prior research on the impact of MMLs (e.g., Cheng et al. 2023, which examines a sample from 1991 to 2018). We employ an alternative sample period in an additional test and find consistent results, which we discuss later.

passed for material misstatements to be identified (Cunningham et al. 2019). After excluding observations without the necessary data to compute control variables, our final sample consists of 118,913 firm-year observations. An untabulated analysis suggests that observations are evenly distributed across years, with each year accounting for 2.11–4.87% of the sample.[14]

4. Empirical Results

4.1 Descriptive Statistics

Table 1 reports the descriptive statistics, which are generally consistent with prior studies (e.g., Aobdia 2019). For our key variable of interest (*MARIJUANA*), at the firm-year level, 28.2% are in states that have introduced MMLs. For our dependent variable (*RES*), 2.4% experience material misstatements. Among the control variables, 32.8% report foreign income (*FOREIGN*), 63.8% have December as their fiscal year-end (*DECEMBER*), and 72.3% are audited by Big N auditors (*BIGN*). On average, firms report 1.843 billion US dollars in total assets (*AT*) and have 4.593 geographic (*SEGGEO*) and 4.024 business (*SEGBUS*) segments. The mean values of the standard deviation of operating cash flow (*STDCFO*), cash flow from operations (*CFO*), lagged absolute total accruals (*ABSTACC*), return on assets (*ROA*), sales growth (*GROWTH*), market-to-book ratio (*MB*), and leverage (*LEV*) are 0.121, −0.022, 0.160, −0.150, 0.238, 2.773, and 0.648, respectively. At the firm-year level, the average state where a firm is located reports 14.982 million in population (*POP*), $36,338 in personal income per capita (*PI*), 29.3% of the population with a college degree (*COLLEGE*), 43.5% political inclination toward the Republican Party (*VOTE*), 15% of the population consuming alcohol daily (*ALCOHOL*).

4.2 Correlation Matrix

Table 2 reports the correlation matrix for the variables used in this study. As shown, there is a significant positive correlation between *RES* and *MARIJUANA*. This provides preliminary

[14] Tables of untabulated analyses are available upon request.

evidence that firms are more likely to report material misstatements following the passage of MMLs. None of the correlations reaches 0.80 or above, except for the correlations between *CFO* and *ROA* (0.82) and between *LNPI* and *COLLEGE* (0.81), suggesting that severe multicollinearity is not a concern (Farrar and Glauber 1967).[15]

4.3 Main Regression Results

Table 3 reports the main regression results. Our model demonstrates satisfactory explanatory power, with control variable signs largely consistent with prior studies (e.g., Aobdia 2019). We first estimate the model with only the variable of interest and firm and year fixed effects. *MARIJUANA* is positive and significant (0.006, $p<0.01$). Next, we incorporate firm and audit characteristics, and *MARIJUANA* remains positive and significant (0.006, $p<0.01$). Finally, after adding state-level control variables, *MARIJUANA* continues to be positive and significant (0.006, $p<0.01$). Collectively, these results provide strong evidence that material misstatements become more likely after the introduction of MMLs. To illustrate economic significance, the coefficients suggest that MMLs increase the odds of material misstatements by 25 percent.[16]

4.4 Alternative Explanations

To further attribute the increase in material misstatements to MMLs, we test whether the effect is stronger in states that experience greater adverse shocks to regional social capital, as proxied by the increase in marijuana usage. Specifically, we decompose *MARIJUANA* into two variables based on the average post-MML increase in marijuana use: *MARIJUANA_H* (*MARIJUANA_L*) equals 1 if a firm is in a state that has adopted MMLs by the end of fiscal year *t* and the average increase in marijuana usage is higher than (equal to or lower than) the median among MML states, and 0 otherwise. Panel A of Table 4 shows that *MARIJUANA_H*

[15] None of the variance inflation factors (VIFs) is higher than ten, with the maximum of VIF being 5.16. In addition, our regression results remain consistent when excluding either *CFO* or *ROA* and either *LNPI* or *COLLEGE* from the model. These suggest that multicollinearity doesn't drive our results.

[16] The economic significance is calculated as dividing the coefficient (0.006) by the mean value of *RES* (0.024), which equals 0.25.

is positive and significant, whereas *MARIJUANA_L* is insignificantly positive. These results suggest that the increase in the risk of material misstatements is more pronounced in states where MMLs are associated with larger increases in marijuana usage, consistent with the argument that MML-induced reductions in social capital contribute to financial misreporting.

To further validate this inference, we examine whether MMLs increase marijuana usage and alcohol consumption. We conduct this test at the state-year level, controlling for state-level characteristics as well as state and year fixed effects. As shown in Panel B of Table 4, we find that marijuana usage significantly increases after MMLs, whereas alcohol consumption remains stable. This finding reinforces our argument that MMLs expand marijuana availability and usage, thereby deteriorating regional social capital and increasing the likelihood of material misstatements. It also helps rule out, at least partially, the possibility that our results are driven by changes in alcohol consumption.

4.5 Parallel-Trend Test

To strengthen the causal inference of our results, we test the parallel trend assumption by replacing *MARIJUANA* with a series of pre- and post-policy indicators: *PRE_2Y*, *PRE_1Y*, *POST_0Y*, *POST_1Y*, *POST_2Y*, and *POST_3Y+*. These variables capture the change in the likelihood of material misstatements two years and one year before the MML introduction, during the year of introduction, and one year, two years, and three years or more after the MML introduction, respectively. Panel C of Table 4 shows that the introduction of MMLs starts to increase the likelihood of material misstatements one year after the introduction but not before. Since different states implemented MMLs at different times during our sample period, the results of this parallel trend test provide strong evidence that firms are more likely to experience material misstatements after the passage of MMLs.

4.6 Placebo and Approximate Randomization Tests

Following DeFond et al. (2020) and Kim et al. (2019), we replace *MARIJUANA* with a pseudo event year that is three years prior to the actual event year. As shown in Panel D of

Table 4, *MARIJUANA* becomes insignificant (p>0.10). This result further strengthens our main findings, confirming that firms are more likely to have material misstatements after MMLs.

We also conduct an approximate randomization test, following Lundholm and Myers (2002) and Stice et al. (2022). Specifically, for each legalizing state, we replace *MARIJUANA* with a randomly assigned pseudo event year. We repeat this random assignment and re-estimate our model 999 times, generating 999 pseudo coefficients on *MARIJUANA*. This process yields a distribution of test statistics under the null hypothesis of no association between *MARIJUANA* and *RES*. We then calculate the significance level of the test statistic as the number of test statistics at least as large as the corresponding coefficient in the main results, divided by 1,000 (999 times plus 1). Because we observe only one case where the coefficient on *MARIJUANA* is at least as large as the corresponding coefficient in our main result (p<0.01), the results (untabulated) suggest that it is indeed the introduction of MMLs that increases the likelihood of material misstatements.

4.7 Stacked DID Approach

Following Baker et al. (2022) and De Franco et al. (2024), we adopt a stacked DID approach as an alternative estimator. Specifically, for each MML event year, we construct a cohort of treatment and control firms for the five years before and after the MMLs. We then stack the datasets across all the cohorts and re-estimate the average effect of MMLs on the likelihood of material misstatements, controlling for cohort × firm and cohort × year fixed effects. As shown in Panel A of Table 5, we continue to find that *MARIJUANA* is positive and significant when using this alternative approach.

4.8 Alternative Measurement

To mitigate concerns about potential measurement errors, we replace *RES* with four different specifications of material misstatements: *RES_NI* indicates income-decreasing restatements, *RES_BIG* indicates Big R restatements, *RES_NEG* indicates restatements with negative impacts on financial statements, and *RES_NEG_BIG* indicates Big R restatements

with negative impacts on financial statements, respectively. As shown in Panel B of Table 5, *MARIJUANA* remains positive and significant across all these different specifications of material misstatements.

To strengthen our inferences, we further employ alternative measures of financial misreporting. Particularly, we replace *RES* with the number of internal control material weaknesses (*ICMW*), the absolute value of discretionary accruals (*ABSDACC*), and the probability of material misstatements (*FSCORE*) (Aobdia 2019; Dechow et al. 2011; Kothari et al. 2005).[17] As shown in Panel C of Table 5, we find that *MARIJUANA* continues to be positive and significant across all three measures of financial misreporting.

To alleviate concerns about incomplete restatement data prior to 2000, we modify our sample period to span from 2000 to 2019. As shown in Panel D of Table 5, *MARIJUANA* remains positive and significant. Finally, we consider the percentage of operations in the headquarter state and re-construct *MARIJUANA* using this alternative measure. In Panel E of Table 5, we continue to observe significant results, indicating that material misstatements become more likely after MMLs.

4.9 Path Analysis

We further conduct path analysis to examine the potential channels through which MMLs may lead to material misstatements. One such channel is internal controls. Prior studies suggest that MMLs can result in weakened controls and regulatory oversight (Gershman 2012), thereby creating incentives and opportunities for financial misconduct (e.g., a lack of segregation of duties) (Doyle et al. 2007). Table 6 reports the results of the path analysis, using the number of internal control material weaknesses (*ICMW*) as the mediating variable. The findings indicate that MMLs have a significant positive direct effect on material misstatements.[18] As for the

[17] We follow Kothari et al. (2005) to estimate the modified Jones model, adjusted by operating performance, to derive discretionary accruals. We require at least ten observations for each year-industry grouping. Our sample size is reduced due to the requirement of additional variables.

[18] This analysis is restricted to 2004−2019 because Section 404 of the Sarbanes-Oxley Act became effective in 2004.

mediated path, we observe that MMLs have a significant positive indirect effect on material misstatements through internal controls. Specifically, MMLs lead to internal control material weaknesses, which in turn increase the likelihood of material misstatements. This finding aligns with the concern that internal control deficiencies result in "more than a remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected" (PCAOB 2004) and that material misstatements are often accompanied by internal control deficiencies (EY 2015; Lee et al. 2022). We also use the absolute value of discretionary accruals (*ABSDACC*) as an alternative mediating variable. Ineffective internal controls may fail to limit managers' ability to manipulate earnings through accruals management (Doyle et al. 2007), which has been found to be positively associated with PCAOB inspection deficiencies (Aobdia 2019). Consistently, we find that MMLs increase the likelihood of material misstatements both directly and indirectly through elevated accruals management.[19]

Collectively, our path analysis suggests that MMLs increase the likelihood of material misstatements through weakened internal controls. This finding aligns with recent studies on the role of internal controls in ensuring financial reporting quality (Doyle et al. 2007; PCAOB 2004) and support our argument that MMLs affect material misstatements via the workforce.

4.10 Cross-Sectional Analysis: Impacts of Deregulation

Our main results indicate that exogenous stocks to social capital raises the propensity of affected firms to engage in financial misreporting, as MMLs influences individuals' ethical beliefs and risk attitudes. If this channel is valid, we would expect the risk of material misstatements to be more pronounced in states that experience greater adverse shocks to regional social capital. To gain further insights into this channel, we proxy MML-induced

[19] Due to the inclusion of numerous variables, we are unable to control for high-dimensional fixed effects, such as firm fixed effects, in the path analysis. Instead, we control for year and industry (two-digit SIC code) fixed effects and cluster the standard errors by firm.

social capital shocks using the prevalence of marijuana use. Specifically, we collect data on marijuana consumption from SAMHDA and divide our sample based on the median value of the marijuana-consuming population in each state. Consistent with our expectations, Panel A of Table 7 shows that *MARIJUANA* remains positive and significant in the subsample with high marijuana usage, but becomes insignificant in the subsample with low marijuana usage. The difference is statistically significant at the 0.01 level.[20] These findings suggest that the impact of MMLs on the likelihood of material misstatements is more pronounced in states with greater marijuana consumption, consistent with the view that weakened social capital contributes to increased financial misreporting.

Similarly, we expect MMLs to introduce greater social capital shocks in states where marijuana is used more frequently. To test this possibility, we collect data on marijuana usage frequency from SAMHDA, coding usage as 2 for daily use, 1 for occasional use, and 0 for no use.[21] We then conduct a median split based on the average frequency of marijuana use in each state. Panel B of Table 7 shows that *MARIJUANA* is positive and significant in the subsample with high usage frequency, but becomes insignificantly positive in the subsample with low usage frequency. The difference is statistically significant at the 0.05 level. This supports the notion that MMLs have a stronger effect on individuals, and, by extension, on financial reporting quality, in states where marijuana is used more frequently.

Finally, we proxy MML-induced social capital shocks using the increased risk of suicide attempts. Carvalho et al. (2019) and Kahn and Wilcox (2022) identify a significant positive association between marijuana use and suicide attempts. If MMLs increases the likelihood of material misstatements by altering individuals' ethics and risk attitudes, the effect is expected to be more pronounced when adverse shocks to social capital are more severe. To examine this,

[20] The sample size is reduced due to data unavailability.
[21] We are unable to further decompose the frequency of marijuana usage based on the number of days of use due to a change in the data format in 2000.

we collect state-level data on suicide attempts from SAMHDA and divide our sample based on the median increase in suicide attempt rates. Panel C of Table 7 shows that *MARIJUANA* remains positive and significant in the subsample with a high increase in suicide attempts, but becomes negative in the subsample with a low increase.[22] The difference is statistically significant at the 0.01 level. These findings suggest that the effect of MMLs on material misstatements is stronger in states where MMLs have a greater negative impact on mental health.[23]

Collectively, Table 7 provides corroborating evidence that MMLs increase the likelihood of material misstatements, particularly in states experiencing more severe adverse shocks to social capital, as proxied by higher prevalence and frequency of marijuana use, as well as greater increases in suicide attempt rates.

4.11 Cross-Sectional Analysis: Firm Characteristics

To gain further insights into the types of firms most affected by MMLs, we first consider a firm's level of decentralization. Garrett et al. (2014) highlight the role of social trust in facilitating information production and sharing within decentralized firms, which tend to have more employees, geographic and business segments, and units or subsidiaries. This suggests that adverse social capital shocks induced by MMLs may exert a stronger impact on the risk of material misstatements in more decentralized firms. Following Garrett et al. (2014), we construct a decentralization score using factor analysis based on the number of employees, geographic segments, and business segments, all obtained from Compustat. We then split our sample at the median value of this score. Consistent with our expectations, Panel A of Table 8 shows that *MARIJUANA* is positive and significant in the subsample with high decentralization

[22] The significant negative coefficient on *MARIJUANA* in the subsample with a low increase in suicide attempts is consistent with the argument that marijuana can help individuals cope with stressful life events (Anderson et al. 2014).

[23] We also examine the duration since a state introduced MMLs. We decompose *MARIJUANA* into two variables based on the median timing of MML implementation (i.e., 2001). Untabulated analysis indicates that both MMLs introduced before 2001 (0.006, $p < 0.05$) and those introduced since 2001 (0.005, $p < 0.01$) increase the likelihood of material misstatements, with the difference being insignificant at conventional levels.

but becomes insignificant in the subsample with low decentralization. The difference is statistically significant at the 0.01 level.

Next, we consider labor intensity. If MMLs influence the likelihood of material misstatements through its impact on individuals' ethical beliefs and risk attitudes, the effect is expected to be more pronounced in industries that are more labor intensive. Following Agrawal and Matsa (2013), we measure labor intensity for each industry-year based on the average ratio of labor and pension expenses to sales, and split our sample at the median value. Panel B of Table 8 shows that *MARIJUANA* is positive and significant in the high labor intensity subsample but becomes insignificant in the low labor intensity subsample. The difference is statistically significant at the 0.05 level. These results suggest that firms operating in labor-intensive industries are more susceptible to MML-induced increases in the risk of material misstatements.

Overall, Table 8 suggests that firms with higher levels of decentralisation and those operating in labor-intensive industries are more susceptible to the adverse social capital shocks induced by MMLs. Consequently, these firms experience a more pronounced increase in the likelihood of material misstatements following the introduction of MMLs.

4.12 Recreational Use of Marijuana

Our main analyses focus on MMLs, as prior studies provide substantial evidence that the introduction of MMLs leads to broader societal consequences for local communities. During our sample period, several states, including Alaska, California, Colorado, Illinois, Maine, Massachusetts, Michigan, Nevada, Oregon, Vermont, and Washington, as well as the District of Columbia, further legalized the recreational use of marijuana. To examine the impact of recreational marijuana legalization on material misstatements, we restrict our analysis to firms located in states with MMLs and replace *MARIJUANA* with *RECREATION*, which is coded as 1 for firm-years after a state legalizes recreational marijuana, and 0 otherwise. Panel A of Table 9 shows that *RECREATION* is positive and significant, suggesting that the likelihood of

material misstatements increases further following the legalization of recreational marijuana. This finding supports our main results, indicating that the legalization of marijuana use raises the likelihood of material misstatements. However, given that the legalization of recreational marijuana is relatively recent in a limited number of states, its long-term impact on material misstatements warrants further investigation. As shown in Panel B of Table 9, our main results remain consistent when excluding firm-years after a state legalizes recreational marijuana (i.e., when *RECREATION* equals 1).

5. Conclusion

This study investigates the impact of adverse shocks to regional social capital on the likelihood of material misstatements. By leveraging the staggered introduction of MMLs in the U.S. and employing a DID research design, we find that the likelihood of material misstatements increases following MML enactment, with a more pronounced effect in states that experience greater social capital shocks, as proxied by a larger rise in marijuana usage. Supplemental analyses suggest that this effect is more likely driven by MML implementation, rather than changes in alcohol consumption. Our results remain robust across various falsification tests, a stacked DID approach, and alternative specifications. Furthermore, path analysis indicates that MMLs contribute to material misstatements by weakening internal controls, thereby creating opportunities for financial misconduct. Cross-sectional analyses show that the increase in material misstatements is more pronounced in states with more prevalent and frequent marijuana use, as well as increased suicide attempt rates, reflecting larger social capital shocks. In addition, we find that the impact of MMLs varies across firms. Specifically, firms with greater decentralization and those operating in labor-intensive industries exhibit a greater increase in material misstatements following MML implementation. Moreover, the risk of material misstatements rises further with the legalization of recreational marijuana. Taken together, these findings support our conjecture that MMLs exacerbate

financial misreporting by negatively affecting regional social capital and individuals' ethical beliefs.

It is important to note that our study is based in the U.S., raising questions about the generalizability of our findings to other countries. In addition, while we use the introduction of MMLs as a proxy for adverse shocks to regional social capital, this approach does not directly capture the frequency of marijuana use among professionals. Future research could extend our analysis by exploring this issue in an international context and employing alternative methodologies, such as interviews or surveys, to gain deeper insights into the relationship between marijuana use and material misstatements. Despite these limitations, our study makes an important contribution by being one of the first to investigate how MMLs, a public health regulation, impact corporate financial reporting.

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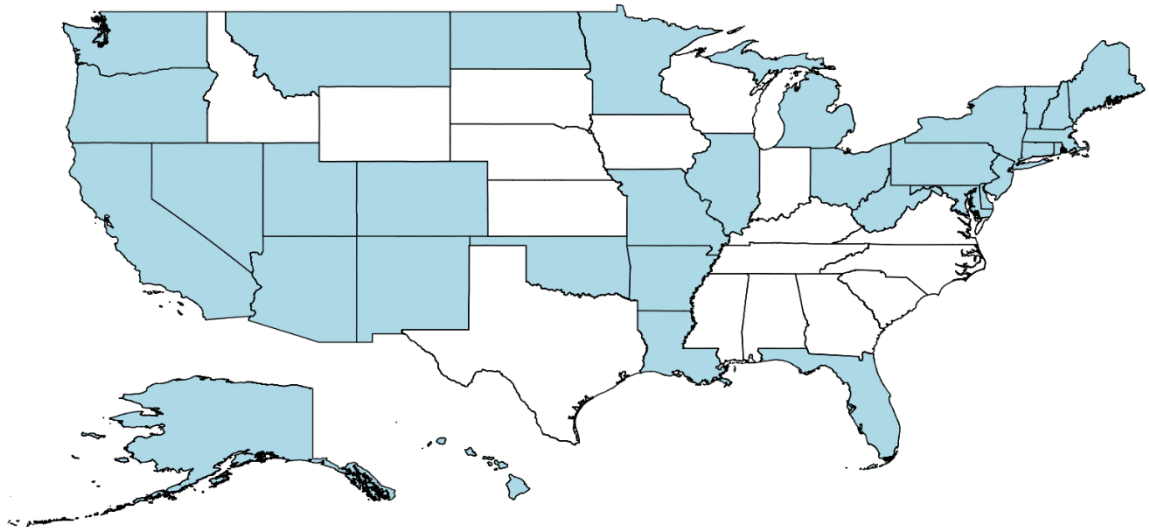
APPENDIX
Variable Definitions

Variable	Definition
RES	= 1 if the fiscal year-end financial statements are restated with the reported earnings being restated downward, and the restatement is disclosed in a form 8-K item 4.02 indicating non-reliance on prior period results, and 0 otherwise;
MARIJUANA	= 1 if a firm is headquartered in a state that has legalizes medical marijuana, and 0 otherwise;
MARIJUANA_H	= 1 if a firm is headquartered in a state that has legalizes medical marijuana and the average increase in marijuana consumption after the legalization is higher than the median increase of states legalizing medical marijuana, and 0 otherwise;
MARIJUANA_L	= 1 if a firm is headquartered in a state that has legalizes medical marijuana and the average increase in marijuana consumption after the legalization is equal to or lower than the median increase of states legalizing medical marijuana, and 0 otherwise;
FOREIGN	= 1 if a firm reports foreign income, and 0 otherwise;
AT	= total assets (billion);
LNTA	= the natural logarithm of total assets;
SEGGEO	= the number of geographic segments;
SEGBUS	= the number of business segments;
STDCFO	= the standard deviation of cash flow from operations over the past four years;
CFO	= cash flow from operations scaled by beginning assets;
ABSTACC	= lagged absolute total accruals scaled by beginning assets, where total accruals are calculated as net income minus cash flow from operations;
ROA	= return on assets, calculated as net income divided by beginning assets;
GROWTH	= year-on-year sales growth;
MB	= market-to-book ratio of equity;
LEV	= leverage ratio, calculated as total liabilities divided by total assets;
DECEMBER	= 1 if a firm's fiscal year ends in December, and 0 otherwise;
BIGN	= 1 if a firm is audited by Big N auditors, and 0 otherwise;
POP	= total population in a state (million);
LNPOP	= the natural logarithm of total population in a state;
PI	= average per capita income in a state (thousand);
LNPI	= the natural logarithm of average per capita income in a state;
COLLEGE	= the percentage of population with a college degree in a state;
VOTE	= political inclination, calculated as the percentage of votes towards the Republican Party in the latest presidential election;
ALCOHOL	= the percentage of population consuming alcohol daily in a state;
PRE_2Y	= 1 if it is two years before the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
PRE_1Y	= 1 if it is one year before the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
POST_0Y	= 1 if it is the year when the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
POST_1Y	= 1 if it is the first year after the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
POST_2Y	= 1 if it is the second year after the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
POST_3Y+	= 1 if it has been three years or longer after the state, where a firm is headquartered, legalizes medical marijuana, and 0 otherwise;
RES_NI	= 1 if the fiscal year-end financial statements are restated with the reported earnings being restated downward, and 0 otherwise;
RES_BIG	= 1 if the fiscal year-end financial statements are restated, and the restatement is disclosed in a form 8-K item 4.02 indicating non-reliance on prior period results, and 0 otherwise;
RES_NEG	= 1 if the fiscal year-end financial statements are restated with the financial statements being negatively impacted, and 0 otherwise;
RES_NEG_BIG	= 1 if the fiscal year-end financial statements are restated with the financial statements being negatively impacted, and the restatement is disclosed in a form 8-K item 4.02 indicating non-reliance on prior period results, and 0 otherwise;
ICMW	= the number of material internal control weaknesses reported for the year;

ABSDACC	= the absolute value of discretionary accruals, which is estimated cross-sectionally based on the modified Jones model, adjusted by operating performance (Kothari et al. 2005);
FSCORE	= the probability of material misstatements, as estimated using Model (1) from Panel A of Table 7 in Dechow et al. (2011).;
RECREATION	= 1 if a state has legalized recreational marijuana, and 0 otherwise.

Note: This table defines the variables used in the models.

Figure 1
States with Medical Marijuana Laws



Note: This map labels the states (in blue) with medical marijuana laws (MMLs) by the end of the sample period (i.e., 2019), including Alaska (1998), Arizona (2010), Arkansas (2016), California (1996), Colorado (2000), Connecticut (2012), Delaware (2011), District of Columbia (2010), Florida (2016), Hawaii (2000), Illinois (2013), Louisiana (2016), Maine (1999), Maryland (2014), Massachusetts (2012), Michigan (2008), Minnesota (2014), Missouri (2018), Montana (2004), Nevada (2000), New Hampshire (2013), New Jersey (2010), New Mexico (2007), New York (2014), North Dakota (2016), Ohio (2016), Oklahoma (2018), Oregon (1998), Pennsylvania (2016), Rhode Island (2006), Utah (2018), Vermont (2004), Washington (1998), and West Virginia (2017). Data on the passage year of MMLs are collected from ProCon.org.

TABLE 1
Descriptive Statistics

Variable	Mean	Std	Q1	Median	Q3
RES	0.024	0.154	0.000	0.000	0.000
MARIJUANA	0.282	0.450	0.000	0.000	1.000
FOREIGN	0.328	0.470	0.000	0.000	1.000
AT (billion)	1.843	5.667	0.028	0.148	0.830
LNTA	18.826	2.465	17.134	18.812	20.537
SEGGEO	4.593	4.887	2.000	3.000	6.000
SEGBUS	4.024	3.910	1.000	3.000	5.000
STDCFO	0.121	0.229	0.030	0.056	0.111
CFO	-0.022	0.323	-0.037	0.062	0.124
ABSTACC	0.160	0.322	0.036	0.074	0.145
ROA	-0.150	0.585	-0.124	0.020	0.071
GROWTH	0.238	0.915	-0.047	0.073	0.242
MB	2.773	6.747	0.972	1.868	3.505
LEV	0.648	0.767	0.316	0.523	0.723
DECEMBER	0.638	0.481	0.000	1.000	1.000
BIGN	0.723	0.447	0.000	1.000	1.000
POP (million)	14.982	11.347	5.794	11.452	20.209
LNPOP	16.189	0.881	15.572	16.254	16.822
PI (thousand)	36.338	11.769	27.066	34.392	43.636
LNPI	10.450	0.318	10.206	10.446	10.684
COLLEGE	0.293	0.064	0.247	0.286	0.329
VOTE	0.435	0.085	0.370	0.417	0.488
ALCOHOL	0.150	0.085	0.078	0.137	0.189

Note: This table reports descriptive statistics of variables used in the models. All the continuous variables are winsorized at the 1st and 99th percentiles. See the Appendix for variable definitions.

TABLE 2
Correlation Matrix

No.	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1)	*RES*																			
(2)	*MARIJUANA*	**0.03**																		
(3)	*FOREIGN*	**0.03**	**0.12**																	
(4)	*LNTA*	**0.06**	**0.01**	**0.42**																
(5)	*SEGGEO*	**0.07**	**0.14**	**0.49**	**0.32**															
(6)	*SEGBUS*	**0.05**	**0.04**	**0.17**	**0.33**	**0.34**														
(7)	*STDCFO*	**-0.03**	**0.08**	**-0.17**	**-0.46**	**-0.14**	**-0.12**													
(8)	*CFO*	**0.04**	**-0.12**	**0.19**	**0.48**	**0.15**	**0.12**	**-0.62**												
(9)	*ABSTACC*	**-0.02**	**0.08**	**-0.14**	**-0.39**	**-0.12**	**-0.09**	**0.62**	**-0.54**											
(10)	*ROA*	**0.03**	**-0.11**	**0.17**	**0.46**	**0.14**	**0.11**	**-0.63**	**0.82**	**-0.65**										
(11)	*GROWTH*	0.00	**0.03**	**-0.08**	**-0.06**	**-0.06**	**-0.05**	**0.16**	**-0.12**	**0.10**	**-0.09**									
(12)	*MB*	**0.01**	**0.04**	**0.03**	**0.04**	**0.02**	**-0.01**	**-0.03**	**0.05**	**-0.06**	**0.09**	**0.07**								
(13)	*LEV*	**-0.02**	**0.03**	**-0.08**	**-0.24**	**-0.10**	**-0.04**	**0.54**	**-0.48**	**0.59**	**-0.62**	**0.03**	**-0.15**							
(14)	*DECEMBER*	**-0.01**	**0.05**	**0.04**	**0.12**	**0.04**	**0.07**	**0.02**	**-0.05**	**0.02**	**-0.04**	**0.05**	**0.01**	**0.03**						
(15)	*BIGN*	**0.02**	**-0.08**	**0.22**	**0.51**	**0.13**	**0.07**	**-0.28**	**0.27**	**-0.27**	**0.28**	**-0.03**	**0.05**	**-0.20**	**0.04**					
(16)	*LNPOP*	**0.02**	**0.30**	**0.07**	**-0.01**	**0.08**	**-0.03**	**0.06**	**-0.07**	**0.05**	**-0.06**	**0.02**	**0.03**	0.00	0.00	**-0.03**				
(17)	*LNPI*	**0.03**	**0.47**	**0.22**	**0.16**	**0.27**	**0.27**	**0.05**	**-0.10**	**0.08**	**-0.10**	**-0.02**	**0.02**	**0.07**	**0.10**	**-0.20**	**0.15**			
(18)	*COLLEGE*	0.00	**0.31**	**0.17**	**0.09**	**0.16**	**0.14**	**0.03**	**-0.07**	**0.04**	**-0.06**	**-0.02**	**0.02**	**0.03**	**0.07**	**-0.13**	**-0.07**	**0.81**		
(19)	*VOTE*	**0.05**	**-0.19**	**-0.05**	**0.10**	**0.06**	**0.18**	**-0.01**	**0.05**	**0.03**	**0.01**	**-0.02**	**-0.04**	**0.05**	**0.07**	**-0.06**	**-0.18**	**-0.05**	**-0.28**	
(20)	*ALCOHOL*	**-0.03**	**-0.24**	**-0.07**	**-0.10**	**-0.11**	**-0.11**	**-0.01**	0.00	**-0.04**	**0.02**	**0.02**	0.00	**-0.04**	**-0.06**	**0.05**	**-0.13**	**-0.19**	**0.11**	**-0.37**

Note: This table reports the Pearson correlation between variables. Bold values indicate correlations significant at the 0.10 level. See the Appendix for variable definitions.

TABLE 3
Legalizing Medical Marijuana and Financial Misstatements

D.V.	*RES*		*RES*		*RES*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.006**	***0.001***	**0.006**	***0.001***	**0.006**	***0.000***
FOREIGN			-0.003	*0.164*	-0.003	*0.189*
LNTA			0.009	*0.000*	0.009	*0.000*
SEGGEO			0.001	*0.000*	0.001	*0.000*
SEGBUS			0.000	*0.667*	0.000	*0.668*
STDCFO			-0.002	*0.501*	-0.002	*0.482*
CFO			0.008	*0.010*	0.007	*0.011*
ABSTACC			0.000	*0.850*	0.000	*0.871*
ROA			-0.004	*0.002*	-0.004	*0.002*
GROWTH			0.001	*0.127*	0.001	*0.125*
MB			0.000	*0.000*	0.000	*0.000*
LEV			0.002	*0.037*	0.002	*0.034*
DECEMBER			-0.009	*0.000*	-0.010	*0.000*
BIGN			-0.006	*0.001*	-0.006	*0.001*
LNPOP					0.000	*0.775*
LNPI					0.007	*0.603*
COLLEGE					0.006	*0.816*
VOTE					0.061	*0.001*
ALCOHOL					0.004	*0.579*
Intercept	Included		Included		Included	
Firm F.E.	Included		Included		Included	
Year F.E.	Included		Included		Included	
Adjusted R^2	25.99%		26.16%		26.18%	
N	118,913		118,913		118,913	

Note: This table reports the baseline regression results. The dependent variable is *RES*, which indicates material misstatements. The variable of interest is *MARIJUANA*, which equals 1 if a firm is headquartered in a state that has legalized medical marijuana, and 0 otherwise. Column (1) shows the results where control variables are not included. Column (2) shows the results after firm characteristics are included. Column (3) shows the results after additional state-level characteristics are included. Two-tailed *p*-values are reported. See the Appendix for variable definitions.

TABLE 4
Supplemental Tests on Alternative Explanations

Panel A: Average Increase in Marijuana Usage after MMLs

D.V.	*RES*	
Variable	Coef.	p-value
MARIJUANA_H	**0.009**	***0.000***
MARIJUANA_L	0.001	*0.654*
Intercept and Controls	Included	
Firm F.E.	Included	
Year F.E.	Included	
Adjusted R^2	26.18%	
N	118,913	

Panel B: Marijuana and Alcohol Consumption

D.V.	*Marijuana Use*		*Alcohol Use*	
Variable	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.007**	***0.003***	**-0.001**	***0.698***
LNPOP	-0.004	*0.749*	-0.023	*0.021*
LNPI	0.015	*0.381*	-0.018	*0.449*
COLLEGE	0.040	*0.359*	0.131	*0.092*
VOTE	-0.026	*0.124*	-0.050	*0.015*
Intercept	Included		Included	
State F.E.	Included		Included	
Year F.E.	Included		Included	
Adjusted R^2	88.07%		87.23%	
N	1,479		1,479	

Panel C: Parallel Trend Analysis

D.V.	*RES*	
Variable	Coef.	p-value
PRE_2Y	**0.002**	***0.464***
PRE_1Y	**0.003**	***0.300***
POST_0Y	**0.002**	***0.574***
POST_1Y	**0.006**	***0.074***
POST_2Y	**0.007**	***0.061***
POST_3Y+	**0.007**	***0.012***
Intercept and Controls	Included	
Firm F.E.	Included	
Year F.E.	Included	
Adjusted R^2	26.16%	
N	118,913	

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TABLE 4 (continued)

Panel D: Pseudo Event Year

D.V.	*RES*	
Variable	Coef.	p-value
MARIJUANA	**0.003**	***0.687***
Intercept and Controls	Included	
Firm F.E.	Included	
Year F.E.	Included	
Adjusted R^2	25.53%	
N	118,913	

Note: This table presents the results of supplemental tests. Panel A reports the results of decomposing *MARIJUANA* into two variables based on the average increase in marijuana consumption following the implementation of MMLs. *MARIJUANA_H* equals 1 for firms in states where the average increase in marijuana consumption after MMLs exceeds the median increase among MML states, while *MARIJUANA_L* equals 1 for firms in states where the increase is equal to or below the median. Panel B provides regression results examining the relationship between MMLs and marijuana and alcohol consumption, with the dependent variable representing the percentage of the population using marijuana or alcohol in each state. Panel C presents the results of a parallel trend analysis, and Panel D reports findings from a robustness test using a pseudo-event year. Two-tailed *p*-values are reported. See the Appendix for variable definitions.

TABLE 5
Sensitivity Tests

Panel A: Stacked Difference-in-Differences Approach

D.V.	*RES*		*RES*		*RES*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.004**	***0.028***	**0.004**	***0.024***	**0.004**	***0.032***
Intercept	Included		Included		Included	
Firm-Level Controls	No		Included		Included	
State-Level Controls	No		No		Included	
Cohort x Firm F.E.	Included		Included		Included	
Cohort x Year F.E.	Included		Included		Included	
Adjusted R^2	39.74%		39.89%		39.89%	
N	601,121		601,121		601,121	

Panel B: Alternative Specifications of Material Misstatements

D.V.	*RES_NI*		*RES_BIG*		*RES_NEG*		*RES_NEG_BIG*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.007**	***0.016***	**0.007**	***0.002***	**0.010**	***0.007***	**0.006**	***0.013***
Intercept and Controls	Included		Included		Included		Included	
Firm F.E.	Included		Included		Included		Included	
Year F.E.	Included		Included		Included		Included	
Adjusted R^2	23.71%		26.19%		22.24%		26.60%	
N	118,913		118,913		118,913		118,913	

Panel C: Alternative Measures of Financial Misreporting

D.V.	*ICMW*		*ABSDACC*		*FSCORE*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.034**	***0.000***	**0.017**	***0.001***	**0.045**	***0.098***
Intercept and Controls	Included		Included		Included	
Firm F.E.	Included		Included		Included	
Year F.E.	Included		Included		Included	
Adjusted R^2	38.57%		43.42%		23.31%	
N	55,187		115,186		117,060	

Panel D: Alternative Sample Period (2000-2019)

D.V.	*RES*	
Variable	Coef.	p-value
MARIJUANA	**0.005**	***0.034***
Intercept and Controls	Included	
Firm F.E.	Included	
Year F.E.	Included	
Adjusted R^2	27.84%	
N	75,311	

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TABLE 5 (continued)

Panel E: Percentage of Operations in the Headquarter State

D.V.	*RES*	
Variable	Coef.	p-value
MARIJUANA	**0.006**	***0.003***
Intercept and Controls	Included	
Firm F.E.	Included	
Year F.E.	Included	
Adjusted R^2	26.16%	
N	118,913	

Note: This table presents the results of sensitivity tests. Panel A reports findings using a stacked difference-in-differences approach. Panel B presents results with alternative measures of material misstatements, while Panel C considers alternative measures of financial misreporting. Panel D restricts the sample period to 2000–2019, and Panel E employs the percentage of operations in the headquarters state as an alternative measure of MMLs. Two-tailed *p*-values are reported. See the Appendix for variable definitions.

TABLE 6
Path Analysis

D.V.	*RES*		*RES*	
Mediating variable (MV)	*ICMW*		*ABSDACC*	
Effect	Coef.	p-value	Coef.	p-value
Total Effect	0.006	*0.003*	0.013	*0.000*
Direct Effect	0.005	*0.011*	0.012	*0.000*
Indirect Effect	0.001	*0.000*	0.000	*0.014*
MARIJUANA -> MV	0.011	*0.000*	0.020	*0.000*
MV -> RES	0.082	*0.000*	0.004	*0.010*
Intercept and Controls	Included		Included	
Year F.E.	Included		Included	
Industry F.E.	Included		Included	
N	55,187		116,561	

Note: This reports the results of path analysis using internal control material weaknesses (*ICMW*) or the absolute value of discretionary accruals (*ABSDACC*) as the mediating variable. Two-tailed *p*-values are reported. See the Appendix for variable definitions.

TABLE 7
Cross-Sectional Analyses: Impact of Deregulation

Panel A: Marijuana Consumption

Sample	<= Median		> Median		Difference
Variable	Coef.	p-value	Coef.	p-value	
MARIJUANA	**-0.003**	***0.408***	**0.012**	***0.000***	**0.015 *** **
Intercept and Controls	Included		Included		
Firm F.E.	Included		Included		
Year F.E.	Included		Included		
Adjusted R^2	26.13%		29.98%		
N	63,589		55,324		

Panel B: Frequency of Marijuana Consumption

Sample	<= Median		> Median		Difference
Variable	Coef.	p-value	Coef.	p-value	
MARIJUANA	**0.004**	***0.454***	**0.018**	***0.003***	**0.015 ** **
Intercept and Controls	Included		Included		
Firm F.E.	Included		Included		
Year F.E.	Included		Included		
Adjusted R^2	26.02%		28.00%		
N	59,662		59,251		

Panel C: Increases in Suicide Attempts

Sample	<= Median		> Median		Difference
Variable	Coef.	p-value	Coef.	p-value	
MARIJUANA	**0.000**	***0.910***	**0.013**	***0.000***	**0.013 *** **
Intercept and Controls	Included		Included		
Firm F.E.	Included		Included		
Year F.E.	Included		Included		
Adjusted R^2	22.87%		29.61%		
N	57,939		60,974		

Note: This table reports the results of cross-sectional analyses based on the marijuana consumption population in a state (Panel A), the average frequency of marijuana consumption in a state (Panel B), and the increases in suicide attempts in a state (Panel C). Two-tailed *p*-values are reported. *** and ** indicate the significance at the 0.01 and 0.05 level, respectively. See the Appendix for variable definitions.

TABLE 8
Cross-Sectional Analyses: Firm Characteristics

Panel A: Decentralization

Sample	<= Median		> Median		Difference
Variable	Coef.	p-value	Coef.	p-value	
MARIJUANA	**0.002**	***0.487***	**0.012**	***0.000***	**0.010 *** **
Intercept and Controls	Included		Included		
Firm F.E.	Included		Included		
Year F.E.	Included		Included		
Adjusted R^2	29.29%		31.96%		
N	60,990		57,923		

Panel B: Labor Intensity

Sample	<= Median		> Median		Difference
Variable	Coef.	p-value	Coef.	p-value	
MARIJUANA	**0.003**	***0.163***	**0.010**	***0.000***	**0.007 ** **
Intercept and Controls	Included		Included		
Firm F.E.	Included		Included		
Year F.E.	Included		Included		
Adjusted R^2	30.35%		28.62%		
N	60,991		57,922		

Note: This table reports the results of cross-sectional analyses based on a firm's level of decentralization (Panel A) and labor intensity in the industry in which the firm operates (Panel B). Two-tailed *p*-values are reported. *** and ** indicate the significance at the 0.01 and 0.05 level, respectively. See the Appendix for variable definitions.

TABLE 9
Legalizing Recreational Marijuana

Panel A: The Incremental Effect of Legalizing Recreational Marijuana

D.V.	*RES*		*RES*		*RES*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
RECREATIONAL	**0.010**	***0.018***	**0.010**	***0.020***	**0.016**	***0.001***
Intercept	Included		Included		Included	
Firm F.E.	Included		Included		Included	
Year F.E.	Included		Included		Included	
Firm-Level Controls	Not Included		Included		Included	
State-Level Controls	Not Included		Not Included		Included	
Adjusted R^2	34.57%		34.64%		34.72%	
N	33,561		33,561		33,561	

Panel B: Removing Periods in Which Recreational Marijuana Is Legalized

D.V.	*RES*		*RES*		*RES*	
Variable	Coef.	p-value	Coef.	p-value	Coef.	p-value
MARIJUANA	**0.005**	***0.003***	**0.005**	***0.003***	**0.006**	***0.002***
Intercept	Included		Included		Included	
Firm F.E.	Included		Included		Included	
Year F.E.	Included		Included		Included	
Firm-Level Controls	Not Included		Included		Included	
State-Level Controls	Not Included		Not Included		Included	
Adjusted R^2	26.77%		26.96%		26.97%	
N	114,148		114,148		114,148	

Note: This table examines the impact of recreational marijuana legalization. Panel A presents regression results on the incremental effect of legalizing recreational marijuana, restricting the analysis to states with MMLs. Panel B tests the robustness of the main results by excluding firm-years in which recreational marijuana has been legalized. Two-tailed *p*-values are reported. See the Appendix for variable definitions.