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Government subsidies and income smoothing

Kostas Pappas[1] | **Martin Walker**[2] | **Alice Liang Xu**[2] | **Cheng (Colin) Zeng**[3]

[1]University of Liverpool Management School, University of Liverpool, Liverpool, UK

[2]Alliance Manchester Business School, University of Manchester, Manchester, UK

[3]School of Accounting and Finance, Hong Kong Polytechnic University, Kowloon, Hong Kong

Correspondence
Martin Walker, Alliance Manchester Business School, University of Manchester, Booth Street West, Manchester M15 6PB, UK.
Email: martin.walker@manchester.ac.uk

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Abstract

This study examines the relationship between government subsidies and income smoothing using a sample of US-listed firms. We find that subsidized firms smooth their earnings more aggressively than their unsubsidized peers. This finding is consistent with the reasoning that subsidized firms bear higher political costs and have more incentives to smooth earnings to avoid public attention. In addition, smoothing by subsidized firms is more pronounced when the subsidies are granted through non-tax-related channels than through tax-based channels, and the positive association between government subsidies and income smoothing is stronger for firms under higher public scrutiny and with less transparent information environments. Further analysis shows that smoothing by subsidized firms serves mainly to obfuscate earnings and that subsidized firms that smooth earnings tend to continue receiving subsidies in the future. Overall, our results help explain the role of government subsidies in shaping firms' accounting and disclosure choices.

KEYWORDS
income smoothing, obfuscation, political cost, subsidies

Subventions gouvernementales et lissage des résultats

Résumé

Cette étude examine la relation entre les subventions gouvernementales et le lissage des résultats à partir d'un échantillon d'entreprises cotées en bourse aux États-Unis. Le travail d'analyse démontre que les entreprises

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subventionnées lissent leurs résultats de manière plus intensive que leurs homologues non subventionnées. Ce résultat appuie l'idée que les entreprises subventionnées assument des conséquences politiques plus lourdes et sont davantage motivées à lisser leurs résultats pour dévier l'attention du public. En outre, le lissage est plus prononcé chez les entreprises subventionnées lorsque les subventions sont accordées dans un cadre non fiscal, comparativement à un cadre fiscal. Par ailleurs, la relation positive entre les subventions gouvernementales et le lissage des résultats est plus forte pour les entreprises soumises à un contrôle public accru et dont l'environnement informationnel favorise moins la transparence. Une analyse plus approfondie révèle que le lissage pratiqué par les entreprises subventionnées vise principalement à maquiller les résultats et que ces entreprises ont tendance à recevoir de nouvelles subventions dans le futur. En résumé, cette étude contribue à expliquer le rôle des subventions gouvernementales dans les décisions des entreprises en matière de comptabilité et de communication d'informations.

MOTS-CLÉS
conséquences politiques, lissage des résultats, obscurcissement, subventions

JEL CLASSIFICATION
H70, M41, M48, G38

In countries where there is great private wealth, much may be affected by the voluntary contribution of patriotic individuals; but in a community situated like that of the United States, the public purse must supply the deficiency of private resources.

— Alexander Hamilton, 1791

1 | INTRODUCTION

Capitalists continue to argue that private businesses perform best when left to their own devices and, therefore, that governments should never bail them out. However, over the past few decades, massive government subsidies have poured into the private sector. In the United States, hundreds of billions of dollars in subsidies are awarded to businesses every year. Nevertheless, a report by the non-profit watchdog group Good Jobs First (2014) affirms that "three-quarters of all the economic development dollars awarded and disclosed by state and local governments have gone to just 965 large corporations." Government subsidies involve a transfer of wealth from taxpayers to private corporations and, in turn, rising discontent over the "hijacking" of public assets to benefit narrow corporate interests.[1] Amid the public frustration with corporate subsidies, the responses of the recipients of subsidies to negative publicity is

[1]For instance, on April 6, 2016, Intelligence Squared, a leading global forum for public debate, discussed whether the United States should eliminate corporate subsidies. Critics argued that it is outrageous to use taxpayers' money to feed the wealth of corporate entities, while proponents contended that strategic subsidies are necessary for innovation and to serve those not served by private interests. In a poll, 53% of the forum's online audience voted to reduce corporate subsidies, while 32% remained undecided.

a significant but under-examined issue. The present study addresses one aspect of this issue by examining the association between government subsidies and firms' discretionary accounting choices.

We build on the political cost hypothesis, according to which firms attempt to mitigate the risk of adverse political actions through downward earnings management (Cahan, 1992; Grace & Leverty, 2010; Han & Wang, 1998; Key, 1997; Ramanna & Roychowdhury, 2010). We refine this hypothesis by arguing that firms receiving government subsidies may try to avoid political backlash by engaging in income smoothing. A backlash against subsidy-receiving firms may occur when they report large profits, which may be perceived as rent extraction from political ties. Backlash may also occur when subsidized firms perform poorly, in which case they may face adverse reputational consequences resulting in perceptions that they are abusing subsidy programs or responsible for costly mismanagement of public funds. Therefore, subsidized firms have a clear incentive to avoid reporting either abnormally high or abnormally low profits to reduce the likelihood of a political backlash, and income smoothing appears to be a reasonable financial reporting choice for this purpose.[2]

To test this smoothing hypothesis, we examine the relationship between government subsidies and income smoothing using a sample of non-financial US-listed firms over the period from 1990 to 2018. Relying on a propensity score matching (PSM) methodology to control for differences between the characteristics of subsidized and non-subsidized firms, we find a significantly positive association between government subsidies and income smoothing that is consistent with the political cost hypothesis. These results are robust to alternative measures of income smoothing and alternative model specifications. We also find the positive relationship between subsidies and income smoothing to be driven mainly by subsidies that are not tax based.

Next, we perform cross-sectional analyses to investigate why subsidized firms might engage more aggressively in income smoothing. First, we reason that, if firms use income smoothing to mitigate political costs, the effect should be stronger for those that are more likely to attract public scrutiny. Using negative media attention to measure public scrutiny (e.g., Chen et al., 2019; Robinson et al., 2011), we find that the positive relationship between government subsidies and income smoothing is confined to firms with higher negative media coverage, consistent with the political cost hypothesis. Second, we examine the ex ante influence of firms' information environments on the subsidy-smoothing relationship since the managers of firms with transparent information environments may find it difficult to smooth earnings given that such behavior is likely to be detected by investors and other information users. Following previous literature (e.g., Boone & White, 2015; Leuz, 2003), we measure firms' information environment transparency using analyst forecast dispersion and institutional ownership. Our empirical evidence shows that the positive association between subsidies and income smoothing is more pronounced for firms with lower levels of information transparency.

Previous research suggests that income smoothing can be either informative, when it reveals managers' private beliefs, or obfuscatory, when accounting manipulation disguises true earnings. To provide insight into the ex post influence of subsidization on the informativeness of income smoothing, we conduct two additional analyses. First, we investigate how subsidies affect the role of income smoothing in debt contracting. Demerjian et al. (2020) find that lenders are more likely to include earnings-based covenants for borrowers who engage in income smoothing, which, in this respect, increases the usefulness of earnings for monitoring borrowers. In our context, if subsidized firms indeed use income smoothing to obfuscate

[2]We propose income smoothing as a more plausible earnings management strategy than downward earnings management for minimizing the likelihood of adverse public attention. According to the data provided by Good Jobs First (n.d.), subsidies often provide benefits over multiple years. Downward earnings management would be unsustainable in a multi-period setting in which accruals reverse but firms remain exposed to political costs.

reported earnings, the positive role of income smoothing in debt contracting should be attenuated, and our empirical evidence is consistent with this reasoning.

Our second additional analysis is inspired by Tucker and Zarowin (2006), who show that, in general, income smoothing improves the predictability of future earnings and, thus, indicates a firm's desire to improve its signaling of future performance to investors. We extend this specification by examining how government subsidies affect the informativeness of income smoothing. Consistent with the obfuscation argument, we find the positive association between income smoothing and the predictability of future earnings to be weaker for firms that receive subsidies.

Next, we investigate the economic consequences of income smoothing for subsidized firms. For example, if subsidized firms use income smoothing to shield politicians who award them subsidies from public scrutiny, they are likely to continue receiving subsidies. In line with this reasoning, we find that subsidized firms that engage in greater income smoothing are more likely to receive subsidies in subsequent periods.

We perform various analyses to check the robustness of our results. To mitigate potential selection bias arising from unobservable variables, we adopt Heckman's two-stage specification, using the sum of corporate subsidies granted in neighboring states as an exogenous determinant of government subsidies, and our findings remain significant. To further alleviate the concern that unobserved omitted variables may influence firms' income-smoothing levels and their ability to obtain subsidies, following Oster (2019), we test for omitted variable bias and find that it is unlikely to be a problem for our study. While we do not claim causality, the results from these tests collectively suggest that the observed relationship between government subsidies and income smoothing is not spurious.

We present a battery of additional tests performed to rule out the possibility that our results are driven by a mechanical relationship between government subsidies and income smoothing or by unidirectional earnings management upward or downward. We also tease out the effect of subsidies on income smoothing that is attributable to contracting motives. Lastly, we present evidence that managers use real activities management in addition to accruals to smooth reported earnings.

This study extends the literature in several ways. First, we contribute to the study of income smoothing by showing that government subsidies significantly affect managers' smoothing incentives. Income smoothing is an issue of growing interest and has been attracting attention, since Graham et al. (2005) report that 97% of respondents to a survey indicated a preference for smooth earnings paths. However, most of the research on income smoothing (e.g., Acharya & Lambrecht, 2015; de Jong et al., 2013; Rountree et al., 2008; Shuto & Iwasaki, 2014) focuses on equity market participants despite survey responses indicating that firms actively engage in income smoothing to influence the perceptions of stakeholders outside the equity markets.[3] As such, the understanding of the influence of other stakeholders on the incentives for income smoothing remains relatively limited. We attempt to broaden this knowledge here by offering new evidence regarding the way public pressure shapes income smoothing. In addition, a few recent studies suggest that income smoothing improves earnings informativeness (Baik et al., 2020; Demerjian et al., 2020). However, our paper provides an important caveat regarding the role of smoothing, which we find to be associated with the incentive to reduce public scrutiny and, therefore, to obfuscate information.

[3]Notable exceptions include Dou et al. (2013), who find that firms smooth earnings to signal low investment risk to contractual parties (e.g., suppliers), and Ng et al. (2019), who provide evidence that managers have incentives to smooth earnings to alleviate employees' concerns about unemployment risk and unemployment insurance can reduce these incentives. In addition, while Bova (2013) finds that managers tend to strategically signal a negative outlook to their unionized workers in order to improve the firm's bargaining position, Hamm et al. (2017) suggest that a strong labor union intensifies managerial incentives to smooth earnings to shelter resources from employees' profit-sharing demands and address employees' risk-aversion demands.

Second, we extend the literature by providing sharper evidence regarding the political cost hypothesis formulated by Watts and Zimmerman (1978, 1986), according to which firms facing high political costs are more likely to make accounting choices that defer reported earnings from current periods to future periods. In addition to reducing reported income, managers may engage in income smoothing to reduce the likelihood of adverse public scrutiny (Moses, 1987; Watts & Zimmerman, 1986, p. 223). However, prior studies have focused overwhelmingly on income-decreasing earnings management (e.g., Cahan, 1992; Han & Wang, 1998; Jones, 1991; Key, 1997) and found little evidence of income smoothing.[4] Our findings suggest that potential political costs incentivize firms to maintain stable earnings rather than simply biasing current-period performance downward. Moreover, we introduce government subsidies as an arguably more powerful proxy for political costs, reasoning that monetary government support is more likely to invite public scrutiny than traditional measures of political costs, such as firm size and industry membership.

Third, this study contributes to the literature on government subsidies. Reports of the economic effects of subsidies have been mixed, with some suggesting that they are beneficial (e.g., Bagwell & Staiger, 1989; Howell, 2017) and others that they are detrimental (e.g., López & Galinato, 2007). Raghunandan (2022) shows that subsidized firms are more likely to engage in misconduct than unsubsidized firms, but relatively little attention has been paid to the impact of government subsidies on corporate accounting and disclosure choices. One exception is Huang (2022), who finds that, compared with unsubsidized firms, subsidized firms engage in more voluntary disclosure of business activities and subsidy-goal-related information, such as job creation and capital investment. We show that, in addition to disclosure choices, subsidized firms tend to obfuscate their reported earnings in response to public scrutiny. To the best of our knowledge, our study is the first to examine the association between government subsidies and accounting choices in the US context.

Our findings are especially timely in light of Government Accounting Standards Board Statement No. 77, which requires the government to disclose its awarded tax incentives. Also, FASB has recently issued an Accounting Standards Update requiring US public companies to disclose the details of government subsidy awards (FASB, 2021).[5] Our study provides information of interest to accounting standard setters by examining the consequences of government subsidies for financial reporting.

2 | BACKGROUND

Schwartz and Clements (1999) define subsidies as any government assistance that increases producers' income beyond what they would earn without such intervention. In the United States, sizable subsidies are awarded to businesses every year, 75% of which go to fewer than 1,000 large firms. Statistics from Good Jobs First (n.d.) show that, since the turn of the century, Boeing has been the top recipient, with subsidies totaling $15.4 billion, followed by General Motors with $8.2 billion, Intel with $6 billion, and Alcoa with $5.8 billion. Though Boeing received a record-high $3.24 billion in subsidies in 2003, in a 2004 conference call with analysts and the press, the firm's CEO, Harry Stonecipher, claimed that this state aid was not a subsidy but simply a matter of "lowering the cost of doing business."

[4]In addition to downward earnings management, Beneish et al. (2008) provide novel evidence that firms use financing to strategically mitigate political pressure. Specifically, they find that tobacco firms diversify acquisitions to reduce expected expropriation costs, thus transforming excess financial assets from tobacco firms into non-tobacco operations and creating shallower pockets that attract less attention.

[5]The FASB released ASU 2021-10 (https://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1176178928778&acceptedDisclaimer=true) on November 17, 2021, with the aim of improving transparency in financial reporting by requiring businesses to disclose information about any government assistance that they receive.

From an economic perspective, subsidies are meant to offset market imperfections, exploit economies of scale in production, meet social policy objectives, and reduce unemployment (Schwartz & Clements, 1999). However, though governments can use subsidies as a policy tool, in the United States most subsidies go to extremely wealthy individuals and politically connected firms and, thus, may not actually create job opportunities or generate net gains in public revenues. In fact, empirical evidence (e.g., Ahearn et al., 2006; Wallsten, 2000) shows that government grants do not positively affect and may even negatively affect employment. Nevertheless, even ineffective and costly subsidies can have political benefits, such as logrolling[6] and other forms of vote trading (Houthakker, 1972). Politicians can also exploit subsidies in their election campaigns (Becker, 1983; Peltzman, 1976).

Previous research classifies government subsidies as either tax-related or non-tax-related (e.g., Alesina & Ardagna, 2010; Raghunandan, 2022).[7] The aim in either case is to achieve the same policy objectives, but the approach differs. Tax-related subsidies, such as rebates and liability reductions, reduce government income without directly affecting government spending. This income loss may be mitigated in the long term depending on how taxpayers use the additional money that they retain as a result of tax cuts. Non-tax-based subsidies, such as cash grants and credit subsidies, on the other hand, involve a direct increase in government spending.

According to Grants.gov (n.d.), to obtain a subsidy, a firm must apply for one from an awarding agency, which then grants awards based on a programmatic review and assessment of applications and a financial review of proposed budgets. Panel A of Figure 1 in Appendix S1 (see the Supporting Information) shows the frequency of subsidies by year, which increases from less than 100 firm-year observations annually before 2000 to more than 700 after 2010. Panel B shows the frequency of subsidies by industry, with companies in most of the Fama-French 48 industries receiving them, especially in the electronics, retail, and machinery sectors.

3 | HYPOTHESIS DEVELOPMENT

According to the political cost hypothesis of Watts and Zimmerman (1978), the fear of public scrutiny and its associated costs and the desire for wealth transfers in the regulatory process motivate firms to manage earnings using discretionary accounting choices. Although their findings are consistent with their hypothesis regarding downward earnings management, their theoretical framework does not preclude the possibility that smoothing may serve as an alternative accounting strategy.

The aim of a government subsidy, as a policy tool, is the redistribution of wealth. As such, one major source of public concern about subsidies is the potential abuse of political power to benefit a select group regardless of whether the claimed purpose of the subsidies is fulfilled. For example, politicians may cater to the interests of a few citizens at the expense of many others when doing so increases their chances of reelection (Rickard, 2012; Rogowski & Kayser, 2002). Even when a subsidy achieves its objective, such as job creation, the public outcry may continue should targeted individuals or firms benefit disproportionately from the wealth transfer. Moreover, the fact that, as discussed in the previous section, corporate subsidies in the United States flow disproportionately to large corporations instead of small businesses has attracted widespread attention from the media (e.g., *Wall Street Journal* and *New York Times*) and watchdog

[6]Logrolling refers to the political practice of a set of legislators agreeing to vote in favor of an item of legislation in return for another set of legislators agreeing to vote in favor of another item of legislation.

[7]See Appendix 1 for a detailed list of the types of subsidies in the Subsidy Tracker database and a flag indicating whether a specific type is tax-related.

organizations (e.g., Good Jobs First),[8] and the elimination of corporate subsidies has become a topic of public debate, including in campaign speeches. As a result, firms that receive government subsidies are likely to attract considerable negative publicity and political backlash when they experience large upward earnings fluctuations because the benefits that they receive are perceived as the use of taxpayers' money to further enrich wealthy individuals or firms.

The misuse of subsidies is another matter of public concern that can have significant repercussions. When subsidies are misused or proven to be ineffective, it can generate negative publicity and undermine the relationship between firms and the politicians who advocated for such subsidization. In such cases, firms may be perceived as wasting public funds, leading to public scrutiny and criticism. This negative perception can tarnish the reputation of both the firms receiving the subsidies and the politicians who supported them. If firms receiving government subsidies experience substantial downward fluctuations in their earnings, it can further intensify the public's perception of misusing public funds. Such situations may give rise to the belief that the firms are essentially wasting taxpayers' money. Consequently, the politicians who were instrumental in securing the subsidies may also face similar backlash, as they could be perceived as having made poor judgments in allocating public funds.[9]

Government subsidies can affect firms' incentives for engaging in income smoothing directly by increasing the firms' wealth or indirectly as signaling effects, even when the amount of the subsidies is modest. Since a firm's eligibility to receive a government subsidy hinges at least partly on its relationship with the government, its receipt of subsidies conveys a certification signal to the public that the government endorses it, thereby enabling it to obtain exclusive licenses, guaranteed access to special projects, and resources, such as favorable bank loans (Lee et al., 2014; Lerner, 1999; Lim et al., 2018; Meuleman & De Maeseneire, 2012). Both the direct and the indirect effects increase the political costs incurred by the receiving firms.

To minimize these costs and shield political patronage from the public, managers are expected to report earnings that stay in the middle, creating a Goldilocks situation. Hence, we formulate our first hypothesis as follows:

> **Hypothesis 1 (H1).** There is a positive association between government subsidies and income smoothing.

As explained in Section 2, corporate subsidies are provided mainly through either tax-related or non-tax-related channels. US corporations have long been criticized for paying low income taxes while also receiving billions of dollars in tax incentives. According to a report by the Institute on Taxation and Economic Policy, Fortune 500 corporations paid an effective average tax rate of 11.3% in 2018, only slightly more than half the statutory rate of 21% (Institute on Taxation and Economic Policy [ITEP], 2019). A recent follow-up report by the institute further revealed that 112 of the companies in the S&P 500 or Fortune 500 paid less than half the statutory corporate tax rate over the period from 2018 through 2020

[8]For instance, the Advanced Technology Vehicles Manufacturing Loan Program was established in 2007 to reduce petroleum use and promote domestic manufacturing. The program offered more than $1 billion in low-interest loans to automotive giants, such as Nissan and Ford, both of which subsequently reported large profits, sparking public outrage that the program was "simply a transfer of wealth from taxpayers to these massive companies. These companies should have no trouble financing a project without government-backed loans if they find it is worth the investment" (Loris & Cosby, 2018).

[9]One example is the solar technology company Solyndra, which received $535 million in subsidies during Barack Obama's presidency but filed for Chapter 11 bankruptcy and laid off all its employees in September 2011 and has been widely cited in the media as an example of the government's misuse of taxpayer money (Schoenberg, 2012). Soon after Solyndra's bankruptcy, Republicans in the US House of Representatives launched an investigation that, after 4 years, concluded that the firm provided the Department of Energy with false and misleading information during the application process and drew down loan proceeds to secure the subsidies that it received. In particular, on June 23, 2011, Solyndra submitted a document to the House Energy and Commerce Committee titled "Exceeding Expectations: Solyndra Today," touting "excellent progress to the company's overall annual strategic plan, while meeting the company's technical, cost and performance milestones." The evidence thus shows that Solyndra attempted to justify and secure government subsidies by inflating its financial performance.

(ITEP, 2021). Meanwhile, these companies received nearly $100 billion in corporate income tax breaks, inviting widespread public discontent. To avoid this kind of backlash, firms that receive tax-related subsidies tend to report lower income[10] rather than inflate their reported earnings, so income smoothing seems an unlikely strategy for the recipients of tax-based subsidies to respond to public pressure. In light of these arguments, we formulate the following hypothesis:

> **Hypothesis 2 (H2).** The positive relationship between government subsidies and income smoothing is more pronounced when the subsidies are granted through non-tax-based rather than tax-based channels.

4 | RESEARCH DESIGN, DATA, AND SAMPLE

4.1 | Sample and data

Our data come from multiple sources. We obtain the subsidy data from Good Jobs First, a national policy resource center for the promotion of corporate and government accountability. This information is compiled from various sources, including (1) government reports and websites, (2) direct data requests made through the Freedom of Information Act, (3) government and corporate press releases, (4) newspaper articles, and (5) reports from other sources, such as academics and non-profit organizations (McIlvaine et al., 2013).[11] Because most subsidy data are obtained from government agencies or through Freedom of Information Act requests, the likelihood of disclosure bias, if any, is modest.[12]

We obtain the firm-level accounting data from Compustat and the stock returns, share prices, and number of common shares from CRSP monthly files. The analyst data are from the I/B/E/S detail file. The political contribution data are from the Federal Election Commission. We retrieve the government contract data from USAspending.gov, the data on union membership and coverage by industry from the Union Membership and Coverage Database, institutional ownership data from Thomson 13f, and media data from RavenPack. Our sample covers the period from 1990 to 2018.[13] We exclude financial firms (SIC 6000–6999) because their accounting properties differ materially from those of industrial firms. All continuous variables are winsorized at the 1st and 99th percentiles.

4.2 | Subsidy measures

To construct the subsidy-related variables, we start by linking the Subsidy Tracker database with the other data sources. One practical difficulty is that this database lists only the abbreviated names of the recipients of subsidies with no other identifiers. To address this difficulty, we use a string-matching algorithm to compare the number and order of the letters in the names of the companies in the Subsidy Tracker database and match the recipients with those in the Compustat database. We then generate a list of potential matches and manually check each to ensure its accuracy, eliminating any pair about which we have doubts.

[10]Consistent with this conjecture, a univariate analysis reveals a significant difference in abnormal accruals between firms that receive tax subsidies (mean = 0.009) and those that do not (mean = 0.019).
[11]For a complete list of the data sources that Good Jobs First uses, see https://www.goodjobsfirst.org/subsidy-tracker-data-sources.
[12]We recognize that government agencies may try to hide controversial and unpopular subsidies or delay reporting them. Arguably, this bias likely works against us here. The variety of data sources and high level of scrutiny should mitigate concerns about disclosure bias, and any remaining bias is unlikely to drive our findings; more likely, our findings would be strengthened in the absence of this bias.
[13]The information about subsidies from Good Jobs First is much more complete from 2003 onward (Raghunandan, 2022). Accordingly, as a robustness check, we repeat the main regressions using a subsample covering 2003–2018 and find that our results remain unaffected. The findings are available in Table IA.7, Panels A and B, in Appendix S1.

We next collect the dollar amount of all the subsidies that a firm receives during the fiscal year. The variable *Subsidy* is equal to the average dollar amount of government subsidies in the previous 3 years ($t-2$, t) scaled by the prior year's total assets.[14] To model the effect of various types of subsidies on income smoothing, we classify the subsidies by type (see Appendix 1 for the classifications). Accordingly, the variable *Tax Subsidy* (*NonTax Subsidy*) is the average dollar amount of tax-related (non-tax-related) subsidies in the prior 3 years ($t-2$, t) scaled by the prior year's total assets.

4.3 | Income smoothing measures

We measure income smoothing in three ways using the methodologies developed by Leuz et al. (2003), Jung et al. (2013), and Tucker and Zarowin (2006), respectively. We calculate our aggregate income smoothing measure (*IS*) by averaging the three individual income smoothing measures *IS_LZ*, *IS_JSY*, and *IS_TZ*. *IS_LZ*, based on the work of Leuz et al. (2003), is equivalent to the standard deviation of earnings scaled by the standard deviation of cash flows from operating activities multiplied by negative one. We scale both earnings and cash flows by the prior year's total assets.

To calculate *IS_JSY*, we rely on the method of Jung et al. (2013), who separate the income smoothing related to managerial decisions from the inherent smoothing in earnings associated with economic and firm-specific factors. First, we measure income smoothing based on reported earnings as the standard deviation of earnings scaled by the standard deviation of cash flows from operating activities and multiplied by negative one (Hunt et al., 1996; Jung et al., 2013; Leuz et al., 2003; Pincus & Rajgopal, 2002). Next, we measure income smoothing based on earnings adjusted for abnormal accruals as the standard deviation of pre-managed earnings scaled by the standard deviation of cash flows from operating activities and multiplied by negative one. We measure abnormal accruals using the modified Jones model (Dechow et al., 1995) supplemented with ROA to control for performance, as suggested by Kothari et al. (2005). Pre-managed earnings are equivalent to the difference between earnings and abnormal accruals. Lastly, we measure *IS_JSY* as the difference between the income smoothing based on reported earnings and the income smoothing based on earnings adjusted for abnormal accruals.

To construct our final income smoothing measure, we follow Tucker and Zarowin (2006) and calculate *IS_TZ* as the Spearman correlation between changes in abnormal accruals and changes in pre-managed earnings multiplied by negative one. When we estimate the three individual income smoothing measures, the standard deviations or Spearman correlations use data from at least three of the 5 years (t, $t+4$). Moreover, to mitigate concerns about the influence of extreme observations and control for industry and time effects, we use the within-industry and year rankings of *IS_LZ*, *IS_JSY*, and *IS_TZ*, rescaled to range between zero and one, in the regression analysis.[15]

4.4 | Modeling the association between government subsidies and income smoothing

We use matched samples to test our hypotheses. In our initial sample, approximately 20% of firm-years receive subsidies, and subsidy awards are highly positively correlated with firm size,

[14]As robustness checks, we repeat our main analysis using an indicator subsidy variable and a subsample of firm-years that receive substantial subsidies, classifying a firm-year as a substantial recipient when the subsidy exceeds the top tercile of the sample, and continue to find a positive association between government subsidies and income smoothing.

[15]In untabulated results, we reestimate our baseline models using the income smoothing measures without transforming them into within-industry and year rankings. The results continue to hold. The findings are available in Appendix S1 (Panels C and D of Table IA.7).

indicating that the sample of subsidized firms is not random. Nevertheless, we control for potential selection bias in the treatment firms (i.e., the recipients of subsidies) before making inferences about the effect of subsidies on income smoothing. To do so, we follow previous studies (Armstrong et al., 2010; Cheng et al., 2013; Koh & Reeb, 2015) and create a matched sample using PSM. We select the control firm-years from the sample firms that never received a subsidy. Our matching approach ensures that subsidized (i.e., treatment) firms and unsubsidized (i.e., control) firms are largely indistinguishable based on characteristics other than subsidization.[16] To achieve this, we implement nearest-neighbor matching with propensity scores serving to match the treatment and control observations and with replacement while imposing a caliper width of 0.001 and using the same covariates as in Equation (1).

To test the relationship between government subsidies and income smoothing, we implement a multivariate regression analysis, testing our predictions using the model:

$$\begin{aligned} ISVar_{t,t+4} = {} & \alpha_0 + \alpha_1 Subsidy\ Variable_{t-2,t} + Controls + \psi_1 Industry\ fixed\ effects \\ & + \psi_2 Year\ fixed\ effects + \varepsilon_t, \end{aligned} \tag{1}$$

where *ISVar* is either the composite measure of *IS* or income smoothing calculated according to the approaches of Leuz et al. (2003) (*IS_LZ*), Jung et al. (2013) (*IS_JSY*), or Tucker and Zarowin (2006) (*IS_TZ*).

Also following prior research, we include a variety of control variables related to income smoothing. At the construct level, the aim of earnings smoothing is to reduce the volatility of reported earnings. Thus, we consider the variable of sales volatility (*SalesVolatility*). We also control for firm characteristics that can affect earnings quality (e.g., Chaney et al., 2011; Cohen et al., 2008; Dechow & Dichev, 2002; Demerjian et al., 2012), namely size (*Size*), sales growth (*SalesGrowth*), market-to-book ratio (*MB*), leverage (*Leverage*), firm performance (*ROA*), market-adjusted returns (*AdjRet*), operating cycle (*OperCycle*), analyst coverage (*NumAnalysts*), accruals quality (*Std*(*AbnAccruals*)),[17] financial statement comparability (*AcctComp*),[18] and whether a firm is audited by a Big N auditor (*BigN*). We control for the unionization rate (*Union*) and managerial ability (*MA-Score*) as well, which have likewise been linked to income smoothing (Baik et al., 2020; Hamm et al., 2017), and consider the determinants for receiving government subsidies, including firms' research and development expenditures (*RD*), number of employees (*Employees*), and political contributions (*ContribAmt*) (Huang, 2022).

We include a variable to proxy for regulatory pressure that a firm may face, for research has shown that firms operating in litigious environments have incentives to avoid negative earnings surprises. Accordingly, we include an indicator variable (*Litigation*) for high-litigation industries (Francis et al., 1994). Appendix 2 presents definitions of the variables and details regarding the measurements.

4.5 | PSM sample analysis

Panel A in Table 1 reports the estimates of the logistic regression of the firms receiving subsidies. The results indicate that the probability that a firm is receiving a subsidy is positively associated with its size (*Log*(*Size*)), suggesting that large firms are more likely to receive financial

[16]Another benefit of PSM is that it provides estimates that mitigate the potential impact of functional form misspecifications, so this method is not affected by nonlinearities when estimating treatment effects (Rubin, 1979; Shipman et al., 2017).

[17]A smaller standard deviation suggests a lower degree of measurement error in accruals, indicating higher accruals quality.

[18]Managers may simply decrease their financial reporting transparency, such as accruals quality or financial statement comparability, to maintain information obfuscation. Thus, we control for accruals quality and financial statement comparability in the regressions. We appreciate an anonymous reviewer for this suggestion.

TABLE 1 PSM estimation and diagnostics.

Panel A: Propensity score estimation

	Dependent variable: $Subsidy_t$	
	Coefficient	***z*-stat**
$SalesVolatility_{t-4,t}$	−0.235	−1.37
$Log(Size_{t-1})$	0.625***	13.10
$SalesGrowth_{t-1,t}$	−0.148	−1.45
MB_t	0.009	1.05
$Leverage_t$	−0.105	−0.44
ROA_t	0.199	0.45
$AdjRet_t$	0.095**	2.02
$Log(OperCycle_{t-4,t})$	−0.303***	−2.88
$Log(1 + NumAnalysts_t)$	0.139	1.62
$Std(AbnAccruals)_{t-4,t}$	−1.006*	−1.85
$AcctComp_t$	0.096***	4.17
$BigN_t$	0.070	0.41
$Union_t$	−20.914	−0.20
$MA\text{-}Score_t$	−0.197	−1.42
RD_t	1.682*	1.91
$Employees_t$	24.999**	2.21
$Log(1 + ContribAmt_t)$	0.061***	5.27
$Litigation_t$	−0.466**	−1.96
Constant	−8.021***	−9.00
Fixed effects	Year/industry	
No. of observations	27,535	
Pseudo R^2	0.393	

Panel B: Covariate balance diagnostics

	Pre-matched sample			Propensity-score-matched sample		
	Subsidy firms $N = 5{,}715$	**Non-subsidy firms $N = 21{,}820$**	**Std. mean diff.**	**Subsidy firms $N = 5{,}715$**	**Non-subsidy firms $N = 5{,}715$**	**Std. mean diff.**
$SalesVolatility_{t-4,t}$	0.18	0.27	−0.363	0.18	0.19	−0.032
$Log(Size_{t-1})$	8.27	6.26	1.164	8.27	8.24	0.013
$SalesGrowth_{t-1,t}$	0.09	0.14	−0.195	0.09	0.10	−0.033
MB_t	3.39	2.96	0.107	3.39	3.35	0.008
$Leverage_t$	0.55	0.48	0.327	0.55	0.55	0.021
ROA_t	0.05	0.02	0.233	0.05	0.05	0.016
$AdjRet_t$	0.05	0.06	−0.013	0.05	0.06	−0.016
$Log(OperCycle_{t-4,t})$	4.73	4.74	−0.012	4.73	4.72	0.017
$Log(1 + NumAnalysts_t)$	2.37	1.79	0.798	2.37	2.36	0.014
$Std(AbnAccruals)_{t-4,t}$	0.09	0.10	−0.121	0.09	0.09	−0.012
$AcctComp_t$	0.04	0.05	−0.208	0.04	0.04	0.018

(Continues)

TABLE 1 (Continued)

Panel B: Covariate balance diagnostics						
	Pre-matched sample			Propensity-score-matched sample		
	Subsidy firms $N = 5{,}715$	Non-subsidy firms $N = 21{,}820$	Std. mean diff.	Subsidy firms $N = 5{,}715$	Non-subsidy firms $N = 5{,}715$	Std. mean diff.
$BigN_t$	0.95	0.91	0.151	0.95	0.95	0.003
$Union_t$	0.00	0.00	−0.365	0.00	0.00	0.022
$MA\text{-}Score_t$	0.56	0.55	0.020	0.56	0.53	0.084
RD_t	0.00	0.01	−0.405	0.00	0.00	0.012
$Employees_t$	3.67	1.10	0.562	3.67	3.02	0.142
$Log(1 + ContribAmt_t)$	−3.29	−3.36	0.032	−3.29	−3.28	−0.005
$Litigation_t$	0.25	0.32	−0.166	0.25	0.26	−0.031

Note: Panel A reports the results for the first-stage model used to estimate the propensity scores, and Panel B the covariate standardized mean differences before and after propensity score matching (PSM). The first-stage model is estimated using a logistic regression with the *z*-statistics based on standard errors corrected for heteroskedasticity and clustered by firm. To obtain matched pairs, we use a nearest-neighbor algorithm that identifies the minimum distance in the propensity scores between subsidized and unsubsidized firms across the same year and industry classification with replacement. The values of all the continuous variables are winsorized at the 1st and 99th percentiles. Appendix 2 presents the details regarding the definition and construction of the variables.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

support from the government. Consistent with prior research (Aobdia et al., 2018), we find politically connected firms ($Log(1 + ContribAmt_t)$) to be more likely to receive subsidies. In addition, the significantly positive coefficient on financial reporting comparability (*AcctComp*) and significantly negative coefficient on accrual quality (*Std*(*AbnAccruals*)) indicate that firms' information quality positively affects their likelihood of being subsidized. Moreover, firms with higher returns ($AdjRet_t$), higher R&D expenditures (*RD*), and more employees (*Employees*) are more likely to receive subsidies. By contrast, firms with higher litigation risk (*Litigation*) are less likely to be subsidized, as are firms with a longer operating cycle (*Log*(*OperCycle*)).

To evaluate the covariate balance, we follow Rosenbaum and Rubin (1985) and use the standardized mean difference, which is the difference in the mean of a covariate between the treated and control groups scaled by the pooled standard deviation of the covariate.[19] According to Rubin (2001), to ensure the reliability of the results from regressions using the matched sample, the absolute standardized difference of means should be less than 0.25 after matching. The fact that, in the values reported in Panel B of Table 1, none of the covariates is near the threshold of 0.25 indicates desirable matching outcomes. Moreover, the explanatory power of the propensity score model (Pseudo $R^2 = 39.3\%$) is sufficiently high.

5 | MAIN RESULTS

5.1 | Summary statistics

Table 2 reports the summary statistics for our main variables. The PSM method produces a sample of 11,430 observations. On average, our sample firms receive subsidies amounting to $1.767 million per annum. The mean tax-related and non-tax-related subsidies equal $1.665

[19]As Austin (2009) points out, the standardized difference is not influenced by sample size, unlike *t*-tests, and, therefore, is better suited to evaluate the balance between the treatment and control groups in the matched and unmatched samples.

TABLE 2 Summary statistics.

Variables	*N*	Mean	P25	Median	P75	Std
$IS_{t,t+4}$	11,430	0.510	0.296	0.519	0.741	0.271
$IS\_LZ_{t,t+4}$	11,430	0.485	0.222	0.444	0.778	0.318
$IS\_TZ_{t,t+4}$	11,430	0.528	0.222	0.556	0.778	0.330
$IS\_JSY_{t,t+4}$	11,430	0.517	0.222	0.556	0.778	0.314
$Subsidy_{t-2,t}$	11,430	3.73e-4	0.000	0.000	1.32e-4	0.001
$Tax\ Subsidy_{t-2,t}$	11,430	1.25e-4	0.000	0.000	3.60e-5	3.62e-4
$NonTax\ Subsidy_{t-2,t}$	11,430	9.81e-5	0.000	0.000	1.32e-5	3.18e-4
$Subsidy_{t-2,t}$ (subsized only)	5,715	7.46e-4	3.15e-5	1.32e-4	6.08e-4	0.001
$Tax\ Subsidy_{t-2,t}$ (subsized only)	5,715	2.51e-4	3.92e-7	3.60e-5	1.98e-4	4.80e-4
$NonTax\ Subsidy_{t-2,t}$ (subsized only)	5,715	1.96e-4	0.000	1.32e-5	1.18e-4	4.28e-4
$Subsidy_{t-2,t}$ (unscaled, $ million)	11,430	1.767	0.000	1.67e-4	0.479	5.345
$Tax\ Subsidy_{t-2,t}$ (unscaled, $ million)	11,430	1.665	0.000	0.000	0.148	15.199
$NonTax\ Subsidy_{t-2,t}$ (unscaled, $ million)	11,430	0.884	0.000	0.000	0.049	5.651
$Subsidy_{t-2,t}$ (unscaled, subsized only, $ million)	5,715	3.535	0.084	0.479	2.516	7.134
$Tax\ Subsidy_{t-2,t}$ (unscaled, subsized only, $ million)	5,715	3.329	0.001	0.148	0.996	21.366
$NonTax\ Subsidy_{t-2,t}$ (unscaled, subsized only, $ million)	5,715	1.768	0.000	0.049	0.530	7.894
$SalesVolatility_{t-4,t}$	11,430	0.185	0.072	0.127	0.222	0.214
$Size_{t-1}$ ($ million)	11,430	12,551	1,231	4,005	12,358	21,481
$Log(Size_{t-1})$	11,430	8.254	7.116	8.295	9.422	1.673
$SalesGrowth_{t-1,t}$	11,430	0.091	−0.013	0.068	0.160	0.233
MB_t	11,430	3.369	1.540	2.413	3.877	4.295
$Leverage_t$	11,430	0.549	0.416	0.552	0.678	0.212
ROA_t	11,430	0.052	0.020	0.056	0.098	0.100
$AdjRet_t$	11,430	0.056	−0.162	0.011	0.195	0.376
$OperCycle_{t-4,t}$ (days)	11,430	133.796	83.906	120.602	169.908	77.421
$Log(OperCycle_{t-4,t})$	11,430	4.722	4.430	4.792	5.135	0.636
$NumAnalysts_t$	11,430	12.902	7.000	12.000	18.000	7.364
$Log(1 + NumAnalysts_t)$	11,430	2.360	1.946	2.485	2.890	0.677
$Std(AbnAccruals)_{t-4,t}$	11,430	0.092	0.045	0.071	0.117	0.072
$AcctComp_t$	11,430	−3.282	−3.830	−2.790	−2.060	2.142
$BigN_t$	11,430	0.951	1.000	1.000	1.000	0.215
$Union_t$	11,430	0.000	0.000	0.000	0.000	0.001
$MA\text{-}Score_t$	11,430	0.544	0.300	0.500	0.800	0.303
RD_t	11,430	0.038	0.000	0.011	0.048	0.066
$Employees_t$	11,430	0.004	0.001	0.002	0.004	0.005
$ContribAmt_t$ ($)	11,430	77,656	1.000	1.000	18,001	191,693
$Log(1 + ContribAmt_t)$	11,430	3.345	0.000	0.000	9.798	5.345
$Litigation_t$	11,430	0.254	0.000	0.000	1.000	0.435

Note: This table reports the summary statistics for the variables used in the main empirical analysis. *Size*, *OperCycle*, *NumAnalysts*, and *ContribAmt* are reported without logs. Appendix 2 presents the details regarding the definition and construction of the variables.

million and $0.884 million, respectively. For the subsidized firms, the means of *Subsidy*, *Tax Subsidy*, and *NonTax Subsidy* before scaling by total assets are $3.535 million, $3.329 million, and $1.768 million, respectively. As discussed in Section 3, the modest amount of government subsidies suggests that subsidies may affect firms' incentives to engage in income smoothing through a signaling effect.

5.2 | Impact of government subsidies on income smoothing

Table 3 presents the results of estimating regression models as in Equation (1) to test H1. The estimated coefficients on *Subsidy* are significantly positive across all four columns. Specifically, in Column 1, where the dependent variable is the composite measure (i.e., *IS*), the coefficient on *Subsidy* is 9.748 and significant at the 1% level. This result suggests that firms receiving government subsidies engage more in income smoothing. Columns 2–4 report the results with *IS_LZ*, *IS_TZ*, and *IS_JSY* as alternative measures of income smoothing, respectively. Likewise, the coefficient estimates on *Subsidy* remain positive and significant for all three measures (coeff. = 7.838, *t*-stat. = 2.48; coeff. = 13.867, *t*-stat. = 4.46; and coeff. = 7.540, *t*-stat. = 2.50, respectively). In terms of economic significance, the result reported in Column 1 suggests that a one-standard-deviation increase in *Subsidy* increases income smoothing by 0.010, thus accounting for 3.60% of the standard deviation of income smoothing in our sample. This effect is economically meaningful given that it is larger than the economic significance of many other commonly documented determinants of income smoothing (e.g., *BigN*, *Union*, *MB*, and *Std*(*AbnAccruals*)). Together, these findings confirm our hypothesis that income smoothing is used as an accounting choice for subsidized firms. Turning to the control variables, we find that income smoothing is positively related to firm size (*Log*(*Size*)), market-to-book ratio (*MB*), ROA (*ROA*), market-adjusted returns (*AdjRet*), financial reporting comparability (*AcctComp*), and managerial ability (*MA-Score*), and negatively related to sales volatility (*SalesVolatility*), sale growth (*SalesGrowth*), leverage (*Leverage*), operating cycle (*Log*(*OperCycle*)), analyst following (*Log*(1 + *NumAnalysts*)), research and development expenditures (*RD*), and litigation risk (*Litigation*). These results are generally consistent with those reported in the literature (Demerjian et al., 2017).

5.3 | Impact of tax and non-tax subsidies on income smoothing

Table 4 presents the results of testing H2, according to which the association between subsidies and income smoothing is more pronounced for non-tax-related channels. In Column 1, where the composite measure *IS* serves as the dependent variable, the coefficient on *Tax Subsidy* is insignificant (coeff. = 10.211, *t*-stat. = 1.32), whereas the coefficient on *NonTax Subsidy* is positive and significant at the 1% level (coeff. = 31.606, *t*-stat. = 3.67). A one-standard-deviation increase in *NonTax Subsidy* increases income smoothing by 0.009, thus accounting for 3.5% of the standard deviation of income smoothing in our sample. This finding is robust to the alternative measures of income smoothing reported in Columns 2–4. Overall, these results align with H2 that non-tax-based subsidies have a stronger positive association with subsidized firms' accounting choices with respect to smoothing their reported earnings than tax-based subsidies.[20]

[20]To address the concern that the different effects of tax and non-tax subsidies on income smoothing could be caused by the determinants of the choice between tax and non-tax subsidies, we require the treated firms to receive both tax-related and non-tax-related subsidies but not at the same time, as a robustness test. Untabulated results continue to show that non-tax subsidies are significantly positively associated with smoothed earnings, whereas tax subsidies are not. This test also provides additional evidence that the main results are attributable to the influence of subsidies on smoothness rather than omitted time-invariant firm characteristics. The findings are available in Appendix S1 (Table IA.1).

TABLE 3 Impact of government subsidies on income smoothing.

Dependent variable	$IS_{t,t+4}$ (1)	$IS\_LZ_{t,t+4}$ (2)	$IS\_TZ_{t,t+4}$ (3)	$IS\_JSY_{t,t+4}$ (4)
$Subsidy_{t-2,t}$	9.748***	7.838**	13.867***	7.540**
	(3.77)	(2.48)	(4.46)	(2.50)
$SalesVolatility_{t-4,t}$	−0.060***	−0.040	−0.076***	−0.063***
	(−3.27)	(−1.57)	(−3.65)	(−2.88)
$Log(Size_{t-1})$	0.026***	0.002	0.045***	0.031***
	(5.60)	(0.35)	(8.96)	(5.58)
$SalesGrowth_{t-1,t}$	−0.047***	−0.023	−0.074***	−0.043**
	(−2.81)	(−1.08)	(−3.73)	(−2.28)
MB_t	0.002*	0.003***	0.001	0.002
	(1.76)	(2.74)	(0.56)	(1.52)
$Leverage_t$	−0.054**	−0.034	−0.050*	−0.078***
	(−2.23)	(−1.21)	(−1.74)	(−2.63)
ROA_t	0.347***	0.347***	0.366***	0.328***
	(6.84)	(5.73)	(6.82)	(5.68)
$AdjRet_t$	0.018*	0.014	0.025**	0.015
	(1.73)	(1.03)	(2.13)	(1.28)
$Log(OperCycle_{t-4,t})$	−0.052***	−0.033***	−0.067***	−0.054***
	(−5.33)	(−3.02)	(−5.70)	(−4.76)
$Log(1 + NumAnalysts_t)$	−0.068***	−0.067***	−0.072***	−0.064***
	(−8.42)	(−7.09)	(−7.73)	(−7.03)
$Std(AbnAccruals)_{t-4,t}$	−0.071	−0.001	−0.165**	−0.046
	(−1.27)	(−0.01)	(−2.41)	(−0.68)
$AcctComp_t$	0.009***	0.009***	0.007***	0.010***
	(4.50)	(4.14)	(3.12)	(3.99)
$BigN_t$	0.003	0.006	0.006	−0.003
	(0.20)	(0.35)	(0.35)	(−0.16)
$Union_t$	6.371	6.575	−3.919	16.457
	(0.53)	(0.47)	(−0.27)	(1.23)
$MA\text{-}Score_t$	0.059***	0.061***	0.043**	0.072***
	(3.47)	(3.30)	(2.17)	(3.36)
RD_t	−0.227**	−0.119	−0.224**	−0.338***
	(−2.45)	(−1.12)	(−2.21)	(−3.18)
$Employees_t$	0.086	1.891	−0.897	−0.735
	(0.08)	(1.61)	(−0.67)	(−0.60)
$Log(1 + ContribAmt_t)$	−0.000	0.001	−0.000	−0.002
	(−0.37)	(0.67)	(−0.21)	(−1.19)
$Litigation_t$	−0.063***	−0.047**	−0.086***	−0.056**
	(−3.76)	(−2.22)	(−4.20)	(−2.25)
Constant	0.675***	0.765***	0.730***	0.530***
	(7.09)	(7.41)	(5.67)	(4.06)

(Continues)

TABLE 3 (Continued)

Dependent variable	$IS_{t,t+4}$ (1)	$IS\_LZ_{t,t+4}$ (2)	$IS\_TZ_{t,t+4}$ (3)	$IS\_JSY_{t,t+4}$ (4)
Fixed effects	Year/industry	Year/industry	Year/industry	Year/industry
No. of observations	11,430	11,430	11,430	11,430
Adjusted R^2	0.092	0.059	0.103	0.078

Note: This table reports the regression results of the impact of government subsidies on income smoothing, using the matched sample. The classification of subsidies is presented in Appendix 1. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variable of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

6 | CROSS-SECTIONAL VARIATION TESTS

6.1 | Conditional effect of negative media coverage

Because firms with high negative media coverage often incur high political costs (Chen et al., 2019), we expect the positive relationship between subsidies and income smoothing to be more pronounced for such firms. To test this conjecture, we construct a proxy for media coverage using data from the RavenPack database, which contains articles from a variety of sources, and use RavenPack's composite sentiment score to identify media articles with negative sentiment. The variable *Negative Media Articles* is the average percentage of all the media articles about a firm that are negative over the fiscal years $t-2$ to t. The sample is split into high (the top tercile) and low (the bottom tercile) subsamples based on *Negative Media Articles*.

Panel A in Table 5 reports the results using *Subsidy* as the independent variable. In line with our expectations, the main effect is limited to the firms that receive high negative media coverage. As Panel B shows, when we further partition our subsidy variable into *Tax Subsidy* and *NonTax Subsidy*, the results show that the difference in the subsidy-smoothing association between the two groups is mainly driven by the non-tax-related subsidies. These results lend overall support to the political cost hypothesis, which is one of our key arguments.

6.2 | Conditional effect of a firm's information environment

Next, we examine the impact of firms' information environment on the relation between income smoothing and subsidization. A transparent information environment facilitates investors' assessments of firms' earnings information, thereby making smoothing activities less likely. To test this prediction, we follow prior literature (Boone & White, 2015; Leuz et al., 2003) and measure information transparency using two proxies. One is analyst forecast dispersion (*Forecast Dispersion*) measured as the 12-month average of the standard deviations of the inter-analyst earnings forecasts scaled by absolute mean forecasts. To calculate this measure, we require a firm-year to be followed by at least two distinct analysts. The second proxy is institutional ownership (*InstOwn*) measured as the percentage of total shares outstanding held by institutional investors. Following previous research (e.g., Aggarwal et al., 2011; Fernando et al., 2017; Gompers & Metrick, 2001), we set the missing institutional shareholding to zero. We measure both variables as the average value over the fiscal years $t-2$ to t and classify as less transparent firms that have higher forecast dispersion and lower institutional ownership. We then split the sample into high and low subsamples using the top and bottom terciles of each conditional variable.

Table 6 presents the results of the subsample analysis. As Panel A shows, we find the coefficient on *Subsidy* to be significantly positive for the high *Forecast Dispersion* and low *InstOwn*

TABLE 4 Comparative impacts of tax and non-tax subsidies on income smoothing.

Dependent variable	$IS_{t,t+4}$ (1)	$IS\_LZ_{t,t+4}$ (2)	$IS\_TZ_{t,t+4}$ (3)	$IS\_JSY_{t,t+4}$ (4)
$Tax\ Subsidy_{t-2,t}$	10.211	12.645	18.243**	−0.255
	(1.32)	(1.37)	(1.99)	(−0.03)
$NonTax\ Subsidy_{t-2,t}$	31.606***	18.703*	38.792***	37.322***
	(3.67)	(1.78)	(3.89)	(3.65)
$SalesVolatility_{t-4,t}$	−0.060***	−0.040	−0.077***	−0.063***
	(−3.27)	(−1.58)	(−3.68)	(−2.86)
$Log(Size_{t-1})$	0.026***	0.002	0.046***	0.031***
	(5.65)	(0.37)	(9.01)	(5.65)
$SalesGrowth_{t-1,t}$	−0.046***	−0.023	−0.073***	−0.043**
	(−2.77)	(−1.05)	(−3.67)	(−2.28)
MB_t	0.002*	0.003***	0.001	0.002
	(1.80)	(2.77)	(0.61)	(1.55)
$Leverage_t$	−0.054**	−0.034	−0.050*	−0.077***
	(−2.24)	(−1.22)	(−1.76)	(−2.63)
ROA_t	0.345***	0.345***	0.362***	0.330***
	(6.82)	(5.71)	(6.77)	(5.71)
$AdjRet_t$	0.018*	0.014	0.025**	0.015
	(1.72)	(1.03)	(2.12)	(1.27)
$Log(OperCycle_{t-4,t})$	−0.052***	−0.033***	−0.068***	−0.054***
	(−5.34)	(−3.02)	(−5.70)	(−4.78)
$Log(1 + NumAnalysts_t)$	−0.068***	−0.067***	−0.072***	−0.064***
	(−8.45)	(−7.11)	(−7.76)	(−7.05)
$Std(AbnAccruals)_{t-4,t}$	−0.071	−0.000	−0.164**	−0.048
	(−1.27)	(−0.00)	(−2.40)	(−0.71)
$AcctComp_t$	0.009***	0.009***	0.007***	0.010***
	(4.49)	(4.13)	(3.09)	(3.99)
$BigN_t$	0.004	0.007	0.007	−0.002
	(0.24)	(0.37)	(0.40)	(−0.12)
$Union_t$	6.360	6.522	−3.968	16.526
	(0.53)	(0.47)	(−0.27)	(1.24)
$MA\text{-}Score_t$	0.059***	0.061***	0.044**	0.073***
	(3.50)	(3.32)	(2.20)	(3.38)
RD_t	−0.227**	−0.119	−0.223**	−0.340***
	(−2.44)	(−1.12)	(−2.20)	(−3.19)
$Employees_t$	0.076	1.865	−0.929	−0.709
	(0.07)	(1.58)	(−0.70)	(−0.58)
$Log(1 + ContribAmt_t)$	−0.000	0.001	−0.000	−0.002
	(−0.38)	(0.68)	(−0.21)	(−1.23)
$Litigation_t$	−0.062***	−0.047**	−0.085***	−0.055**
	(−3.72)	(−2.19)	(−4.14)	(−2.23)

(Continues)

TABLE 4 (Continued)

Dependent variable	$IS_{t,t+4}$ (1)	$IS\_LZ_{t,t+4}$ (2)	$IS\_TZ_{t,t+4}$ (3)	$IS\_JSY_{t,t+4}$ (4)
Constant	0.679***	0.768***	0.737***	0.532***
	(7.09)	(7.45)	(5.61)	(4.09)
Fixed effects	Year/industry	Year/industry	Year/industry	Year/industry
No. of observations	11,430	11,430	11,430	11,430
Adjusted R^2	0.092	0.059	0.103	0.079

Note: This table reports regression results of the impact of tax and non-tax subsidies on income smoothing, using the matched sample. The classification of subsidies is presented in Appendix 1. Details of variable definitions can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variables of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

TABLE 5 Conditional effect of negative media coverage.

	Dependent variable: $IS_{t,t+4}$		
	Low *Negative Media Articles*$_{t-2,t}$ (1)		High *Negative Media Articles*$_{t-2,t}$ (2)
Panel A: Overall subsidies			
Subsidy$_{t-2,t}$	3.507		12.527***
	(0.95)		(3.43)
F-test of coefficient differences (*p*-value)		0.040**	
Controls	Yes		Yes
Fixed effects	Year/industry		Year/industry
No. of observations	3,030		2,994
Adjusted R^2	0.160		0.118
Panel B: Tax and non-tax subsidies			
Tax Subsidy$_{t-2,t}$	36.758**		22.429
	(2.19)		(1.37)
F-test of coefficient differences (*p*-value)		0.728	
NonTax Subsidy$_{t-2,t}$	−1.279		13.158**
	(−0.24)		(2.52)
F-test of coefficient differences (*p*-value)		0.026**	
Controls	Yes		Yes
Fixed effects	Year/industry		Year/industry
No. of observations	3,030		2,994
Adjusted R^2	0.161		0.117

Note: This table reports the split sample analysis of the impact of government subsidies on income smoothing conditional on negative media coverage, using the matched sample. *Negative Media Articles*$_{t-2,t}$ is the average percentage of negative media articles covering a firm over the fiscal years $t-2$ to t. The sample is split into high (above the top tercile) and low (below the bottom tercile) subsamples based on the conditional variable. Control variables in the baseline analysis are included but not reported in this table for brevity. Intercepts are not reported either. The classification of subsidies is presented in Appendix 1. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variables of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed). The *p*-values of the equality tests are based on one-tailed tests given the predicted signs.

TABLE 6 Conditional effect of corporate information environment.

	Dependent variable: $IS_{t,t+4}$			
	Forecast Dispersion$_{t-2,t}$		*InstOwn*$_{t-2,t}$	
	Low (1)	High (2)	Low (3)	High (4)
Panel A: Overall subsidies				
Subsidy$_{t-2,t}$	4.369	14.768***	8.744**	6.874
	(0.68)	(3.78)	(2.04)	(1.58)
F-test of coefficient differences (*p*-value)	0.082*		0.376	
Controls	Yes	Yes	Yes	Yes
Fixed effects	Year/industry	Year/industry	Year/industry	Year/industry
No. of observations	3,748	3,614	3,570	3,744
Adjusted R^2	0.097	0.112	0.154	0.092
Panel B: Tax and non-tax subsidies				
Tax Subsidy$_{t-2,t}$	−3.202	16.781	−3.244	21.532*
	(−0.19)	(1.41)	(−0.25)	(1.72)
F-test of coefficient differences (*p*-value)	0.164		0.903	
NonTax Subsidy$_{t-2,t}$	48.634***	32.763**	47.559***	2.225
	(2.63)	(2.38)	(2.89)	(0.17)
F-test of coefficient differences (*p*-value)	0.746		0.016**	
Controls	Yes	Yes	Yes	Yes
Fixed effects	Year/industry	Year/industry	Year/industry	Year/industry
No. of observations	3,748	3,614	3,570	3,744
Adjusted R^2	0.099	0.110	0.155	0.092

Note: This table reports the split sample analysis of the impact of government subsidies on income smoothing conditional on the firm's information environment, using the matched sample. The information environment is proxied by analyst forecast dispersion (Columns 1 and 2) and institutional ownership (Columns 3 and 4). The sample is split into high (above the top tercile) and low (below the bottom tercile) subsamples based on the conditional variable. Control variables in the baseline analysis are included but not reported in this table for brevity. Intercepts are not reported either. The classification of subsidies is presented in Appendix 1. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. The *p*-values of the equality tests are based on one-tailed tests given the predicted signs. Gray shading indicates the variables of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

subsamples. By contrast, the coefficient is insignificant for the low *Forecast Dispersion* and high *InstOwn* subsamples. These results imply that the positive relation between income smoothing and subsidization prevails mainly among firms with less transparent information environments. As Panel B shows, we find that the finding documented in Panel A is driven mainly by non-tax-related subsidies, despite the weak pattern when *Forecast Dispersion* serves as the partitioning variable.

7 | FURTHER ANALYSES

7.1 | Subsidy-induced income smoothing: Beneficial or pernicious?

The findings presented in Section 6 indicate that income smoothing in response to subsidies is employed as a means of obfuscation. Consequently, one might anticipate that the positive effects of smoothing on earnings informativeness are weakened for firms receiving subsidies.

To explore this possibility, we conduct two additional analyses, which will be discussed in the following subsections.

7.1.1 | Impact of government subsidies on the role of income smoothing in debt contracting

First, we consider how subsidization affects the role of income smoothing in debt contracting. Demerjian et al. (2020) find that private debt contracts to borrowers with greater income smoothing are more likely to include earnings-based covenants, consistent with the reasoning that income smoothing increases the usefulness of earnings for monitoring borrowers. In our context, if subsidized firms use income smoothing to obfuscate reported earnings, the positive role of income smoothing in debt contracting should be attenuated. To test this conjecture, we construct a loan sample by matching our full sample with the loan covenant data and then partition the sample into loans corresponding to subsidized and unsubsidized firm-years (*D_Subsidy*). Specifically, insofar as income smoothing is measured over the years $t-4$ to t, *D_Subsidy* equals one when a firm has received subsidies over the years $t-6$ to $t-4$, and zero otherwise. Then, following Demerjian et al. (2020), we estimate the following model for the two subsamples:

$$ISCovenant_t = \alpha_0 + \alpha_1 IS_{t-4,t} + Controls + \varepsilon, \quad (2)$$

where *ISCovenant* is an indicator variable equal to one when the debt contract includes an income statement covenant, and zero otherwise. Following Demerjian (2011), we classify as income statement covenants the DealScan covenant classifications interest coverage, debt service coverage, fixed charge coverage, debt-to-EBITDA, senior debt-to-EBITDA, and EBITDA.

Following Demerjian et al. (2020), we include the firm-specific control variables borrower size (*Log*(*Size*)), leverage (*Leverage*), growth opportunities (*MB*), profitability (*ROA*), and sales growth (*SalesGrowth*), the standard deviation of abnormal accruals (*AbnAccruals*), and the market-adjusted returns (*AdjRet*). In addition, we include as loan-specific variables the borrower's prior relationship with the bank (*PreRelation*), indicators capturing whether the loan is a revolving loan (*Revolver*) and an institutional loan (*InstTranche*), respectively, the presence of a performance pricing provision (*PPP*), prior income statement covenants and balance sheet covenants (*ISCovenant Priordeal* and *BSCovenant Priordeal*), the presence of covenants restricting CAPEX (*CAPEXrestrict*), the presence of sweep covenants (*SweepCov*), the presence of covenants restricting dividends (*Dividend Restrict*), the size of the lending syndicate (*Log* (*SyndicateSize*)), an indicator variable for the use of collateral (*Collateral*), the amount (*Log* (*Loan Size*)) and the maturity (*Log*(*Maturity*)) of the loan, and the interest spread (*Spread*).

Table 7 reports the results. We find the coefficient on *IS* to be significantly positive for the unsubsidized subsample (coeff. = 0.245, *t*-stat = 2.86) but insignificant for the subsidized subsample (coeff. = −0.088, *t*-stat = −0.55). The difference in the coefficients between the two samples is significant. These results suggest that income smoothing benefits the usefulness of earnings in debt contracting among unsubsidized firms but that this benefit diminishes among subsidized firms, consistent with the reasoning that subsidized firms use income smoothing to obfuscate reported earnings.

7.1.2 | Impact of smoothing by subsidized firms on the stock price informativeness about future performance

Next, we adopt the approach of Tucker and Zarowin (2006) and test whether smoothing by subsidized firms improves or reduces stock price informativeness with regard to future

TABLE 7 The impact of subsidization on the role of income smoothing in debt contracting.

	Dependent variable: $ISCovenant_t$	
	$D\_Subsidy_{t-6,t-4} = 0$ (1)	$D\_Subsidy_{t-6,t-4} = 1$ (2)
$IS_{t-4,t}$	0.245***	−0.088
	(2.86)	(−0.55)
F-test of coefficient difference (*p*-value)	0.060*	
Controls	Yes	Yes
Fixed effects	Year/industry	Year/industry
No. of observations	6,728	2,009
Pseudo R^2	0.280	0.390

Note: This table reports the regression results of the impact of subsidization on the relation between income smoothing and the use of income statement items in debt covenants. The dependent variable, $ISCovenant_t$, is an indicator variable that equals one if the loan includes an interest coverage ratio, fixed charge, debt service, minimum EBITDA, or debt-to-earnings covenant, and zero otherwise. Control variables in Equation (2) are included but not reported in this table for brevity. Intercepts are not reported either. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variable of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

performance. Specifically, we estimate the following modified future earnings response coefficient (FERC) model for subsidized and unsubsidized subsamples:

$$\begin{aligned} R_t = {} & \mu_0 + \mu_1 ROA_{t-1} + \mu_2 ROA_t + \mu_3 ROA_{t+1} + \mu_4 R_{t+1} + \mu_5 IS_{t-4,t} + \mu_6 IS_{t-4,t} \times ROA_{t-1} \\ & + \mu_7 IS_{t-4,t} \times ROA_t + \mu_8 IS_{t-4,t} \times ROA_{t+1} + \mu_9 IS_{t-4,t} \times R_{t+1} \\ & + Control\ Variables\ and\ their\ interactions + \psi_1 Industry\ fixed\ effects \\ & + \psi_2 Year\ fixed\ effects + \varepsilon_t, \end{aligned} \tag{3}$$

where the dependent variable R_t is the cumulative buy-and-hold return for year t measured over the 12-month period ending 3 months after the firm's fiscal year end, ROA_t is the income before extraordinary items for year t scaled by the prior year's total assets, and R_{t+1} is the stock return in year $t + 1$. Similar to Baik et al. (2020), we include firm size, earnings volatility, the number of analysts following the firm, and their interactions. Appendix 2 presents the definitions of the variables.

The reasoning behind this test is that, if the managers of subsidized firms use income smoothing to obfuscate firms' performance, the smoothed earnings are expected to incorporate less forward-looking information, thereby reducing the informativeness of the stock price. The traditional FERC model measures how much information about future earnings is reflected in current stock returns (e.g., Collins et al., 1994; Lundholm & Myers, 2002), with future earnings serving as a measure of future performance.

Table 8 presents the results of the test. The coefficient on the key variable of interest, $ROA_{t+1} \times IS_{t-4,t}$, is insignificant for the subsidized subsample (coeff. = −0.337, *t*-stat = −0.84), but significantly positive for the unsubsidized subsample (coeff. = 0.380, *t*-stat = 2.04). The difference between the coefficients of the two subsamples is significant. These results show that income smoothing improves the stock price informativeness regarding future earnings for the unsubsidized sample but that this effect does not hold for the subsidized sample. The results presented in Tables 7 and 8, taken together, therefore, suggest that subsidized firms indeed use income smoothing to obfuscate their performance.

TABLE 8 Impact of subsidization on the role of income smoothing in the stock price informativeness about future performance.

	Dependent variable: R_t	
	$D\_Subsidy_{t-6,t-4} = 0$ (1)	$D\_Subsidy_{t-6,t-4} = 1$ (2)
ROA_{t-1}	0.359**	−0.954*
	(2.12)	(−1.76)
ROA_t	0.750***	1.383**
	(4.05)	(2.41)
ROA_{t+1}	0.018	0.408
	(0.09)	(0.74)
R_{t+1}	−0.124***	−0.059
	(−3.44)	(−0.68)
$IS_{t-4,t}$	0.001	0.015
	(0.04)	(0.45)
$ROA_{t-1} \times IS_{t-4,t}$	−1.422***	−0.329
	(−6.92)	(−0.73)
$ROA_t \times IS_{t-4,t}$	1.455***	0.590
	(6.69)	(1.40)
$ROA_{t+1} \times IS_{t-4,t}$	0.380**	−0.337
	(2.04)	(−0.84)
F-test of coefficient difference (*p*-value)	0.098*	
$R_{t+1} \times IS_{t-4,t}$	0.059*	−0.147*
	(1.68)	(−1.85)
Control/interactions	Yes	Yes
Fixed effects	Year/industry	Year/industry
No. of observations	19,029	3,932
Adjusted R^2	0.293	0.379

Note: This table reports the regression results on the impact of subsidization on the role of income smoothing in the stock price informativeness about future performance. The dependent variable, R_t, is the cumulative buy-and-hold return for fiscal year t. ROA_t is measured as income before extraordinary items (ib) for the year t, deflated by the prior year's total assets. Control variables and their interactions in Equation (3) are included but not reported in this table for brevity. Intercepts are not reported either. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variable of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

7.2 | Impact of income smoothing on future government subsidies

We argue that subsidized firms engage in income smoothing to avoid negative publicity and to shield the politicians who award the subsidies from voter scrutiny. To the extent that negative publicity strains firms' relationships with these politicians, firms that fail to manage public scrutiny may not receive future subsidies. In our context, we expect subsidized firms that smooth earnings to be more likely to continue receiving subsidies. To test this prediction, we focus on the firms that receive a subsidy during years $t-2$ to t and examine the impact of income smoothing during years t to $t+4$ on the likelihood that those firms receive further subsidies after year $t+4$. In line with our prediction, Column 1 in Table 9 shows that a subsidized firm is more likely to receive another subsidy when it smooths earnings after obtaining its current subsidy. Furthermore, the results shown in Columns 2 and 3 indicate that subsidized firms that

TABLE 9 Impact of income smoothing on future subsidies.

Dependent variable	$D\_Subsidy_{t+n}$ (1)	$D\_Tax\ Subsidy_{t+n}$ (2)	$D\_NonTax\ Subsidy_{t+n}$ (3)
$IS_{t,t+4}$	0.233*	0.258**	0.290**
	(1.74)	(2.23)	(2.43)
Control variables	Yes	Yes	Yes
Fixed effects	Year/industry	Year/industry	Year/industry
No. of observations	10,065	10,065	10,065
Pseudo R^2	0.540	0.435	0.409

Note: This table reports the regression results of the impact of income smoothing by subsidized firms on the likelihood of these firms receiving another subsidy in the future. $D\_Subsidy_{t+n}$ is an indicator variable that equals one when a subsidized firm receives another subsidy in any year after the current year of subsidy (t) until the end of our sample period, and zero otherwise, where $n = 4, 5, \ldots, 2018 - t$. D_Tax ($NonTax$) $Subsidy_{t+n}$ is an indicator variable that equals one when a subsidized firm receives another tax- (non-tax) based subsidy in any year after the current year of subsidy (t) until the end of our sample period, and zero otherwise, where $n = 4, 5, \ldots, 2018 - t$. Control variables in the baseline analysis are included but not reported in this table for brevity. Intercepts are not reported either. The classification of subsidies is presented in Appendix 1. Details of the definition and construction of the variables can be found in Appendix 2. t-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variable of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

engage in smoothing are more likely to obtain both tax-related and non-tax-related subsidies. This evidence indicates that the perceived benefits of obtaining future subsidies could be a driving force behind a firm's income-smoothing behavior.[21]

8 | ROBUSTNESS TESTS

8.1 | Correcting for unobservable selection bias

Conducting this study poses a challenge due to the presence of *observable* and *unobservable* differences between subsidized firms and unsubsidized firms, which may confound our inferences regarding the impact of government subsidies on income smoothing. To mitigate any selection bias resulting from the observed heterogeneity, we employ PSM in our main analyses. However, it is still possible that some unobservable variables influence the results. To address selection bias from unobservables, we also utilize Heckman's selection model. Tucker (2010) recommends using both approaches to ensure robust inferences, as PSM alone may not fully address the concerns it is intended to tackle.

Our Heckman selection procedure involves a two-stage approach. In the first stage, we use a probit regression to model the probability of a firm receiving government subsidies, following the rationale of subsidy competition (Slattery, 2022). In the second stage, we estimate the impact of these subsidies on income smoothing. To capture the influence of subsidy competition, we incorporate *Neighbor States Subsidies*, which represents the total subsidies received by firms headquartered in neighboring states. This accounts for the pressure on the focal state's government agencies to offer subsidies in order to attract or retain firms. It is important to note that the availability of subsidies in neighboring states does not directly affect income smoothing practices in the focal state.

[21]The finding reported in Table 1, Panel A, of a positive association between *AcctComp* and the probability of receiving a subsidy appears inconsistent with our view that income smoothing by subsidized firms serves the purpose of obfuscating information. However, upon further inspection, we find that the effect of *AcctComp* in the analysis of Table 1, Panel A, is not material. When we exclude *AcctComp* from this analysis, the Pseudo R^2 falls from 0.393 to 0.390. Thus, it is our view that the effect reported for *AcctComp* in Table 1, Panel A, is easily dominated by the demand for income smoothing to avoid political costs.

TABLE 10 Heckman's selection model.

Dependent variable	$D\_Subsidy_t$	$IS_{t,t+4}$
	First stage (1)	Second stage (2)
Neighbor States Subsidies$_{t-2,t}$	0.033***	
	(6.98)	
Subsidy$_{t-2,t}$		3.862*
		(1.80)
IMR_t		0.029
		(1.04)
Controls	Yes	Yes
Fixed effects	Year/industry	Year/industry
No. of observations	24,736	5,294
Adjusted/pseudo R^2	0.404	0.092

Note: This table reports the results on the relation between income smoothing and government subsidies using the Heckman selection model. The exogenous variable used in the first stage is *Neighbor States Subsidies*, which is the sum of subsidy for all other firms with headquarters within states neighboring the state of the current firm's headquarters, divided by 1,000. Column 1 shows the 1st stage estimates, while Column 2 shows the second-stage estimates. Control variables in the baseline analysis are included but not reported in this table for brevity. Intercepts are not reported either. Details of the definition and construction of the variables can be found in Appendix 2. *IMR* is the inverse Mills ratio. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variables of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 10 presents the results. In the first stage, we model the receipt of subsidy (*D_Subsidy*) on *Neighbor States Subsidies* and the same control variables as in Equation (1). The coefficient on *Neighbor States Subsidies* is significantly positive (coeff. = 0.033, *z*-stat = 6.98). In the second stage, we constrain the sample to subsidized firms and the coefficient on *Subsidy* remains positive and significant (coeff. = 3.862, *z*-stat = 1.80). The coefficient on the inverse Mills ratio (*IMR*) is 0.029 and statistically insignificant. This approach to correct for selection bias is, of course, not perfect, but these results corroborate our main finding that firms receiving government subsidies engage in more income smoothing.

8.2 | Smoothing compared with unidirectional upward and downward earnings management

To address the challenge of distinguishing between income smoothing and unidirectional earnings management (upward or downward), we conduct a sensitivity analysis following Hamm et al. (2017). This analysis explores whether our results are primarily influenced by upward earnings management during periods of poor performance or downward earnings management during periods of good performance. We re-run our main regressions on subsamples categorized by firms reporting positive or negative earnings changes after receiving subsidies. If our findings are driven chiefly by downward (upward) earnings management, we would expect to observe a positive relationship between subsidies and income smoothing solely among firms with good (bad) performance.

Table 11 presents the results. We adopt change in earnings in Columns 1–2 and change in pre-managed earnings in Columns 3–4. In all cases, our inferences with respect to income smoothing remain unchanged. We acknowledge that this analysis cannot definitively rule out unidirectional upward or downward earnings management as the underlying earnings

TABLE 11 Assessment of unidirectional upward and downward earnings management.

	Dependent variable: $IS_{t,t+4}$			
	$\Delta ROA_{t-1,t}$		$\Delta Pre\text{-}Managed\ ROA_{t-1,t}$	
	Increase (1)	Decrease (2)	Increase (3)	Decrease (4)
$Subsidy_{t-2,t}$	8.885**	9.978***	8.588**	9.503***
	(2.42)	(2.77)	(2.43)	(2.69)
Controls	Yes	Yes	Yes	Yes
Fixed effects	Year/industry	Year/industry	Year/industry	Year/industry
No. of observations	5,898	5,488	5,872	5,506
Adjusted R^2	0.085	0.136	0.096	0.109

Note: This table reports the regression results of the impact of government subsidies on income smoothing conditional on earnings changes and pre-managed earnings changes, using the matched sample. Control variables in the baseline analysis are included but not reported in this table for brevity. Intercepts are not reported either. Details of the definition and construction of the variables can be found in Appendix 2. *t*-statistics reported in parentheses are based on standard errors corrected for heteroskedasticity and clustered by firm. Gray shading indicates the variable of interest.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

management objective, but we are convinced that the additional findings materially reduce the validity of these alternative interpretations.

8.3 | Comparison of regular and sporadic recipients of subsidies

We are concerned that our results could be driven by a mechanical relation between subsidies and income smoothing. That is, firms receiving subsidies on a regular basis are likely to have smoother income streams than unsubsidized firms, even without earnings management. If our main finding is, in fact, driven solely by this mechanical relation, it should be observable mainly among the regular recipients of subsidies. To test this possibility, we create two subsamples, one consisting of the firms that receive regular subsidies (defined as those for which the frequency of subsidy acquisition is in the top tercile of all the subsidized firms in our sample) and the other consisting of the firms that receive subsidies sporadically (defined as those for which the frequency of subsidy acquisition is in the bottom tercile). We then perform PSM and reestimate Equation (1) for both subsamples. The untabulated results show that firms receiving either regular or sporadic subsidies have smoother earnings than unsubsidized firms, but the effect is significantly stronger for the firms in the sporadic subsidies group.[22]

8.4 | Political cost motives versus contracting motives

We interpret our main findings as indicating that subsidized firms smooth their earnings because of political cost considerations. Nevertheless, subsidized firms may simultaneously receive government contracts, which are sometimes considered implicit subsidies. Under these circumstances, political cost motives may become entangled with contracting motives because firms with government contracts also have incentives to engage in income smoothing to obtain favorable contract terms and maintain long-term relationships with the government. We attempt to distinguish between these motivations by creating a sample without government

[22]The findings are available in Appendix S1 (Table IA.2).

contractors, excluding any firm receiving a federal contract and then repeating the PSM to create matched pairs in the reduced sample of 7,652 observations. The untabulated results show that our main results remain unchanged after excluding government contractors.[23]

8.5 | Income smoothing based on real activities manipulation

In the main analysis, we focus on accrual-based smoothing activities. However, both archival and survey evidence indicates that managers may use accruals as well as real earnings management to smooth earnings (Demerjian et al., 2017; Graham et al., 2005; Hamm et al., 2017). Thus, we further investigate whether government subsidies affect income smoothing through real earnings management and, if so, how.

To capture real earnings management, we first follow Roychowdhury (2006) and calculate it as the sum of abnormal production, abnormal discretionary expenses multiplied by −1, and abnormal cash flow from operations multiplied by −1. Next, we modify *IS_JSY* and *IS_TZ* by replacing abnormal accruals with real earnings management and adjusting cash flows with abnormal cash flows to create the new proxies, *IS_JSY_REM* and *IS_TZ_REM*. Lastly, we update the main proxy for income smoothing by averaging *IS_JSY_REM* and *IS_TZ_REM*. We name the new variable *IS_REM*.

In addition, we follow Hamm et al. (2017) and construct income smoothing based on R&D expenditures in a similar manner as we follow Tucker and Zarowin (2006) in constructing income smoothing based on accruals. Specifically, we calculate *IS_RD* as the correlation between the change in R&D and the change in pre-R&D earnings using data from at least 3 of the 5 years (t, $t+4$). A higher value of *IS_RD* indicates higher levels of income smoothing through R&D expenditures.

Untabulated results show the coefficient on *Subsidy* to be significantly positive (coeff. = 4.532, t-stat. = 1.71) when the dependent variable is *IS_REM*. However, when we measure income smoothing using R&D expenditures (*IS_RD*), the coefficient on *Subsidy* is negative and insignificant (coeff. = −6.277, t-stat. = −1.63).[24] Together, these results suggest that subsidized firms attempt to use real earnings management in addition to discretionary accruals to smooth earnings, but there is little evidence that they tend to smooth earnings through R&D expense adjustments in particular. A possible explanation is that subsidies are often granted for the purpose of promoting innovation, and the recipients of such subsidies are unlikely to make accounting choices that are inconsistent with achieving the objective of the subsidy.

8.6 | Other robustness checks

We perform several other robustness checks.[25] First, although Good Jobs First tries its best to collect the actual amount of government subsidies, in cases in which the actual subsidy spreads over multiple years and, hence, the exact information is unavailable, it records the total granting amount in the granting year, possibly introducing measurement error (Huang, 2022). To address this concern empirically, we provide a robustness check using an indicator subsidy variable, which is less likely to be subject to measurement error, as an alternative measure (e.g., Huang, 2022; Raghunandan, 2022). Despite limited evidence supporting H2, the results still demonstrate that subsidized firms engage in more income smoothing compared to unsubsidized firms, consistent with H1. Second, to address the possibility that our results are

[23]The findings are available in Appendix S1 (Table IA.3).
[24]The findings are available in Appendix S1 (Table IA.4).
[25]The results are available in Appendix S1 (Table IA.5).

driven by omitted variables, we follow Oster (2019) and consider whether potential omitted variables could affect our baseline results.[26] Oster (2019) proposes assessing the robustness of estimated β coefficients based on whether the bound of β (1) falls within the 99.5% confidence interval for the coefficient and (2) excludes zero. In our study, the likely bounds for β [9.748, 12.544] fall within the 99.5% confidence interval for β [2.491, 17.006], and the bounding estimate excludes zero, suggesting that the estimated β coefficient is unlikely to be driven by omitted variables. Moreover, the δ value of −3.656 indicates that any omitted factors must be 3.656 times more important than the observable factors for there to be a treatment effect of zero. These results, then, suggest that omitted variables are unlikely to drive our results.

Third, to ensure that time-invariant firm omitted variables do not drive the relationship between subsidy and income smoothing, we include firm fixed effects in our regression model in addition to other control variables. Following the suggestion of Breuer and deHaan (2023), we use the full sample (not PSM matched) and firms that have received a subsidy at least once during the sample period in this test to allow for within-firm variation on subsidy. The result is presented in Table IA.5, Panel C, in Appendix S1. In Column 1, where the independent variable (*D_Subsidy*) is an indicator variable, the positive and significant coefficient on *D_Subsidy* suggests that persistent unobserved correlated omitted variables do not drive our conclusion. In Column 2, the coefficient on the continuous independent variable (*Subsidy*) is positive but statistically insignificant. However, these results should be interpreted with caution given the potential bias induced by the inclusion of high-dimensional fixed effects when there is a potential measurement error in the continuous independent variable, as we discussed earlier (Jennings et al., 2023). Fourth, in our main analysis, we use standard errors clustered at the firm level. As a robustness check, we cluster the standard errors by firm and year, which Petersen (2008) also recommends, and find that our results are unchanged.

Lastly, one caveat regarding PSM is that the matching may substantially reduce the sample size, leading to diminished statistical power (Shipman et al., 2017). This reduced sample size may compromise the generalizability of the PSM findings. To mitigate this concern, we implement entropy balancing (Hainmueller, 2012), using a maximum entropy reweighting scheme so that the mean, variance, and skewness of each unsubsidized firm's control variable are the same as or similar to those of each subsidized firm's control variable. One significant advantage of entropy balancing over other matching methods is that no observations are lost. The results show that our inferences are not affected when we use this alternative matching technique.[27]

9 | CONCLUSIONS

We examine the financial reporting consequences of government subsidies with a particular focus on income smoothing. We find robust evidence that government subsidies are positively associated with a firm's income-smoothing behavior, consistent with the political cost hypothesis. In addition, our results show non-tax-based rather than tax-related subsidies to be the main force driving the positive relationship with income smoothing.

We also show that the positive relation between subsidies and income smoothing is more pronounced for firms facing higher public scrutiny and those with more opaque information environments. As complementary evidence, we find that subsidization adversely affects the role of income smoothing in debt contracting and reduces the ability of income smoothing to improve the predictability of future earnings, suggesting that subsidized firms' smooth earnings

[26]Several recent studies use this approach to test for omitted variable bias (e.g., Bao et al., 2022; Bernard et al., 2021; Donohoe et al., 2021; Jha et al., 2021).

[27]To further alleviate the endogeneity concern arising from the possibility that some unobserved omitted variables influence firms' smoothing levels and their ability to obtain subsidies, we also employ a difference-in-differences design as a robustness check following Huang (2022). For brevity, we report the results in Appendix S1 (Table IA.6).

with the intention of obfuscating earnings informativeness. Lastly, we find that subsidized firms exhibiting greater income smoothing are likely to continue receiving subsidies.

There are several caveats to the results obtained in this study, beginning with limitations on the interpretation of causality in the relationship between government subsidies and income smoothing. In particular, unobserved correlated omitted variables could influence firms' smoothing levels and their ability to obtain subsidies. While we take various steps to minimize this concern, the lack of exogenous shocks to government subsidies means that we cannot completely rule out the possibility that some results are, nevertheless, due to omitted variable bias. In addition, we cannot entirely rule out the possibility that our evidence that subsidies increase smoothing could be attributable to a higher level of unidirectional downward or upward earnings management among subsidized firms caused by increased subsidies.

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ORCID

Kostas Pappas https://orcid.org/0000-0003-3012-0858
Martin Walker https://orcid.org/0000-0002-0148-5199
Alice Liang Xu https://orcid.org/0000-0001-6735-3693
Cheng (Colin) Zeng https://orcid.org/0000-0002-0142-9509

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX 1: CLASSIFICATION OF SUBSIDIES

Type of subsidy	Content	Tax break
Cash grant	These include a variety of programs in which corporations are awarded a specific amount of money outright or in connection with meeting job performance or other goals	No
Cost reimbursement	Programs, usually involving film production, that reimburse companies for specific expenditures (other than worker training) in the state	No
Enterprise zone	Programs tied to investment in specific geographic areas that often bundle a variety of state and/or local tax breaks	Yes
Loan or bond financing	Programs that provide companies with financing that needs to be repaid	No
Grant/low-cost loan	These include programs that contain features of both grants and loans, such as forgivable loans, where the company may not have to pay back the money if certain goals are met	No
Industrial revenue bond	Low-cost financing based on tax-exempt bonds	No
Infrastructure assistance	Programs that cover costs, such as installation of utilities or building of private roads at a company facility	No
Megadeal	Those entries on subsidy packages worth $50 million or more each that were compiled using not only official disclosure sources	Excluded
Property tax abatement	Reductions on real property and business personal property	Yes
Tax credit/rebate	These include corporate income tax credits, sales tax exemptions, and other programs in which a company's tax obligation is reduced or the firm is rebated taxes paid previously	Yes
Tax credit/rebate and grant	Programs that combine tax credits/rebates with grants	Yes
Venture capital	Programs in which state governments make an investment in a company	No
Tax increment financing	Subsidies based on the diversion of a portion of property taxes linked to an increase in assessed value brought about by redevelopment (sometimes based on *sales* taxes)	Yes
Training reimbursement	Programs that pay for or reimburse companies for the cost of training new or existing workers	No
Federal grant	Cash grants from the federal government	No
Federal allocated tax credit	Tax credit/rebate from the federal government	Yes
Federal loan or loan guarantee	Loan-related subsidies from the federal government	No
Federal insurance	For example, political risk insurance provided by the Overseas Private Investment Corporation	No
Federal tax-exempt bond	For example, Gulf Opportunity Zone bonds	Yes

APPENDIX 2: DEFINITIONS AND MEASUREMENT OF VARIABLES

Variables	Definition and measurement	Source
Income smoothing variables		
Accruals	Firm's earnings (ib) minus cash flow from operations (oancf) scaled by the prior year's total assets (at)	Compustat
IS	Combined measure of income smoothing calculated as the average ranking of *IS_JSY*, *IS_LZ*, and *IS_TZ*	Compustat
IS_JSY	Following Jung et al. (2013), income smoothing is calculated as the difference between smoothing based on reported earnings and smoothing based on earnings adjusted for abnormal accruals. In the regression analysis, we use the decile ranking within industry and year, which is rescaled to range between zero and one Income smoothing based on reported earnings is the standard deviation of earnings (ib) calculated using data from at least 3 of the 5 years (t, $t + 4$) divided by the standard deviation of the cash flows from operating activities (oancf) calculated using data from at least 3 of the future 5 years (t, $t + 4$), with the result multiplied by -1. Both earnings and cash flows are scaled by the prior year's total assets (at) Income smoothing based on earnings adjusted for abnormal accruals is the standard deviation of pre-managed earnings calculated using data from at least 3 of the 5 years (t, $t + 4$), divided by the standard deviation of cash flows from operating activities (oancf) calculated using data from at least 3 of the 5 years (t, $t + 4$), with the result multiplied by -1. Both pre-managed earnings and cash flows are scaled by the prior year's total assets (at). Abnormal accruals are calculated as the residuals from the modified Jones model. Pre-managed earnings are the difference between earnings (ib) and abnormal accruals	Compustat
IS_LZ	Following Leuz et al. (2003), income smoothing is calculated as the standard deviation of earnings (ib) calculated using data from at least 3 of the 5 years (t, $t + 4$) divided by the standard deviation of cash flows from operating activities (oancf) calculated using data from at least 3 of the 5 years (t, $t + 4$), with the result multiplied by -1. Both earnings and cash flows are scaled by the prior year's total assets (at). In regression analysis, we use the decile ranking within industry and year, which is rescaled to range between zero and one	Compustat
IS_TZ	Following Tucker and Zarowin (2006), income smoothing is calculated as the correlation between the change in abnormal accruals and the change in pre-managed earnings calculated using data from at least 3 of the 5 years (t, $t + 4$), with the result multiplied by -1. Abnormal accruals are calculated as the residuals from the modified Jones model.	Compustat

(Continues)

APPENDIX (Continued)

Variables	Definition and measurement	Source
	Pre-managed earnings are the difference between earnings (ib) and abnormal accruals. In regression analysis, we use the decile ranking within industry and year, which is rescaled to range between zero and one	
Subsidy variables		
$D\_Subsidy_{t-2,t}$	Indicator variable that equals one when a firm has received subsidies in the past 3 years ($t-2$, t), and zero otherwise	Subsidy Tracker
$D\_Subsidy_{t+n}$	Indicator variable that equals one when a subsidized firm receives another subsidy in any year after the current year of subsidy (t) until the end of our sample period, and zero otherwise, where $n = 4, 5, \ldots, 2018 - t$	Subsidy Tracker
$D\_NonTax\ Subsidy_{t+n}$	Indicator variable that equals one when a subsidized firm receives another non-tax-based subsidy in any year after the current year of subsidy (t) until the end of our sample period, and zero otherwise, where $n = 4, 5, \ldots, 2018 - t$	Subsidy Tracker
$D\_Tax\ Subsidy_{t+n}$	Indicator variable that equals one when a subsidized firm receives another tax-based subsidy in any year after the current year of subsidy (t) until the end of our sample period, and zero otherwise, where $n = 4, 5, \ldots, 2018 - t$	Subsidy Tracker
$NonTax\ Subsidy_{t-2,t}$	Average dollar amount of non-tax-related subsidies the firm has received in the past 3 years ($t-2$, t) scaled by the prior year's total assets (at)	Subsidy Tracker
$Subsidy_{t-2,t}$	Average dollar amount of the government subsidies that a firm has received in the past 3 years ($t-2$, t) scaled by the prior year's total assets (at)	Subsidy Tracker
$Tax\ Subsidy_{t-2,t}$	Average dollar amount of tax-related subsidies that a firm has received in the past 3 years ($t-2$, t) scaled by the prior year's total assets (at)	Subsidy Tracker
Control variables		
AbnAccruals	Accruals quality calculated using the Dechow and Dichev (2002) model	Compustat
AcctComp	Following De Franco et al. (2011), accounting comparability is calculated as the absolute value of the difference of the predicted value of a regression of firm i's earnings on firm i's return using the estimated coefficients for firms i and j, respectively. It is calculated for each firm i − firm j pair, ($i \neq j$), $j = 1$ to j firms in the same two-digit SIC industry as firm i	Compustat, https://mitmgmtfaculty.mit.edu/rverdi/
AdjRet	Firm's market-adjusted buy-and-hold return for year t calculated using CRSP monthly return data and value-weighted market returns	CRSP
BigN	Indicator variable that equals one for firms audited by Big N audit firms (au between 1 and 8) in year t, and zero otherwise	Compustat
ContribAmt	Total amount of political contributions made by a firm over the previous 5 years (Correia, 2014)	Federal Elections Commission

APPENDIX (Continued)

Variables	Definition and measurement	Source
Employees	Number of employees (emp) scaled by total assets (at)	Compustat
Leverage	Long-term debt (dltt) scaled by the sum of the long-term debt (dltt) and common equity (ceq)	Compustat
Litigation	Indicator variable that equals one for firms in litigious industries, and zero otherwise. The following industries are considered to involve high litigation risk: biotechnology (SIC 2833–2836), computers (SIC 7370–7374), electronics (SIC 3600–3674), and retailing (SIC 5200–5961)	Compustat
MA-Score	Managerial ability calculated using the data envelopment analysis (DEA)-based method developed by Demerjian et al. (2012)	https://peterdemerjian.weebly.com/managerialability.html
MB	Firm's market capitalization (prcc_f × csho) scaled by the common equity (ceq) for year *t*	Compustat
NumAnalysts	Number of analysts covering a firm in year *t*	I/B/E/S
OperCycle	Length of a firm's operating cycle defined as sales turnover plus inventory days [(sale/360)/(average rect) + (cogs/360)/(average invt)]	Compustat
RD	Firm's research and development expenditures (xrd) scaled by the prior year's total assets (at). Missing values of xrd are replaced with zero	Compustat
ROA	Firm's earnings (ib) scaled by the prior year's total assets (at)	Compustat
SalesGrowth	Change in sales (sale) from $t-1$ to t scaled by the prior year's sales	Compustat
SalesVolatility	Standard deviation of sales (sale) scaled by the prior year's total assets (at) and calculated using data from at least three of the past 5 years ($t-4$, t)	Compustat
Size	Firm's market value (prcc_f × chso) measured at the end of the fiscal year	Compustat
Union	Unionization rate calculated as the industry-level union membership from the Union Membership and Coverage Database, multiplied by a firm's number of employees (emp), and scaled by total assets (at)	Union Membership and Coverage Database
Conditional variables		
InstOwn	Institutional ownership calculated as the percentage of total shares outstanding held by institutional investors and measured at the closest day to the end of the fiscal year. Missing values of *InstOwn* are replaced with zero	Thomson 13f
Forecast Dispersion	Analyst forecast dispersion measured as the 12-month average of the standard deviation of inter-analyst earnings forecasts scaled by absolute mean forecasts	I/B/E/S
Negative Media Articles	Number of negative media articles scaled by total media articles for a firm	RavenPack
Δ*Pre-Managed ROA*	Change in pre-managed earnings from $t-1$ to t. Pre-managed earnings is the difference between earnings (ib) and abnormal accruals, scaled by the prior year's total assets (at). Abnormal accruals are calculated as the residuals from the modified Jones model	Compustat

(Continues)

APPENDIX (Continued)

Variables	Definition and measurement	Source
ΔROA	Change in a firm's earnings (ib) scaled by the prior year's total assets (at) from $t-1$ to t	Compustat
Other variables		
BSCovenant Priordeal	Indicator variable that equals one when the prior loan includes a leverage ratio, debt-to-equity ratio, net worth, current ratio, or quick ratio covenant, and zero otherwise	DealScan
CAPEXrestrict	Indicator variable equal to one when the loan includes a covenant restricting the level of capital expenditures, and zero otherwise	DealScan
Collateral	Indicator variable equal to one when the loan agreement contains collateral requirements, and zero otherwise	DealScan
Dividend Restrict	Indicator variable equal to one when the loan includes a dividend restriction, and zero otherwise	DealScan
InstTranche	Indicator variable equal to one when the loan has a Term Loan B or higher, and zero otherwise	DealScan
ISCovenant	Indicator variable that equals one when the loan includes an interest coverage ratio, fixed charge, debt service, minimum EBITDA, or debt-to-earnings covenant, and zero otherwise	DealScan
ISCovenant Priordeal	Indicator variable that equals one when the prior loan includes an interest coverage ratio, fixed charge, debt service, minimum EBITDA, or debt-to-earnings covenant, and zero otherwise	DealScan
Loan size	Loan amount in millions of dollars	DealScan
Maturity	Loan maturity in months	DealScan
PPP	Indicator variable that equals one when the loan includes a performance pricing provision, and zero otherwise	DealScan
PreRelation	Indicator variable that equals one when at least one of the lead arrangers of deal i has led the borrower firm's prior deals within the previous 5-year period, and zero otherwise	DealScan
R	Cumulative buy-and-hold return for fiscal year t	CRSP
Revolver	Indicator variable that equals one when the loan is a revolving credit facility, and zero otherwise. A revolving loan is a loan with a type of any of the following: "Revolver/Line <1 Yr.," "Revolver/ Line > = 1 Yr.," "Revolver/Term Loan," "364-Day Facility," "Demand Loan," or "Limited Line"	DealScan
Neighbor States Subsidies	Sum of subsidy for all other firms with headquarters within states neighboring the state of the current firm's headquarters, divided by 1,000	Subsidy Tracker
Spread	Interest spread (AllInDrawn)	DealScan
SyndicateSize	Number of syndicate lenders in the loan	DealScan
SweepCov	Indicator variable equal to one when the loan includes an excess cash flow sweep, asset sales sweep, debt issuance sweep, equity issuance sweep, or insurance proceeds sweep, and zero otherwise	DealScan