Accounting for leases and corporate investment

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Abstract

We examine the real effects of lease capitalization rules (i.e., standards that require firms to capitalize finance leases) on corporate investment. We show that the introduction of these rules leads to a decrease in investment, which is more pronounced for firms with high reliance on leases. We posit and find that lease capitalization affects investment via a learning channel and a contracting channel. Regarding the first channel, we argue that managers identify areas of overinvestment and activities that should be discontinued or downsized because of the information they collect and analyze to comply with lease capitalization rules. Accordingly, we find that the effect of lease capitalization is stronger when learning opportunities are higher. Regarding the second channel, we argue that lease capitalization affects investment via its effect on contracts. Accordingly, we document an increase in the likelihood of covenant breaches and a stronger decline in investment for financially constrained firms.

Running Head: Accounting for leases and corporate investment

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I. INTRODUCTION

We study the real effects of accounting standards that require firms to capitalize finance leases (hereafter, "lease capitalization rules") on firm investment. Leases represent an important source of financing. The total value of new lease arrangements around the world is estimated to have exceeded $1,300 billion in 2020 (Solifi 2022). Therefore, understanding whether lease accounting can affect a firm's real decisions is of paramount importance.

In 2005, the Czech Republic, Greece, Italy, and the Slovak Republic switched from an accounting treatment with no requirement to capitalize lease arrangements (hereafter, the "*operating lease model*") to an accounting treatment that requires the capitalization of finance (i.e., capital) leases (hereafter, the "*hybrid lease model*"). Following Shroff (2017), we hypothesize that the introduction of the requirement to capitalize (finance) leases (i.e., to recognize a lease asset and a lease liability in the amount of the present value of future lease rents at the beginning of the lease term) may affect firm investment decisions for at least two reasons.

First, compliance with lease capitalization standards requires firms to collect, process, and disclose additional information. Prior evidence suggests that managers often make internal decisions, including capital budgeting decisions, based on the same financial information that they report externally (Kaplan 1984; Zimmerman 2009; Dichev, Graham, Harvey, and Rajgopal 2013). Therefore, the data that managers collect and process to comply with lease capitalization standards is likely to incrementally inform managers regarding the return of different projects. Moreover, in the process of preparing for the implementation of these standards, managers engage in a comprehensive review of the firm's operations (Shumsky 2016; Trentmann 2019). During this review, they may identify areas of overinvestment and activities that should be discontinued or downsized. We refer to this channel, first proposed by Shroff (2017), as the *learning channel*.

Second, because of its effects on the balance sheet and income statement, lease capitalization may affect contractual outcomes. The adoption of lease capitalization standards may lead to a deterioration in accounting-based debt covenant ratios if these ratios are not fully adjusted for lease capitalization or changes in GAAP. Lenders may use this opportunity to re-contract loan terms, taking advantage of firm switching costs or the lack of alternative financing options to charge high covenant waiver fees, introduce more restrictive covenants in loan agreements (Nini, Smith, and Sufi 2009), and/or negotiate higher interest rates (Hart and Moore 1988; Aghion and Bolton 1992; Rajan 1992). Firms may also face a contractually defined increase in interest rates if debt contracts include interest-increasing performance pricing provisions (Loomis 1991; Asquith, Beatty, and Weber 2005; Ball, Bushman, and Vasvari 2008). Projects that were previously NPV positive may become NPV negative because of the increase in interest rates. We refer to this channel as the *contracting channel*.

We test whether lease capitalization affects firm investment by examining the change in employment and capital expenditures following the introduction of lease capitalization rules in the Czech Republic, Greece, Italy, and the Slovak Republic in 2005. Our difference-in-differences research design takes advantage of the fact that private firms in these countries continued to report according to a set of (simplified) local standards, and therefore did not experience a concurrent change in lease accounting.[1] We compare the change in the investment of public firms in these four treatment countries (hereafter, treated firms) to the change in the investment of firms in a control group (hereafter, control firms). Our control group includes private firms matched to treatment firms based on country, year, industry, firm size, and leverage. An important feature of our research design is that it allows us to employ a comprehensive fixed effects structure to control

[1] The approach of using a matched sample of private firms to examine the effects of accounting standard changes has been used in prior studies (Cascino and Gassen 2015).

for unobservable time-invariant firm characteristics, time-varying industry cycles, and changes in country-level macroeconomic conditions.

We document economically and statistically significant decreases in the employment and capital expenditures of treatment firms following the adoption of lease capitalization rules. Employment (capital expenditures) of public firms decrease by 13.6 percent (13.9 percent) following the adoption of lease capitalization rules.

The concurrent adoption of IFRS by our sample countries poses an important challenge to the identification of the effect of lease capitalization on investment. To alleviate the concern that the decline in investment is driven by changes in accounting standards unrelated to leases, we conduct a placebo test. We fail to find a significant change in public firm investment in countries that adopted IFRS in 2005 but already required capitalization of finance leases prior to 2005, which alleviates the concern that the effect we document is due to the concurrent adoption of IFRS.

Next, we examine whether our treatment effect varies, in the cross-section, with the extent to which firms rely on leases as a source of financing. Our evidence is consistent with the effect of lease capitalization rules on investment being stronger for lease-intensive firms—that is, firms that record large amounts of lease assets and liabilities as a percentage of total assets when lease capitalization rules come into force and firms with large rent expenses. This provides reassurance that the effect we document is driven by the adoption of lease capitalization rules, rather than other accounting standards, regulatory changes, or changes in macroeconomic conditions.

We conduct a series of empirical tests to understand why the introduction of lease capitalization rules affects investment. The combined evidence of these tests suggests that the decline in investment can be explained by both the learning channel and the contracting channel. We find that most of the treatment firms did not disclose their future lease commitments prior to

the adoption of lease capitalization rules. This lends support to the conjecture that the adoption of lease standards required managers to collect, analyze, and disclose additional information. To further investigate the learning channel, we examine whether firms with higher learning opportunities (i.e., firms where compliance with lease capitalization rules is more likely to expand managerial information sets and facilitate the monitoring of investment decisions) experience a stronger decline in investment. We consistently find that the effect of lease capitalization rules on investment is stronger for firms with higher organizational complexity, lower internal information quality, and overinvesting firms.

We next delve into the qualitative annual report disclosures of treated firms. We find that, compared to low lease intensity firms, high lease intensity firms are more likely to discuss lay-offs, employee redundancies, and spin-offs in their annual reports following the change in lease rules. This suggests that firms do not simply reduce the amount of new capital expenditures, but also spin off divisions and lay off employees, which is consistent with our conjecture that managers identify areas of overinvestment and activities that should be discontinued or scaled down when preparing for adoption of lease capitalization standards.

Finally, we examine whether the decline in investment that we document can also be explained by the effect of lease capitalization on debt covenant ratios (i.e., the contracting channel). We document a significant increase in the frequency of debt covenant breaches, which is concentrated in the year of adoption of lease capitalization standards. Based on the assumption that financially constrained firms have fewer alternative financing opportunities and are hence more likely to face higher debt renegotiation costs, we argue that, if our treatment effect is driven by a debt contracting channel, it should be stronger for financially constrained firms. We consistently find that financially constrained firms experience a stronger decrease in employment

(but not in capital expenditures) following the adoption of lease capitalization standards. Combined, our evidence suggests that the effect of lease capitalization standards on investment can be explained by both the learning channel and the contracting channel.

Our study contributes to the literature that examines the real effects of accounting regulation by showing that the introduction of lease capitalization rules affects firm investment decisions. In a closely related paper, Shroff (2017) examines 49 U.S. accounting rule changes and finds that these changes affect corporate investment through both a contracting channel and an information channel. Our paper nicely complements and extends the evidence in Shroff (2017). We also contribute to the literature on lease accounting. Prior research documents that lease accounting affects firms' financing choices (Imhoff and Thomas 1988; Altamuro 2006). We show that lease accounting also affects firms' investment decisions via a learning channel and a contracting channel.

Our findings are particularly interesting because, while early studies (Abdel-Khalik, Thomson, and Taylor 1978; El-Gazzar 1993) suggest that creditors do not take into account future operating lease rents in defining debt covenants and bond risk premia, more recent studies broadly support the idea that operating leases are regarded as debt by credit rating agencies, creditors, and equity investors (Wilkins and Zimmer 1983; Imhoff, Lipe, and Wright 1993; Ely 1995; Dhaliwal, Lee, and Neamtiu 2011; Altamuro, Johnston, Pandit, and Zhang 2014; Kraft 2015; Lim, Mann, and Mihov 2017).[2] Nevertheless, we show that the adoption of lease capitalization rules leads to economically significant declines in employment and capital expenditures.

[2] These findings are consistent with several studies that compare the extent to which recognized and disclosed numbers can explain variation in stock or bond pricing and returns. Those studies often document differences in the way in which equity investors treat recognized (as opposed to disclosed) numbers (Aboody 1996; Davis-Friday, Folami, Liu, and Mittelstaedt 1999; Ahmed, Kilic, and Lobo 2006; Muller, Riedl, and Sellhorn 2015).

II. HYPOTHESES DEVELOPMENT

Survey and anecdotal evidence point to a close alignment between management accounting systems and financial accounting systems used for external reporting (Kaplan 1984; Zimmerman 2009; Dichev et al. 2013), suggesting that managers often make internal decisions based on the information that they report externally. Following Shroff (2017), we argue that the adoption of lease capitalization standards requires managers to collect and process additional information regarding future lease commitments. Managers conduct a review of the firm's operations in the process of preparing for compliance with these standards (Shumsky 2016; Trentmann 2019). During this review, they examine the assets that the firm has in place (both financed by leases and by other types of arrangements) and assess the return generated by those assets. In the process, they may identify areas of overinvestment and activities that should be discontinued, downsized, or spun off.[3]

Managers may not have full visibility on their lease portfolios or choose not to fully take off-balance sheet lease information into account in their decision making prior to the change in lease standards for several reasons. First, it may be difficult and costly to collect and process information on lease commitments given that firms often have large portfolios of leases (Shumsky 2016; Trentmann 2019). Lower-level managers, for example, may find it hard to credibly communicate this information to upper-management or may not have incentives to do so in the presence of moral-hazard problems (e.g., incentives for overinvesting and empire building). In line with this argument, Shumsky (2016) and Trentmann (2019) argue that top managers (e.g., CFOs

[3] Shumsky (2016) claims that *"most large companies are party to thousands of leases. Yet, few of these are tracked by top decision makers like chief financial officers and financial controllers."* She also quotes Sheri Wyatt, a managing director of PwC's capital market and accounting advisory practice, who states that *"visibility into company's lease portfolios will enable companies and CFOs to start making potentially different decisions and cut costs potentially across the organization."*

and controllers) often do not keep track of their firms' lease portfolios. Second, managers have limited attention and limited information processing abilities (Simon 1973), and may not fully appreciate the benefits of collecting lease information. This may be, in part, because they are unable to credibly reveal their private information regarding off-balance sheet commitments in the context of their countries' institutional environment (e.g., low enforcement and low litigation risk).

We thus contend that managers learn from the information they collect and analyze in preparation for compliance with lease capitalization standards (Shroff 2017; Roychowdhury, Shroff, and Verdi 2019) and this information leads to a reassessment of investment decisions. During the review of firm's operations that they conduct in preparation for compliance with lease capitalization standards, managers may not only uncover leased assets that are underutilized (Trentmann 2019), but also other assets that should be sold, activities that should be discontinued, and businesses that should be spun off. We refer to this channel, first proposed by Shroff (2017), as the *learning channel*.

Moreover, because of its effects on the balance sheet and income statement, lease capitalization may affect contractual outcomes. Debt contracts often include covenants and performance pricing provisions. The adoption of lease capitalization rules may lead to a deterioration in accounting-based covenant ratios if loan contracts are based on floating GAAP and covenant ratios are not fully adjusted for off-balance sheet leases. If covenant ratios fall below the thresholds defined in debt agreements, creditors have the right to call the debt and may use the opportunity to renegotiate and re-contract loan terms, especially if interest rates have increased since the loan issuance (Lys 1984). Firms face a hold-up problem, and lenders take advantage of switching costs or the lack of alternative financing options to charge high covenant waiver fees, renegotiate loans at higher interest rates (Hart and Moore 1988; Aghion and Bolton 1992; Rajan

1992), and introduce restrictive covenants on capital expenditures (Nini et al. 2009). Moreover, firms may face a contractually defined increase in interest rates if debt contracts include interest-increasing performance pricing provisions (Loomis 1991; Asquith et al. 2005; Ball et al. 2008).[4] The increase in interest rates and covenant restrictions may, in turn, cause managers to reassess investment decisions. Projects that were previously feasible and NPV positive may now become unfeasible or NPV negative, leading to a decrease in investment. The adoption of lease capitalization standards may also affect other contractual outcomes. For example, it may lead to a decline in the performance measures used in executive compensation contracts (e.g., return on assets), causing managers to drop marginal projects to increase their compensation. The evidence in prior literature is, in fact, consistent with compensation committees failing to adjust for off-balance sheet leases.[5] We refer to this channel as the *contracting channel*.

Both the learning channel and the contracting channel suggest a decline in investment following the adoption of lease capitalization rules, leading to our first hypothesis:

H1: The adoption of lease capitalization standards leads to a decrease in investment.

If managers make decisions based, to a large extent, on the same information that they report externally, firms required to recognize large amounts of lease assets and liabilities upon adoption of lease capitalization standards (i.e., firms with high lease intensity) should experience more significant changes to the information used for capital budgeting. We argue that firms where lease use is more widespread are more likely to identify areas of their business that should be scaled down, spun off, or discontinued, because they have to engage in more comprehensive reviews of

[4] Ball et al. (2008) find that very few performance pricing debt contracts appear to constructively capitalize operating leases in the U.S.

[5] Imhoff et al. (1993) examine the association between CEO compensation and ROA and ROE ratios both before and after constructive capitalization of operating leases. They find that constructively capitalizing leases does not help to explain CEO compensation.

their operations across different geographical and operational segments. Furthermore, we posit that high lease intensity firms should experience a stronger deterioration in debt covenant ratios and, as a result, larger increases in interest rates and/or stricter restrictions to capital expenditures. This leads to our second hypothesis:

> *H2: The effect of the adoption of lease capitalization standards on investment is stronger for firms with higher lease intensity.*

The assumption underlying our main hypothesis (*H1*) is that, prior to the change in lease standards, firms do not keep track of all leases and/or do not fully reflect all lease information in internal decision making and contracting. This does not, however, preclude the possibility that firms keep track of and consider some of their lease assets and liabilities when making investment decisions and drafting contractual arrangements. Moreover, the extent to which firms (and their contractual counterparties) keep track of leases and incorporate lease information in their decision making may increase with lease intensity. This could lead to a non-linear, U-shaped, relationship between lease intensity and the investment effects of lease capitalization rules. Therefore, whether the effect of lease capitalization is stronger for high or medium lease intensity firms is an open empirical question. Nonetheless, we believe both patterns—that is, a stronger effect for high lease intensity firms and a U-shaped effect—would be consistent with, and hence provide support for our main hypothesis, *H1*.

Furthermore, we expect the effect of lease capitalization rules on investment to be stronger for firms with higher learning opportunities, that is, firms where the adoption of lease capitalization rules is more likely to expand managerial information sets and facilitate the monitoring of investment decisions. Multi-segment firms are more likely to be affected by information asymmetries between headquarters and divisional managers (Harris, Kriebel, and Raviv 1982; Myerson 1982) and face important challenges in aligning the incentives of divisional managers

and monitoring their investment decisions (Bushman, Chen, Engel, and Smith 2004). As divisional managers often have empire building incentives (Hope and Thomas 2008), we posit that compliance with lease standards is more likely to uncover overinvestment and leads to a large investment adjustment in these firms. We further conjecture that firms with lower internal information quality experience larger declines in investment when lease capitalization standards come into force. Defined by Gallemore and Labro (2015) as "accessibility, usefulness, reliability, quantity, and signal-to-noise ratio of the data and knowledge collected, generated, and consumed within an organization," internal information quality has been shown by prior literature to improve managerial decision making (Hodge, Kennedy, and Maines 2004). Managers of higher internal information quality firms may thus already incorporate comprehensive lease information in their decisions prior to the adoption of lease capitalization standards. Finally, we contend that overinvesting firms are more likely to decrease investment following the review of their operations. This reasoning leads to our next hypothesis:

> *H3: The effect of the adoption of lease capitalization standards on investment is stronger for firms with higher learning opportunities.*

We conjecture that the adoption of lease capitalization standards also affects investment via its effect on contractual outcomes. To the extent that the effect of lease capitalization standards on investment is driven, at least in part, by a deterioration in financial covenants and a renegotiation of debt agreements, this effect should be stronger for financially constrained firms that rely more heavily on external financing and lack outside refinancing opportunities (Fazzari, Hubbard, and Petersen 1988). This leads to our last hypothesis:

> *H4: The effect of the adoption of lease capitalization standards on investment is stronger for firms with higher financial constraints.*

III. LEASE ACCOUNTING STANDARDS AND LEASE DISCLOSURES

We hand collect information on the lease accounting standards in force in OECD and European Union countries between 1995 and 2015 from the webpages of various governmental agencies, national accounting bodies, and securities regulators.[6] While most of the countries that we examine already have a hybrid lease model in force in 1995, six countries moved from an operating lease model to a hybrid lease model between 1995 and 2015. Specifically, Cyprus and Turkey changed their lease accounting rules in 2003, and the Czech Republic, Greece, Italy, and the Slovak Republic did so when they adopted IFRS in 2005. Our research design takes advantage of these changes in lease standards, as well as of the fact that private firms continued to report following a set of (simplified) local accounting standards and, therefore, did not experience concurrent changes in lease accounting rules. We drop Cyprus and Turkey from our sample because the private firm data we require to implement our difference-in-differences research design is scarce for these countries.

To understand whether the introduction of lease capitalization rules is likely to have led to the collection and analysis of additional information, we begin by examining the 2001 and 2002 annual reports of 20 public firms in each of the countries that introduce lease capitalization standards during our sample period.[7] We determine whether these firms disclose the present value of their future operating lease obligations or, alternatively, provide enough information to estimate this present value. Only 20 percent of the 46 annual reports that we obtain contain a separate lease footnote. More importantly, only one annual report provides an estimate of the present value of future lease payments. Firms disclose the annual breakdown of future minimum lease payments in

[6] We examine lease standards in force in 35 Organization for Economic Co-Operation and Development (OECD) countries and 6 European Union countries that do not belong to the OECD (Bulgaria, Croatia, Cyprus, Lithuania, Malta, and Romania). We focus on these countries, because information on lease accounting standards in countries that do not belong to the OECD or to the European Union is limited. Moreover, we collect lease standards in force from 1995 onwards only because we are unable to find comprehensive information on lease accounting standards before 1995.

[7] We select the 20 largest firms from each country based on size and amount of rent expenses.

only one instance and the effective lease interest rate in only one instance as well. Moreover, firms disclose the amount of current year lease expenses (total future minimum operating lease payments) in only 4 (8) annual reports, respectively. It thus becomes apparent that in most cases firms did not provide enough information in their annual reports to reliably estimate the present value of future lease obligations before the adoption of lease capitalization rules. This evidence suggests that the introduction of the hybrid lease model did not simply lead to the recognition in the balance sheet of information previously disclosed in the footnotes, but also likely involved the collection and analysis of additional information.

IV. RESEARCH DESIGN AND SAMPLE SELECTION

Research Design

To investigate the effect of lease capitalization rules on investment, we take advantage of the move from an operating lease model to a hybrid lease model in the Czech Republic, Greece, Italy, and the Slovak Republic. We employ a difference-in-differences approach, where the treatment group consists of public firms in these four countries, and the control group includes private firms matched to treatment firms based on country, year, industry, firm size, and leverage. Our primary goal is to find, for each public firm, a private firm that is observably similar on dimensions likely to affect investment.[8]

We match treatment and control firms on country, industry, and year because industry factors, macroeconomic conditions (e.g., policy uncertainty, economic growth, and information environment), and country-level regulation (e.g., tax policies, creditor protection, and product

[8] In choosing our matching and control variables, we balance the concern about potential non-linear relations among the variables of interest with the consequences of overmatching for the quality of the estimators and the representativeness of the treatment and control groups (Heckman, Lalonde, and Smith 1999). Following Asker, Farre-Mensa, and Ljungqvist (2015), we employ a parsimonious matching strategy in our main analysis and subsequently assess the robustness of our findings to the use of broader sets of matching variables.

market regulation) have been shown by prior literature to affect firm investment choices (Hall and Jorgenson 1967; Jorgenson 1971; Fazzari, Hubbard, and Petersen 1998; Gulen and Ion 2016). We further match treatment and control firms on size and leverage as prior literature shows a strong association between investment, firm size, and leverage (Lang, Ofek and Stulz 1996; Gala and Julio 2016) and public firms are on average larger and less leveraged than private firms (Asker, Farre-Mensa, and Ljunqvist 2011).

We track the investment of treatment and control firms over a seven-year period that begins three years before and ends three years after the changes in lease accounting standards. Our identification strategy effectively compares investment *before* and *after* the adoption of lease capitalization standards for treatment and control firms. We estimate the following model (where the subscripts k, i, and t denote country, firm, and year, respectively):

$$INV_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times PUBLIC_i + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \qquad (1)$$

The dependent variable is the investment of firm *i* in year *t+1*. Firm-level investment (INV) is proxied by either $EMPLOY$, the logarithm of the number of employees, or $CAPEX$, the logarithm of capital expenditures.[9] Our main variable of interest is the interaction term $LEASE \times PUBLIC$. $LEASE$ is an indicator variable set equal to one if country k uses a hybrid lease model in year t, and zero if it uses an operating lease model. $PUBLIC$ is an indicator variable set equal one if firm *i* is a publicly traded company, and zero otherwise. Following Polk and Sapienza (2009), the vector of control variables $\boldsymbol{X}$ includes the logarithm of total assets to control for firm size ($SIZE$), the percentage change in sales ($SALES\_GROWTH$) to control for growth opportunities, and cash

[9] Following Badertscher, Shroff, and White (2013) and Kausar, Shroff, and White (2016), we calculate capital expenditures as the change in fixed assets plus depreciation.

flows from operations (CFO), calculated as the sum of earnings before extraordinary items and depreciation scaled by total assets, to control for profitability.

The model includes firm, industry × year, and country × year fixed effects. The inclusion of firm fixed effects allows us to control for time-invariant firm characteristics potentially affecting investment levels. Additionally, the industry × year and country × year fixed effects account for time-varying industry investment cycles, as well as time-varying country-level macroeconomic factors that may also affect firm investment. Our main coefficient of interest is β_1. If, as we predict, investment decreases following the adoption of lease capitalization rules then β_1 should be negative. All continuous variables are winsorized at the 1 and 99 percent level, and we cluster standard errors by country.[10]

Unobservable country-level time-varying factors present an important challenge to the identification of the effect of lease capitalization standards on investment. The use of private firms in treatment countries as a control group helps us address this challenge by allowing us to include country × year fixed effects in our models. Our fixed effects structure helps alleviate the concern that unobservable macroeconomic factors correlated with both investment and the treatment (i.e., with the timing of the adoption of the new lease standards) could bias our inferences. This is particularly important because our sample includes the years of the financial crisis and, therefore, a decline in investment might simply reflect reduced investment opportunities or increased financial constraints (Campello, Graham, and Harvey 2010). Our research design also mitigates concerns associated with the endogeneity of lease standards (which may have been introduced in response to changes in investment opportunities), as well as with the enactment of other regulations

[10] Our results are qualitatively unchanged if we double-cluster standard errors by country and year, or if we instead cluster standard errors by country-year, industry-year, or country-industry-year.

during the sample period (e.g., changes in tax rules) to the extent that these regulations equally apply to private and public firms.

An implicit assumption in our research design is that public and private firms in each country exhibit similar sensitivity to macroeconomic shocks. The matching of control (i.e., private) firms to treatment (i.e., public) firms based on a series of observable characteristics alleviates the concern that fundamental differences between public and private firms may drive our findings. Moreover, we formally test for differences in pre-treatment trends to yield support to the parallel trend assumption in our difference-in-differences design. Finally, we conduct several cross-sectional tests to investigate the heterogeneity of the treatment effect and, specifically, whether the treatment effect is stronger for firms with high lease intensity.

The concurrent adoption of IFRS presents another important challenge to the identification of the effect of lease capitalization standards on investment. While our cross-sectional tests alleviate this concern to some extent, we also conduct a placebo test, in which we examine changes in firm investment in countries that adopted IFRS in 2005 but already had a hybrid model in place before 2005. We discuss this placebo test in detail in Section V.

Data and Descriptive Statistics

We source our firm-level data from Orbis, a database published by Bureau van Dijk Electronic Publishing.[11] We exclude financial and utilities companies as well as observations for which investment or control variables are missing. We further require sample firms to have at least one observation in both the pre- and post-treatment periods. The final sample consists of 9,373 (8,018) firm-year observations for the employment (capital expenditures) tests.

[11] We also rely on Compustat to obtain data on rental expenses for the analysis reported in Table 5, Panel B and on IBES to obtain earnings announcement dates for the analysis reported in Table 6, Panel B.

Table 1, Panel A reports descriptive statistics for the treatment and matched control samples before and after the change in lease accounting standards. Table 1, Panel B presents the results of a univariate difference-in-differences analysis of the effect of lease capitalization on investment. These tests indicate that, relative to control firms, treatment firms experience an average decline in $EMPLOY$ ($CAPEX$) of 0.098 (0.111). While these univariate comparisons should be interpreted with caution, they provide initial evidence that the introduction of lease capitalization rules led to a decrease in firm investment.

V. EMPIRICAL RESULTS

Lease Capitalization, Employment, and Capital Expenditures

Table 2 presents the results of the estimation of Equation (1). The dependent variable is $EMPLOY$ in Column (1) and $CAPEX$ in Column (2). If the change in lease accounting standards leads to a decrease in investment, then the coefficient on $LEASE \times PUBLIC$ should be negative.[12] We find that, following the adoption of lease capitalization rules, employment and capital expenditures of public firms on average decrease by 13.6 percent and 13.9 percent, respectively. These results suggest that lease capitalization rules have an economically significant effect on firm-level investment.

To compare the economic magnitude of our findings to prior studies that examine changes in investment following the introduction of financial reporting regulation, we recast the percentage decrease in capital expenditures as a percent point decrease in the ratio of capital expenditures to total assets. We find that, for the average firm in our sample, a 13.9 percent decrease in capital

[12] Since the dependent variables are natural log-transformed, the coefficients on $LEASE \times PUBLIC$ represent the percentage change in employment and capital expenditures following the switch from the operating lease model to the hybrid lease model.

expenditures is equivalent to a 1.4 percent point decrease in capital expenditures to total assets.[13] The economic magnitude of the decrease in capital expenditures we document therefore appears to be in line with Shroff (2017) who finds that a one standard deviation increase in the cumulative effect of accounting standards leads to a 2.4 percent point increase in capital expenditures to total assets, Kraft et al. (2018) who document that, following an increase in reporting frequency, firms exhibit a 1.6 percent point decrease in the ratio of capital expenditures to total assets, and Shroff (2020) who finds that a clean PCAOB report for the company's auditor leads to a 0.5 percent point increase in capital expenditures over total assets.

Finding a benchmark for the relative decrease in employment is harder because prior studies examining the real effects of accounting information on investment mostly focus on capital investment. Therefore, we benchmark our employment effects to studies focusing on other types of regulatory changes or firm characteristics, acknowledging that these studies might not provide the most appropriate benchmarks. Chen, de Simone, Hanlon, and Lester (2019) document a 14.4 percent change in firm employment following the adoption of innovation box regimes in Europe. Also using an international sample, Bena, Ferreira, Matos, and Pires (2017) find that a 3 percent-point increase in foreign institutional ownership leads to an increase of approximately 12 percent in firm employment. Almeida, Fos, and Kronlund (2016) show that U.S. managers are willing to trade-off a 5 percent decrease in employment for share repurchases to meet analyst EPS forecasts. While these studies focus on different settings, we believe they nonetheless provide reassurance that the magnitude of the employment effect we document is reasonable.

[13] The average firm in our sample has approximately $33 million in capital expenditures and $330 million in assets. The ratio of capital expenditures to total assets for the average sample firm is hence approximately 10.0%. Under the assumption that capital expenditures do not affect total assets (e.g., if these expenditures are fully paid for in cash), a 13.9% decrease in capital expenditures decreases the capital expenditures to total assets ratio from 10.0% to 8.6%, a 1.4 percent point decrease.

Dynamic Effects

Our identification comes from the comparison of the change in investment ($EMPLOY$ and $CAPEX$) in treated and control firms following the adoption of lease capitalization rules. An important identifying assumption is that, in the absence of the change in lease accounting standards, treatment and control groups would exhibit similar trends in investment (i.e., parallel trends). One potential concern with our approach is that, rather than a result of the introduction of lease capitalization rules, the estimated treatment effects simply reflect differences in the underlying characteristics of treated and control firms.

While we seek to address this concern by matching treatment and control observations, we also directly test for differences in pre-treatment trends in Table 3. Specifically, we re-estimate Equation (1) after replacing the $LEASE$ indicator variable with five indicator variables capturing time relative to the change in lease accounting standards: $BEFORE^{-1}$, $BEFORE^{0}$, $AFTER^{1}$ $AFTER^{2}$, and $AFTER^{3}$. These five indicator variables enter our regressions only as interactions with the public firm indicator ($PUBLIC$), as their main effects are absorbed by the inclusion of country × year fixed effects.

The coefficients on $BEFORE^{-1} \times PUBLIC$ and $BEFORE^{0} \times PUBLIC$ are statistically insignificant for both proxies of investment. Moreover, we document a statistically significant decrease in $CAPEX$ in the year following the introduction of lease capitalization rules (Column (2)), and a significant decrease in employment in the two years that follow (Column (1)). This evidence suggests that, while prior to the introduction of lease capitalization rules the estimated treatment effects are statistically indistinguishable from zero, they experience a sharp decrease following the change in lease standards. Our results are stronger in later years presumably because investment and financing policies are often set in advance. Moreover, the effect on employment

takes place with a lag, which is consistent with firms being more reluctant to adjust employment than investment in fixed assets.[14] Overall, these results strengthen our inferences by mitigating concerns related to different pre-existing trends in our variables of interest for treatment and control firms.

Alternative Matching Variables

Following Asker et al. (2015), in untabulated tests, we investigate the robustness of our findings to the use of alternative sets of matching variables, that include, in addition to the matching variables used in the main analysis, sales growth, cash flows from operations, and liquidity. We continue to document economically and statistically significant declines in employment and capital expenditures when we use these alternative sets of matching variables.

The Impact of Mandatory IFRS Adoption

Our sample countries changed their lease accounting standards in 2005 as part of their adoption of IFRS. This poses a significant identification challenge to our analysis. The effect of IFRS adoption on investment is *ex ante* unclear. On the one hand, IFRS adoption may facilitate firms' access to foreign capital markets (Covrig, DeFond, and Hung 2007; DeFond, Hu, Hung, and Li 2011; Florou and Pope 2012) thereby leading to an increase in investment. On the other hand, it may have a series of financial statement effects, unrelated to leases, whose net impact on investment decisions is unclear.

If the decrease in investment that we document is driven by IFRS adoption, we should also observe a decrease in investment in countries where the adoption of IFRS in 2005 did not bring

[14] This delayed response is not surprising, considering that our sample countries are among those with the highest employment protection in the world (OECD 2020) and employment protection regulation has been shown to increase labor adjustment costs, impeding restructuring of the workforce and layoffs and increasing the stickiness of labor costs (Banker, Byzalov, and Chen 2013; Haltiwanger, Scarpetta, and Schweiger 2014; Bottasso, Conti, and Sulis 2017).

about a change in lease standards. Based on this premise, we conduct a placebo test where we re-estimate Equation (1) in a sample of public-private firm pairs from countries that adopted IFRS in 2005 but did not experience a concurrent change in lease standards, because they already required the capitalization of finance leases prior to IFRS adoption. For each treatment firm in our sample, we obtain a public-private firm pair from one of these countries, matched based on year, industry, size, leverage, and distance between local GAAP and IFRS. The sample used in this analysis consists of these public-private firm pairs.

We present the results of this analysis in Table 4. We do not find evidence of a significant decrease in public firms' investment following IFRS adoption in this alternative sample. The results of this test thus alleviate the concern that the decrease in investment we document is driven by mandatory IFRS adoption.

Cross-Sectional Heterogeneity – Lease Intensity

If the decrease in investment that we document is driven by the adoption of lease capitalization rules, then we should observe stronger decreases in investment for firms with higher lease intensity, as posited by *H2*, or, alternatively, a U-shaped pattern, with stronger effects for medium lease intensity firms. We use two proxies to capture lease intensity: (i) the size of the lease assets and liabilities recognized in the year the hybrid lease model is first adopted; and (ii) the amount of rent expense reported in the income statement.

Lease Intensity Proxied by Lease Assets and Lease Liabilities

We hand-collect information regarding the size of lease assets and liabilities recognized by the treatment firms when they first adopt the hybrid lease model from their 2005 annual reports.[15]

[15] When firms disclose both the effect on lease assets and the effect on lease liabilities, we take the average of these effects.

We create an indicator variable, $INTENSITY$, which is set equal to one if the ratio of lease assets and liabilities to total assets is in the upper tercile of the sample distribution, and zero otherwise. We set $INTENSITY$ equal to zero for control firms. We then estimate the following model:

$$INV_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times PUBLIC_i + \beta_2 LEASE_{k,t} \times PUBLIC_i \times INTENSITY_i + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (2)$$

where the dependent variable is firm investment ($EMPLOY$ or $CAPEX$) as in Equation (1).[16]

Table 5, Panel A presents the results of the estimation of Equation (2). The number of observations is significantly smaller than in Table 2 because we are only able to locate the 2005 annual reports for 189 treatment firms. The coefficient on the triple interaction term $LEASE \times PUBLIC \times INTENSITY$ is negative across the two dependent variables but only statistically significant when the dependent variable is $CAPEX$, consistent with changes in lease accounting standards affecting the capital expenditures of high lease intensity firms more negatively.[17]

Lease Intensity Proxied by Rent Expense

Our second proxy for lease intensity is based on the amount of rent expense reported by firms prior to lease capitalization. We posit that, all other things equal, firms reporting higher amounts of rent expense (and thus with higher levels of operating leases) are more likely to be impacted by the switch to the hybrid lease accounting model. Because rent expense is not available in Orbis, the sample used in this analysis consists of public firms covered by Compustat. Therefore,

[16] The main effects ($LEASE$ and $INTENSITY$) are not included in Equation (2) because they are perfectly collinear with the country × year and firm fixed effects, respectively. We cannot estimate all interactions as $INTENSITY$ is, by definition, equal to zero for control (i.e., private) firms.

[17] In untabulated tests, we (i) add to Equation (2) an indicator for medium lease intensity and respective interactions; (ii) partition the sample into zero, medium, and high lease intensity firms; and (iii) replace our lease intensity indicator by a continuous variable capturing recognized lease assets and liabilities as a fraction of total assets and add to Equation (2) also the squared value of this continuous variable and its respective interactions. The results (untabulated) of these tests indicate that, as expected, firms with no leases do not experience significant decreases in investment. This provides reassurance that the decline in investment that we document is attributable to lease capitalization standards. Moreover, we do not find any evidence of non-linearities.

instead of the control sample of private firms that we use in our main analysis, we use an alternative control sample that consists of public firms in countries that did not experience a change in lease rules, matched to our treatment firms based on year, industry, firm size, and leverage. This alternative research design allows us to control for the extent of lease use by control firms as rent expenses provide a proxy for actual lease use, rather than the assets and liabilities recognized on the balance sheet following the change in lease standards. We estimate the following model:

$$INV_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 HRE_{i,t} + \beta_2 LEASE_{k,t} \times HRE_{i,t} + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (3)$$

HRE is an indicator variable set equal to one if the ratio of rent expense to sales is in the upper tercile of the sample distribution, and zero otherwise. Table 5, Panel B presents the results of this estimation. The coefficient on $LEASE \times HRE$ is negative and significant across both proxies of investment, suggesting that the negative effect of lease capitalization rules on investment is significantly stronger for firms with higher levels of rent expenses. This additional analysis provides further support for the hypothesis that lease capitalization rules have a stronger effect on firm investment in firms with higher reliance on leases (*H2*).[18]

Cross-Sectional Heterogeneity – Learning Opportunities

H3 posits that the effect of lease capitalization rules on investment is stronger when learning opportunities are higher. To test this hypothesis, we interact $LEASE \times PUBLIC$ in Equation (1) with $LEARNING$, a proxy for learning opportunities, and estimate the following model:[19]

[18] In untabulated tests, we again fail to find non-linearities in the effect of lease capitalization standards on investment when we use rent expenses as a proxy for lease intensity.

[19] $LEARNING$ is measured prior to the change in lease rules. We are unable to estimate the coefficient on $PUBLIC \times LEARNING$ because this variable is collinear with firm fixed effects.

$$INV_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times LEARNING_i + \beta_2 LEASE_{k,t} \times PUBLIC_i + \beta_3 LEASE_{k,t} \times PUBLIC_i \times LEARNING_i + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (4)$$

We expect the coefficient on $LEASE \times PUBLIC \times LEARNING$ to be negative, consistent with firms with higher learning opportunities experiencing stronger decreases in investment.

We rely on three proxies for learning opportunities: (i) the degree of organizational complexity; (ii) internal information quality prior to the change in lease capitalization rules; and (iii) the extent of overinvestment. Our measure of internal information quality is available for public firms only. Therefore, when our proxy for learning opportunities is internal information quality, we follow the same approach as in the rent expense (HRE) analysis and replace our control sample by a sample of public firms in countries that did not experience a change in lease rules, matched to our treatment firms based on year, industry, firm size, and leverage, and estimate the following model:

$$INV_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times LEARNING_i + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (5)$$

Organizational Complexity

Table 6, Panel A presents the results of the estimation of Equation (4), where $COMPLEXITY$ is used as a proxy for learning opportunities. $COMPLEXITY$ is an indicator variable set equal to one if the number of industries the firm operates in is in the top tercile of the sample distribution, and zero otherwise. The coefficient on $LEASE \times PUBLIC \times COMPLEXITY$ is negative and significant for both investment measures, which provides support for *H3* and is consistent with the effects that we document being driven, at least in part, by the learning channel.

Internal Information Quality

Table 6, Panel B presents the results of the estimation of Equation (5), where $LOW\ IIQ$ is used as a proxy for learning opportunities. $LOW\ IIQ$ is an indicator variable set equal to one if the

firm's earnings announcement speed prior to the adoption of lease capitalization rules is in the bottom tercile of its sample distribution, and zero otherwise. We choose earnings announcement speed as a proxy for internal informational quality following Gallemore and Labro (2015), based on the assumption that managers that announce earnings soon after the fiscal year-end have more accurate and reliable information (including information regarding lease contracts) readily accessible, and are more likely to make optimal investment decisions. The coefficient on $LEASE \times LOW\ IIQ$ is negative and statistically significant when the dependent variable is $EMPLOY$ (Column (1)), and negative, but statistically insignificant, when the dependent variable is $CAPEX$ (Column (2)).[20] This evidence provides support for the hypothesis that the decline in investment is driven, in part, by the acquisition, processing, and disclosure of new information, especially when the quality of firms' internal information is low prior to the change in lease standards.

Overinvestment

To identify overinvesting firms, we pool all public and private firms in our sample and estimate the following regression by industry using investment levels in 2001 (or 2002 if 2001 financial statement information is unavailable):

$$INV_{i,t+1} = \beta_1 SIZE_{i,t} + \beta_2 SALES\_GROWTH_{i,t} + \beta_3 CFO_{i,t} + \varepsilon_{it+1} \quad (6)$$

The residual captures the amount of investment that cannot be explained by the firm's fundamentals. We rank firms based on unexplained investment (i.e., on the residual from the

[20] To circumvent sample selection issues associated with low IBES coverage in our treatment countries during our sample period and taking advantage of the high correlation between earnings announcement speed and audit lag documented in prior studies (Krishnan and Yang 2009), we conduct an additional test where we use the audit lag (i.e., the difference between the audit report date and the fiscal year-end) as a proxy for internal information quality. In untabulated tests, we document stronger declines in capital expenditures and employment for firms with higher audit lag. We conduct this analysis using our sample of treatment firms only because English language annual reports are not available for private firms and for a large portion of our public control firms.

estimation of Equation (6)) and create an indicator variable, $OVERINVEST$, which is set equal to one if the firm is in the top tercile of unexplained investment prior to the change in lease rules, and zero otherwise.

Table 6, Panel C reports the results of the estimation of Equation (4), where $OVERINVEST$ is used as a proxy for learning opportunities. The coefficient on $LEASE \times PUBLIC \times OVERINVEST$ is negative and significant at the 10% level for both proxies of investment, which is consistent with a stronger reduction in investment for overinvesting firms. Combined, our evidence is consistent with lease capitalization affecting investment via the learning channel.

Qualitative Investment Disclosures

We conduct a textual analysis of annual reports to investigate whether and how firms discuss decreases in investment. We build seven lists of words to capture discussions related to a reduction in investment: "*lay-off*," "*redundant*," "*discontinue*," "*divest*," "*restructure*," "*spin-off*," and "*downsize*" (please refer to the Appendix for more details). We scale the number of times words in each of these lists are used by the total number of words in the annual report. The sample used in this analysis includes treated firms only because we are unable to retrieve annual reports for private firms. As we lack a control group, we focus, instead, on the variation of the treatment effect with lease intensity. We estimate the following model:

$$INV\_WORDS_{i,t+1} = \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times INTENSITY_i + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (7)$$

Our variable of interest is $LEASE \times INTENSITY$. As in Equation (1) we control for firm, industry × year, and country × year fixed effects. The main effects of $LEASE$ and $INTENSITY$ are not included in Equation (7) because they are perfectly collinear with the country × year and firm fixed effects, respectively.

Table 7 presents the results of the estimation of Equation (7). High lease intensity firms are more likely to discuss lay-offs, employee redundancy, and spin-offs in their annual reports following the change in lease rules. These findings add further support to the hypothesis of a decline in investment following the introduction of lease capitalization rules using very different investment measures. Moreover, they are suggestive of firms not only reducing the amount of new capital expenditures, but also spinning off divisions and laying off employees, which is consistent with our conjecture that managers identify areas of overinvestment and activities that should be discontinued or downsized when preparing for compliance with lease capitalization standards.[21]

Covenant Breaches

We next examine the contracting channel. We focus on the effect of lease capitalization on debt contracts because detailed information on other types of contracts (e.g., executive compensation contracts) is not available for our sample firms during our sample period.[22]

We investigate whether firms are more likely to breach their debt covenants following the change in lease rules. Taking advantage of the requirement to disclose material covenant breaches in annual reports (Christensen and Nikolaev 2012), we start by identifying all annual reports that contain the word "*covenant*." We then read these annual reports to determine whether firms discuss covenant breaches. As we are unable to retrieve annual reports (or other sources of covenant data)

[21] In untabulated tests, we re-run the analysis presented in Table 7 controlling for financial constraints (FC). We continue to find that high lease intensity firms are more likely to discuss lay-offs, employee redundancy, and spin-offs in their annual reports following the change in lease rules.

[22] We conduct an empirical test aimed at examining whether lease capitalization affects investment via its effect on compensation contracts. Based on the assumption that firms whose executive compensation is materially affected by the requirement to capitalize finance leases provide a discussion of these effects in their annual report, we estimate a model similar to the model presented in Equation (7), where the dependent variable reflects the relative use of compensation-related words in the annual report. We do not find any evidence of a significant change in compensation disclosures following the adoption of lease capitalization rules. The lack of a statistically significant association is hard to interpret, however, as it could mean that the change in lease rules did not have material implications for executive compensation or, alternatively, that firms do not discuss these implications in their annual reports.

for private firms, this analysis focuses on public firms only, and we exploit the variation in treatment effect across high and low lease intensity firms.

Table 8, Panel A reports the percentage of high and low lease intensity firms reporting a covenant breach in the three years before and the three years after the introduction of lease capitalization rules (i.e., the pre-treatment and post-treatment periods). The likelihood of a breach significantly increases for high lease intensity firms following the adoption of lease capitalization standards (from 0.83 percent to 9.55 percent). This increase is significantly higher than the increase experienced by low lease intensity firms (from 3.73 percent to 3.84 percent).

We then estimate the following model:

$$BREACH_{i,t+1} = \alpha + \beta_1 LEASE_{k,t} \times INTENSITY_{i,t} + \gamma' \boldsymbol{X}_{i,t} + \varepsilon_{it+1} \quad (8)$$

$BREACH$ is an indicator variable equal to one if the firm's annual report describes a covenant breach, and zero otherwise. Table 8, Panel B reports the results of this estimation. The coefficient on $LEASE \times INTENSITY$ is positive and significant, both when the model is estimated using a logistic regression (Column (1)) and when the model is estimated using ordinary least squares (Column (2)). The coefficient remains positive and significant when we add country and year fixed effects (Column (3)), country × year fixed effects (Column (4)), and firm and year fixed effects (Column (5)).[23] The results of this analysis are suggestive of an increase in the likelihood of a covenant breach following the adoption of lease capitalization standards, which is consistent with the debt contracting channel.

Next, we investigate the differential sensitivity of high and low lease intensity firms to the adoption of lease standards in event time. We re-estimate the model presented in Column (5) in Table 8, Panel B replacing the $LEASE$ indicator with separate event-time dummies, each marking

[23] Because of a potential incidental parameter problem, we estimate the last three specifications using ordinary least squares only.

a period relative to the adoption of lease capitalization rules (except for the first year in the sample, 2002, which serves as a benchmark). We then plot the coefficients on the interaction between $INTENSITY$ and each event-time dummy in Figure 1. Our evidence suggests that, as expected, the increase in the likelihood of breaches for high lease intensity firms is concentrated in the year of adoption. The dynamic analysis also provides support for the parallel-trends assumption, as there is no evidence of different trends in the breaches of high and low lease intensity firms in the years leading to the adoption of lease capitalization rules.

Cross-Sectional Heterogeneity – Financial Constraints

We next turn to testing *H4*. We add to Equation (1) a proxy for financing constraints (FC) and the double and triple interactions of this proxy with $LEASE$ and $PUBLIC$. Specifically, we estimate the following model:

$$\begin{aligned} INV_{i,t+1} = {} & \alpha_i + \alpha_{ind} \times \alpha_t + \alpha_k \times \alpha_t + \beta_1 LEASE_{k,t} \times FC_{i,t} + \beta_2 PUBLIC_i \times FC_{i,t} \\ & + \beta_3 LEASE_{k,t} \times PUBLIC_i + \beta_4 LEASE_{k,t} \times PUBLIC_i \times FC_{i,t} + \gamma' \boldsymbol{X}_{i,t} \\ & + \varepsilon_{it+1} \end{aligned} \quad (9)$$

Following Kausar, Shroff, and White (2016), we classify firms as financially constrained if they are in the bottom tercile of sample distribution of firm size or in the bottom tercile of the sample distribution of firm age (Hadlock and Pierce 2010).[24] Our main coefficient of interest in Equation (9) is β_4. If, as predicted, financially constrained firms experience a stronger decrease in investment following the adoption of lease capitalization rules, then β_4 should be negative.

Table 9 presents the results of this analysis. The coefficient on $LEASE \times PUBLIC \times FC$ is negative in both investment regressions, although only statistically significant when the dependent variable is $EMPLOY$ (Column (1)), indicating that financially constrained firms experience

[24] We do not directly use the financing constraints index developed by Hadlock and Pierce (2010) because their index is calibrated for the sample of U.S. Compustat firms and the index parameters are unlikely to apply to our sample of public and private international firms (Kausar et al. 2016).

stronger reductions in employment following the adoption of lease capitalization rules. Note that the coefficient on $LEASE \times PUBLIC$ is also negative, irrespective of the investment proxy we use, suggesting that the decrease in investment is not solely driven by a debt contracting channel.[25]

VI. CONCLUSION

In this study, we examine the real effects of lease capitalization rules. We take advantage of the introduction of the requirement to capitalize finance leases in four countries in 2005 to gauge the effect of lease capitalization standards on firm-level investment. We document a decrease in employment and capital expenditures following the switch from the operating lease model to the hybrid lease model. The decrease in investment is stronger for firms with higher reliance on leases and robust to a battery of sensitivity checks designed to alleviate the potential confounding effects of contemporaneous regulatory changes (e.g., the adoption of IFRS) and macroeconomic factors. We conduct a series of cross-sectional tests that broadly support our prediction that lease capitalization rules affect investment via a learning channel and a contracting channel.

A few caveats are in order. First, while our research design effectively allows us to control for changes in regulation and macroeconomic conditions that equally affect private and public firms, because our treatment events are concentrated in time, we cannot entirely rule out the possibility that the decrease in investment we document is driven, at least in part, by other concurrent events. Second, although there is extensive debate surrounding the effects of ASC 842 and IFRS 16, our study cannot speak to the impact of these new standards specifically because of differences in the nature of the accounting rule change. Differences in the quality of institutions

[25] In untabulated tests, we re-estimate the baseline model presented in Table 2 controlling for an estimate of firm-specific interest rates and removing from the sample all firm-years following a breach of loan covenants. The coefficient on $LEASE \times PUBLIC$ remains negative and significant. Combined, the evidence of our empirical tests suggests that our treatment effect can be explained by *both* the learning channel and the contracting channel.

across countries (namely in the strength of enforcement of accounting standards) may also limit the generalizability of our findings. Third, because of data limitations, we do not examine the effect of lease standards on firm leasing activities. To the extent that leases and capital investments are substitutes, the reduction of capital expenditures might be accompanied by an increase in leasing. While we believe this substitution is unlikely given the employment effect we document and the general declining trend in overall leasing activity in our treatment countries in our sample period (see, for example, Assilea 2007), we are unable to test this substitution effect directly.

In closing, our study documents important real effects of lease capitalization rules, thus contributing to the literature on the real effects of accounting information, as well as to the literature that focuses specifically on accounting for leases. Our findings are likely to be of interest to firms, creditors, equity investors, rating agencies and regulators alike.

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APPENDIX
Variable Definitions

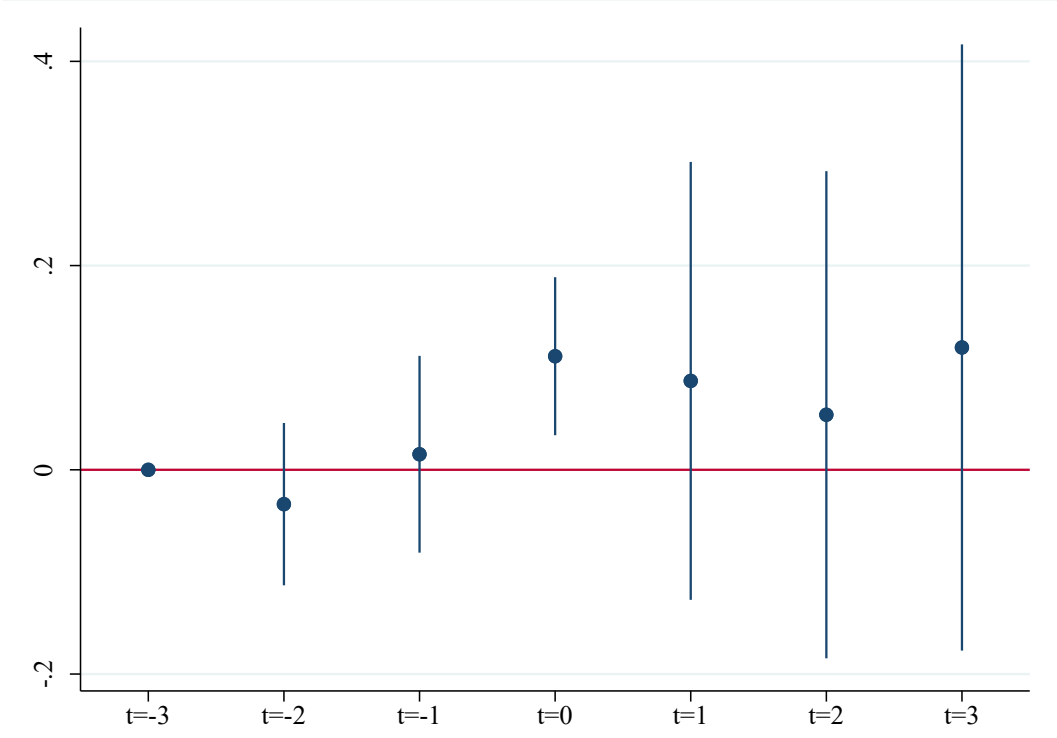
Variable	*Definition*
Main Variables	
$LEASE$	Indicator variable set equal to one if a country's lease accounting standards require firms to capitalize finance leases, and zero otherwise (Source: hand-collected).
$PUBLIC$	Indicator variable set equal to one if a firm is publicly traded, and zero otherwise (Source: Orbis).
$EMPLOY$	Natural logarithm of the number of employees (Source: Orbis).
$CAPEX$	Natural logarithm of capital expenditures in U.S. dollars. Capital expenditures are calculated as the change in fixed assets plus depreciation (Source: Orbis).
$BREACH$	Indicator variable set equal to one if a covenant breach is disclosed in the firm's annual report, and zero otherwise (Source: hand-collected from treatment firms' annual reports).
Control Variables	
$SIZE$	Natural logarithm of total assets in U.S. dollars (Source: Orbis).
$SALES\_GROWTH$	Sales growth, computed as the percentage change in sales (Source: Orbis).
CFO	Sum of earnings before extraordinary items and depreciation, scaled by total assets (Source: Orbis).
Cross-Sectional Variables	
$INTENSITY$	Indicator variable set equal to one if the ratio of the average lease assets and liabilities recognized following the adoption of lease capitalization rules to total assets is in the upper tercile of the sample distribution, and zero otherwise (Source: hand-collected from treatment firms' annual reports).
HRE	Indicator variable set equal to one if the ratio of rent expense to sales is in the upper tercile of the sample distribution, and zero otherwise (Source: Compustat).
$LEARNING$	Indicator variable set equal to one for firms where learning opportunities are high, and zero otherwise. We use three proxies for high learning opportunities: $COMPLEXITY$, $LOW\ IIQ$, and $OVERINVEST$.
$COMPLEXITY$	Indicator variable set equal to one if the number of industries in which the firm operates is in the top tercile of the sample distribution, and zero otherwise (Source: Orbis).

(continued)

APPENDIX
(Continued)

Variable	*Definition*
Cross-Sectional Variables (cont.)	
$LOW\ IIQ$	Indicator variable set equal to one for firms where internal information quality (IIQ) is low (i.e., in the bottom tercile of its sample distribution), and zero otherwise. We use earnings announcement speed as a proxy for IIQ. Earnings announcement speed is the number of days between the end of the fiscal year and the firm's earnings announcement, divided by 365 and multiplied by -1 (Source: IBES).
$OVERINVEST$	Indicator variable set equal to one if the firm is in the top tercile of unexplained investment, and zero otherwise. To estimate unexplained investment, we pool all public and private firms in our sample and estimate the following regression by industry using investment levels in 2001 (or 2002 if 2001 financial statement information is unavailable): $INV_{i,t+1} = \beta_1 SIZE_{i,t} + \beta_2 SALES\_GROWTH_{i,t} + \beta_3 CFO_{i,t} + \varepsilon_{it+1}$. The residual captures the amount of investment that cannot be explained by the firm's fundamentals (Source: Orbis).
FC	Indicator variable set equal to one if the firm is in the bottom tercile of the sample distribution of firm size or in the bottom tercile of the sample distribution of firm age, and zero otherwise (Source: Orbis).
Other Variables	
INV_WORDS	Number of words related to a decrease in investment, scaled by the total number of words in the annual report. We identify these words based on the following lists: - *Lay-off*: lay-off/ laid-off/ laying-off/ layoff/ lay off/ laid off/ laying off - *Redundant*: redundant - *Discontinue:* discontinue/ discontinued/ discontinuing/ discontinuation - *Divest:* divest/ divested/ divesting/ divestiture/ divestment/ disinvest/ disinvested/ disinvesting/ disinvestment - *Restructure*: restructure/ restructured/ restructuring/ restructuration - *Spin-off: s*pin-off/ spun-off/ spinning-off/ spinoff/ spin off/ spun off/ spinning off - *Downsize*: downsize/ downsized/ downsizing For ease of presentation, we multiply this variable by 1,000 (Source: hand-collected from treatment firms' annual reports).

FIGURE 1
Lease Capitalization and Covenant Breaches: Dynamic Effects



This figure depicts the estimated coefficients of an ordinary least squares (OLS) regression which we use to investigate the differential likelihood of a covenant breach for high and low lease intensity firms surrounding the adoption of lease capitalization standards. We estimate the model presented in Table 8, Panel B, Column (5), but replace the *LEASE* indicator with separate event-time dummies, each marking a period relative to the adoption of lease capitalization standards. Vertical bands represent 95% confidence intervals for the point estimate in each event-time period and are calculated based on standard errors clustered at the country level.

TABLE 1
Summary Statistics and Univariate Results

Panel A: Summary Statistics

Variables	*N*	*Mean*	*S.D.*	*Median*	*N*	*Mean*	*S.D.*	*Median*
	Treatment Sample (Pre-treatment)				*Control Sample (Pre-treatment)*			
EMPLOY	1,877	5.424	1.520	5.484	2,088	5.084	1.418	5.059
CAPEX	1,518	1.519	2.194	1.607	1,773	0.900	1.913	0.868
SIZE	1,877	4.118	1.952	4.135	2,088	3.743	1.539	3.709
SALES_GROWTH	1,877	0.533	1.899	0.204	2,088	0.406	1.339	0.202
CFO	1,877	0.056	0.085	0.057	2,088	0.060	0.079	0.056
	Treatment Sample (Post-treatment)				*Control Sample (Post-treatment)*			
EMPLOY	2,752	5.288	1.594	5.353	2,656	5.046	1.417	5.017
CAPEX	2,287	1.362	2.235	1.411	2,440	0.855	1.967	0.855
SIZE	2,752	4.474	1.984	4.528	2,656	4.000	1.583	3.949
SALES_GROWTH	2,752	0.313	1.736	0.054	2,656	0.121	0.785	0.060
CFO	2,752	0.052	0.087	0.052	2,656	0.061	0.090	0.057

Panel B: Univariate Difference-in-Differences Analysis of the Effect of Lease Capitalization on Investment

EMPLOY

		Pre-treatment (a)	*Post-treatment* (b)	(b)-(a)
Treatment Sample	(i)	5.424	5.288	-0.136*
				(-1.72)
Control Sample	(ii)	5.084	5.046	-0.038
				(-0.47)
	(i)-(ii)	0.340***	0.242*	-0.098***
		(3.45)	(1.94)	(-2.73)

CAPEX

		Pre-treatment (a)	*Post-treatment* (b)	(b)-(a)
Treatment Sample	(i)	1.519	1.362	-0.157
				(-1.35)
Control Sample	(ii)	0.900	0.855	-0.045
				(-0.40)
	(i)-(ii)	0.619***	0.507*	-0.111*
		(5.56)	(4.02)	(-1.66)

Panel A reports summary statistics for our main variables of interest for the treatment and control samples. The *Treatment Sample* consists of public firms in treatment countries (the Czech Republic, Greece, Italy, and the Slovak Republic). The *Control Sample* consists of private firms in treatment countries, matched to treatment firms based on country, year, industry, firm size, and leverage. Panel B reports average values of our dependent variables (the natural logarithm of the number of employees, $EMPLOY$, and the natural logarithm of capital expenditures, $CAPEX$) for the treatment and control samples in the three years before and the three years after the introduction of lease capitalization rules (i.e., the pre-treatment and post-treatment periods). We first compute the firm-level average for each variable in the pre- and post- treatment period. We then calculate the cross-sectional averages for each quadrant. We assess the statistical significance of the difference-in-differences values (i.e., the lower right-hand side number in each panel) by

comparing the change in average $EMPLOY$ and $CAPEX$ from the pre- to the post-period for treatment and control firms using t-tests. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at 1% and 99% level. All variables are defined in the Appendix.

TABLE 2
Lease Capitalization and Investment: Baseline Results

	EMPLOY	*CAPEX*
	(1)	(2)
LEASE × PUBLIC	-0.136**	-0.139**
	(-2.04)	(-2.08)
SIZE	0.315***	0.324***
	(5.24)	(3.09)
SALES_GROWTH	-0.046***	0.002
	(-5.60)	(0.06)
CFO	0.101	0.454
	(0.70)	(1.03)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.876	0.795
Observations	9,373	8,018

This table examines the change in investment following the introduction of lease capitalization rules. It reports the coefficients from the estimation of two OLS regressions. The dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) and the natural logarithm of capital expenditures ($CAPEX$) in Column (2). Both dependent variables are measured at year $t + 1$. $LEASE$ is an indicator variable set equal to one if a country's lease accounting standards require firms to capitalize finance leases, and zero otherwise. $PUBLIC$ is an indicator variable set equal to one if the firm is publicly traded, and zero otherwise. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 3
Lease Capitalization and Investment: Dynamic Effects

	$EMPLOY$	$CAPEX$
	(1)	(2)
$BEFORE^{-1} \times PUBLIC$	-0.064	0.021
	(-0.57)	(0.09)
$BEFORE^{0} \times PUBLIC$	-0.092	-0.052
	(-0.78)	(-0.29)
$AFTER^{1} \times PUBLIC$	-0.136	-0.172***
	(-1.36)	(-5.18)
$AFTER^{2} \times PUBLIC$	-0.212**	-0.344
	(-2.01)	(-1.37)
$AFTER^{3} \times PUBLIC$	-0.210*	-0.029
	(-1.81)	(-0.17)
$SIZE$	0.316***	0.325***
	(5.34)	(3.13)
$SALES\_GROWTH$	-0.046***	0.001
	(-5.72)	(0.05)
CFO	0.092	0.462
	(0.64)	(1.07)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.877	0.795
Observations	9,373	8,018

This table reports the results of the analysis of the dynamic effects of changes in lease accounting standards on investment. We replace $LEASE$ by five indicator variables: $BEFORE^{-1}$ is an indicator variable set equal one for firms in a country that will change lease accounting standards in the following year, and zero otherwise; $BEFORE^{0}$ is an indicator variable set equal to one for firms in a country that changes lease accounting standards in that year, and zero otherwise; $AFTER^{1}$ is an indicator variable set equal to one for firms in a country that changed lease accounting standards in the previous year, and zero otherwise; $AFTER^{2}$ is an indicator variable set equal to one for firms in a country that changed lease accounting standards two years before, and zero otherwise; and $AFTER^{3}$ is an indicator variable set equal to one for firms in a country that changed lease accounting standards three years before, and zero otherwise. The dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) and the natural logarithm of capital expenditures ($CAPEX$) in Column (2). Both dependent variables are measured at year $t + 1$. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 4
Placebo Test

	EMPLOY	*CAPEX*
	(1)	(2)
LEASE × PUBLIC	-0.076	0.040
	(-0.98)	(0.31)
SIZE	0.209***	0.297***
	(3.88)	(3.45)
SALES_GROWTH	-0.015***	0.072**
	(-4.96)	(2.90)
CFO	0.295*	0.757***
	(2.06)	(4.81)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.915	0.811
Observations	8,317	7,204

This table presents a placebo test, where we estimate the difference-in-differences model presented in Table 2 in a sample of firms from countries that adopted IFRS in 2005 but did not experience a concurrent change in lease standards (i.e., countries that already required the capitalization of finance leases prior to IFRS adoption). For each treatment firm in our sample, we obtain a public-private firm pair from one of these countries, matched based on year, industry, size, leverage, and distance between local GAAP and IFRS. The sample used in this analysis consists of those public-private firm pairs. The dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) and the natural logarithm of capital expenditures ($CAPEX$) in Column (2). Both dependent variables are measured at year $t + 1$. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 5
Cross-Sectional Heterogeneity: Lease Intensity

Panel A: Lease Assets and Liabilities

	EMPLOY	*CAPEX*
	(1)	(2)
$LEASE \times PUBLIC$	-0.001	0.072
	(-0.02)	(1.00)
$LEASE \times PUBLIC \times INTENSITY$	-0.050	-0.196**
	(-0.42)	(-2.47)
$SIZE$	0.291***	0.367***
	(8.51)	(6.56)
$SALES\_GROWTH$	-0.008***	-0.032
	(-7.76)	(-0.53)
CFO	-0.127	0.193
	(-0.45)	(0.28)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.785	0.629
Observations	2,207	1,910

TABLE 5
(continued)

Panel B: Rent Expense

	EMPLOY	*CAPEX*
	(1)	(2)
$LEASE \times HRE$	-0.124*	-0.102**
	(-1.89)	(-2.09)
HRE	0.111**	0.062
	(2.00)	(0.89)
$SIZE$	0.543***	0.643***
	(13.24)	(12.25)
$SALES\_GROWTH$	0.049**	0.171***
	(2.01)	(2.93)
CFO	0.468***	1.350***
	(3.58)	(5.65)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.974	0.903
Observations	3,198	4,203

This table examines how the change in investment following the introduction of lease capitalization rules varies, in the cross-section, with lease intensity. In Panel A, we proxy for lease intensity using $INTENSITY$, an indicator variable set equal to one if the effect on lease assets and lease liabilities scaled by total assets is in the upper tercile of the sample distribution, and zero otherwise. In Panel B, we proxy for lease intensity using HRE, an indicator variable set equal to one if the ratio of rent expense to sales is in the upper tercile of the sample distribution, and zero otherwise. The sample used in in Panel B consists only of public firms in treatment countries. In both panels, the dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) and the natural logarithm of capital expenditures ($CAPEX$) in Column (2). All dependent variables are measured at year $t + 1$. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 6
Cross-sectional Heterogeneity: Learning Opportunities

Panel A: Organizational Complexity

	EMPLOY	*CAPEX*
	(1)	(2)
$LEASE \times COMPLEXITY$	0.055	0.185***
	(0.73)	(3.03)
$LEASE \times PUBLIC$	-0.102*	-0.085***
	(-1.71)	(-3.23)
$LEASE \times PUBLIC \times COMPLEXITY$	-0.105**	-0.157***
	(-2.35)	(-2.64)
$SIZE$	0.312***	0.318***
	(5.24)	(3.07)
$SALES\_GROWTH$	-0.046***	0.002
	(-5.63)	(0.09)
CFO	0.0923	0.450
	(0.71)	(1.03)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.876	0.795
Observations	9,373	8,018

TABLE 6
(continued)

Panel B: Internal Information Quality

	EMPLOY	*CAPEX*
	(1)	(2)
LEASE × LOW IIQ	-0.184***	-0.172
	(-3.23)	(-1.16)
SIZE	0.134	0.251*
	(1.24)	(1.76)
SALES_GROWTH	-0.012***	0.001
	(-7.44)	(0.04)
CFO	-0.396	-0.122
	(-0.86)	(-0.13)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.806	0.578
Observations	1,785	1,493

TABLE 6
(continued)

Panel C: Overinvestment

	$EMPLOY$	$CAPEX$
	(1)	(2)
$LEASE \times OVERINVEST$	-0.130***	-0.033
	(-3.57)	(-0.74)
$LEASE \times PUBLIC$	-0.105	-0.022
	(-1.53)	(-0.23)
$LEASE \times PUBLIC \times OVERINVEST$	-0.058*	-0.180*
	(-1.69)	(-1.85)
$SIZE$	0.318***	0.326***
	(5.44)	(3.06)
$SALES\_GROWTH$	-0.047***	0.001
	(-5.70)	(0.02)
CFO	0.106	0.452
	(0.79)	(1.04)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.877	0.795
Observations	9,373	8,018

This table examines how the change in investment following the introduction of lease capitalization rules varies, in the cross-section, with learning opportunities. We proxy for learning opportunities using organizational complexity in Panel A, internal information quality in Panel B, and overinvestment in Panel C. In Panel A, $COMPLEXITY$ is an indicator variable set equal to one if the number of industries in which the firm operates is in the top tercile of the sample distribution, and zero otherwise. In Panel B, $LOW\ IIQ$ is an indicator variable set equal to one if internal information quality is in the bottom tercile of the sample distribution, and zero otherwise. We use earnings announcement speed, measured as the number of days between the end of the fiscal year and the firm's earnings announcement, divided by 365 and multiplied by -1, as a proxy for internal information quality. To identify overinvesting firms in Panel C, we pool all public and private firms in our sample and estimate the following regression by industry using investment levels in 2001 (or 2002 if 2001 financial statement information is unavailable): $INV_{i,t+1} = \beta_1 SIZE_{i,t} + \beta_2 SALES\_GROWTH_{i,t} + \beta_3 CFO_{i,t} + \varepsilon_{it+1}$.The residual captures the amount of investment that cannot be explained by the firm's fundamentals. We rank firms based on unexplained investment and create an indicator variable $OVERINVEST$, which is set equal to one if the firm is in the top tercile of unexplained investment, and zero otherwise. The dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) of Panels A, B and C, and the natural logarithm of capital expenditures ($CAPEX$) in Column (2) of Panels A, B and C. Both dependent variables are measured at year $t + 1$. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 7
Qualitative Investment Disclosures

INV_WORDS:	*Lay-off*	*Redundant*	*Discontinue*	*Divest*	*Restructure*	*Spin-off*	*Downsize*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$LEASE \times INTENSITY$	0.002**	0.002*	0.026	-0.013	0.015	0.015***	-0.000
	(2.22)	(1.90)	(0.42)	(-0.93)	(0.50)	(4.53)	(-0.11)
$SIZE$	0.001**	0.001	0.006	-0.035***	-0.041***	-0.002	0.000
	(2.10)	(1.35)	(0.20)	(-7.44)	(-6.27)	(-0.33)	(0.23)
$SALES\_GROWTH$	-0.000**	0.000	0.000	-0.000**	-0.000**	-0.000***	-0.000*
	(-2.46)	(0.86)	(0.12)	(-2.23)	(-2.05)	(-8.23)	(-1.76)
CFO	-0.018	-0.005	0.244	-0.045	-0.154	-0.016	-0.008
	(-1.07)	(-0.45)	(1.30)	(-0.68)	(-0.62)	(-0.59)	(-0.53)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year × Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Country	Country	Country	Country	Country	Country	Country
Adjusted R-squared	0.289	0.360	0.282	0.463	0.416	0.103	0.185
Observations	925	925	925	925	925	925	925

This table examines the change in the relative use of language related to a reduction in investment in the annual reports by high lease intensity firms following the introduction of lease capitalization rules. INV_WORDS is the number of words related to a reduction in investment (based on the word lists in Appendix) scaled by the total number of words in the annual report. $INTENSITY$ is an indicator variable equal to one if lease capitalization rules on lease assets and lease liabilities scaled by total assets is in the upper tercile of the sample distribution, and zero otherwise., . The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$) and cash flows (CFO). All specifications include firm, year × industry, year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 8
Likelihood of a Covenant Breach

Panel A: Univariate Difference-in-Differences Analysis of the Effect of Lease Capitalization on the Likelihood of a Covenant Breach

		Pre-treatment	*Post-treatment*	
		(a)	(b)	(b)-(a)
High lease intensity (*INTENSITY=1*)	(i)	0.83%	9.55%	8.72%***
				(3.15)
Low lease intensity (*INTENSITY=0*)	(ii)	3.73%	3.84%	0.11%
				(0.09)
	(i)-(ii)	2.90%	-5.71%***	8.61%***
		(1.57)	(-2.78)	(2.89)

Panel B: Multivariate Analysis

	BREACH				
	(1)	(2)	(3)	(4)	(5)
LEASE × INTENSITY	1.070***	0.058***	0.051**	0.045**	0.101***
	(6.18)	(9.66)	(2.07)	(1.97)	(3.09)
SIZE	0.355	0.014	0.008	0.007	-0.026***
	(0.67)	(0.60)	(0.32)	(0.29)	(-4.48)
SALES_GROWTH	-0.011*	-0.000***	-0.000*	-0.000*	-0.000
	(-1.91)	(-3.32)	(-1.77)	(-1.80)	(-0.05)
CFO	-9.098**	-0.368	-0.316	-0.350	-0.429
	(-2.17)	(-1.31)	(-1.06)	(-1.20)	(-1.21)
Firm FE	No	No	No	No	Yes
Year FE	No	No	Yes	No	Yes
Country FE	No	No	Yes	No	No
Year × Country FE	No	No	No	Yes	No
Cluster	Country	Country	Country	Country	Country
R-squared	0.081	0.027	0.035	0.037	0.128
Observations	925	925	925	925	925

Panel A reports the percentage of high and low lease intensity firms reporting a covenant breach in the three years before and the three years after the introduction of lease capitalization rules. We assess the statistical significance of the difference-in-differences values by comparing the change in frequency of a covenant breach from the pre- to the post-period for high and low lease intensity firms using t-tests. Panel B presents the results of the estimation of a logistic regression (Column (1)) and four OLS regressions (Columns (2) to (5)). The dependent variable is *BREACH*, an indicator variable equal to one if the firm breaches a debt covenant and zero otherwise. *INTENSITY* is an indicator variable equal to one if the effect of lease capitalization rules on lease assets and lease liabilities scaled by total assets is in the upper tercile of the sample distribution, and zero otherwise. The specifications in columns (3), (4), and (5) include year and country, year × country, and firm and year fixed effects, respectively. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.

TABLE 9
Cross-Sectional Heterogeneity: Financial Constraints

	$EMPLOY$	$CAPEX$
	(1)	(2)
$LEASE \times FC$	-0.018	0.146
	(-0.24)	(0.73)
$PUBLIC \times FC$	0.189***	0.149
	(2.80)	(1.12)
$LEASE \times PUBLIC$	-0.094*	-0.105*
	(-1.71)	(-1.77)
$LEASE \times PUBLIC \times FC$	-0.142***	-0.064
	(-2.64)	(-0.21)
$SIZE$	0.318***	0.329***
	(5.70)	(3.28)
$SALES\_GROWTH$	-0.046***	0.004
	(-5.88)	(0.13)
CFO	0.078	0.421
	(0.56)	(1.02)
Firm FE	Yes	Yes
Year × Industry FE	Yes	Yes
Year × Country FE	Yes	Yes
Cluster	Country	Country
Adjusted R-squared	0.877	0.795
Observations	9,373	8,018

This table examines how the change in investment following the introduction of lease capitalization rules varies, in the cross-section, with firm financial constraints. FC is an indicator variable set equal to one if the firm's size or age are in the bottom tercile of the sample distribution, and zero otherwise. The dependent variable is the natural logarithm of the number of employees ($EMPLOY$) in Column (1) and the natural logarithm of capital expenditures ($CAPEX$) in Column (2). Both dependent variables are measured at year $t + 1$. The regressions control for size ($SIZE$), sales growth ($SALES\_GROWTH$), and cash flows (CFO). All specifications include firm, year × industry, and year × country fixed effects. The table reports (in parentheses) *t*-statistics based on heteroscedasticity-robust standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively. All continuous variables are winsorized at the 1% and 99% level. All variables are defined in the Appendix.