Journal of
Risk and Financial Management

MDPI

Article

Managers' Investment Decisions: Incentives and Economic Consequences Arising from Leases

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Abstract: What incentives do managers face that might give rise to inefficient investments in leases? If managers make inefficient investments in leases, what economic consequences arise for those managers and their firms? We develop a model of expected investments in leased assets and use the residuals from the model as proxies for inefficient investments. We find that, in contrast to investments in capital expenditures, leasing appears to be a mechanism through which managers can seemingly over-invest, even among firms with high quality financial reporting and negative free cash flows. Examining economic consequences, we predict and find that unexpected investments in leased assets trigger increasing future sales growth but declining future earnings growth for as long as three years ahead. We also find a negative relation with contemporaneous stock returns, suggesting investors view unexpected investments in leases as value destructive. Finally, despite negative returns consequences, we find that unexpected investments in leases are associated with *higher* CEO compensation driven primarily by future sales growth. Our study suggests that compensation contracts that reward growth may give managers' incentives to drive sales growth with larger-than-expected investments in leased assets, which lead to slower future earnings growth and negative share price consequences for investors. Our results should inform managers and board members, investors, and researchers interested in investment efficiency, corporate governance, and leases.

Keywords: leases; investment; corporate governance; compensation; sales growth; earnings growth; stock returns

Citation: Eaton, Tim V., Craig Nichols, James Wahlen, and Matthew Wieland. 2021. Managers' Investment Decisions: Incentives and Economic Consequences Arising from Leases. *Journal of Risk and Financial Management* 14: 165. https://doi.org/10.3390/jrfm14040165

Academic Editor: Khaled Hussainey

Received: 9 March 2021
Accepted: 30 March 2021
Published: 6 April 2021

1. Introduction

In this study, we examine managers' decisions to lease assets and the subsequent economic consequences. What factors enhance managers' efficient investments in leases? What incentives do managers face that might give rise to inefficient investments in leases? If managers make inefficient investments in leases, what economic consequences arise (if any) for those managers and their firms? This paper provides novel empirical evidence on these questions.

When firm managers seek to increase productive capacity and output, they can acquire control over additional productive assets through mergers and acquisitions, capital expenditures, and/or leases. Investments in leased assets exceed USD 1.5 trillion among publicly traded U.S. companies (United States Chamber of Commerce 2012). While Beatty et al. (2010) show that firms with low accounting quality have higher proportions of leased assets relative to purchased assets, little is known about the *efficiency* of investments in leased assets. Prior research on the determinants of managers' efficient investment decisions has focused primarily on acquisitions and capital expenditures (Roychowdhury et al. 2018), concluding that managers' investment decisions are sensitive to the availability of free cash flows (Jensen 1986; Lang et al. 1991; Richardson 2006; and many others) and that these decisions are enhanced by better monitoring through higher quality financial reporting (Biddle et al. 2009). However, do those factors also curb inefficient investments in leases? Unlike capital expenditures, monitoring and constrained free cash flows may be less effective controls of managers' decisions to lease because leases have very different cash flow, financing, and, until recently, accounting characteristics. Specifically, leases do not require much up-front cash outflow, do not convey ownership of the asset to the lessee, and as a result, create less credit risk for the lessor. Additionally, until the recent implementation of ASC 842, operating leases were unrecognized, off-balance sheet arrangements.

To provide empirical evidence on whether efficient versus inefficient levels of investments in off-balance sheet operating leases trigger different economic consequences for firms and their managers, we examine a sample of firms for which we can obtain operating lease footnote data from Compustat and for which the undiscounted future lease commitments exceed 5% of total assets. We focus on operating leases because they are more substantial investments than capitalized leases for most firms. Only 36.4% of our sample firms also have capital leases, and they comprise only 1.7% of total assets. Our sample of 12,204 firm-year observations from 2001 to 2016 consists of firms for which off–balance sheet leases are important elements of the composition of productive assets and capital structure, as discounted minimum future operating lease payments amount to an average of 19.2% of total assets.

Ideally, researchers would measure the "efficient" level of a manager's new investments, but of course this is unobservable, even to the manager making these decisions in a world of uncertainty. Models in the investment efficiency literature estimate managers' expected investments in capital expenditures (CapEx), relying on proxies for the firm's investment opportunity set, such as Tobin's Q. These proxies provide some explanatory power for managers' observed investments, creating a basis for projecting firms' expected investments. In this literature, investment amounts that differ from the expected level of investments (the model residuals) then serve as proxies for unexpected investments. Of course, just as "efficient" investments are not directly observable, it is also not possible to observe whether unexpected investments are "inefficient". However, if managers make inefficient investment decisions, the consequences should be estimable. Inefficient investments should be value-destructive insofar as costs exceed benefits. Thus, one should be able to validate whether unexpected investments are valid proxies for inefficient investments by predicting and testing their consequences for future earnings and stock returns. If estimates of expected and unexpected investments are predominantly noise, then they should bear indistinguishable relations with future economic consequences.

Managers' decisions to acquire productive assets through leases and/or CapEx are likely affected by similar but not necessarily identical economic determinants (the "lease vs. buy decision"). Therefore, we draw on the models for CapEx to develop our own model of expected investments in leased assets. We include various proxies for firms' investment and profitable growth opportunities, including Tobin's Q, sales growth, asset growth, and lease turnover (firm productivity in generating sales using leased assets). We also include factors to capture the influence on managers' investment decisions given firms' financial condition and constraints, including leverage, net cash flows from operating activities, volatility in return on assets, whether the firm has rated debt, and lagged leases. In addition, we control for lease renewals, firm size and age, industry, and other determinants. Our model explains roughly 18% of the cross-sectional variation in firms' investments in operating leased assets. Expectations models with relatively modest explanatory power are not uncommon in this literature. Additionally, consistent with this literature, we use the fitted values from our model as proxies for expected investments in leased assets for each firm/year in our sample. We use the residuals as proxies for unexpected investments. Of course, these residuals will reflect some degree of noise, because our model does not fully capture all of the determinants of lease investment decisions for all firm/years in the sample. To the extent our model yields residuals that are reliable proxies for managers' inefficient lease investment decisions, they should have predictable relations with future economic consequences.

For an initial validation of our model, we first examine whether managers' leasing decisions reflect the same constraints observed in the literature examining investment efficiency in CapEx, namely available free cash flows and high quality financial reporting. Leases differ from CapEx in immediate cash flow needs; leases spread the cash outflows over the lease term, rather than requiring up-front payment. Consistent with Jensen (1986) free cash flows hypothesis and with the results in Richardson (2006), we find that unexpected investments in CapEx are sensitive to free cash flows, especially positive free cash flows. However, we find that unexpected investments in leases are much less sensitive to free cash flows, and the relation does not change with the sign of free cash flows. Our findings suggest that managers can make investments in leased assets even when free cash flows are negative.

Lower quality financial reporting enhances potential agency conflicts by increasing the degree of information asymmetry between managers and outsiders, which enables managers to over- or under-invest in CapEx (Biddle et al. 2009). During our study period, operating leases personified low-quality accounting information because they were off-balance sheet arrangements. However, it is not clear whether the quality of *recognized* amounts on income statements and balance sheets will influence the efficiency of *unrecognized* investments in leased assets. Consistent with prior literature, we find that unexpected investments in CapEx are diminishing across firms with better financial reporting quality (using a Dechow and Dichev (2002) accruals model). Using our model, we find that managers' unexpected investments in off-balance sheet leases are also diminishing across firms in the quality of financial reporting, but that the relation is considerably weaker than it is for CapEx. Overall, our results suggest that, in contrast with CapEx, managers' propensity to invest in leased assets can arise even among firms with higher quality financial reporting and negative free cash flows. We also find that firms in the highest (lowest) quintile of unexpected lease changes also have high (low) unexpected CapEx. Thus, leasing and CapEx are not simply substitute mechanisms for over-investment.

Next, we develop and test a series of predictions of the economic consequences of investments in leased assets. In these tests, we focus on consequences associated with positive unexpected lease residuals, rather than on negative residuals. We adopt this focus in part to compare results with the extensive prior literature on managers' incentives for over-investments in CapEx and acquisitions (e.g., Jensen 1986; Stulz 1990; Stein 2003; and others), although the literature has devoted some attention to incentives for why managers might under-invest. [One example is the "quiet-life" hypothesis (Bertrand and Mullainathan 2003), which predicts managers very late in their careers become less active in making new investments. While this hypothesis has merit, it applies to only a very small subset of managers who may be prone to under-invest in the final years of tenure. Hypotheses and evidence on the tendency to over-invest apply to a much broader set of managers throughout the majority of their careers.] We also focus on positive residuals because they are proxies for actions managers have taken this period (e.g., investing in additional leases) whereas negative residuals are more difficult to interpret, seemingly reflecting actions managers have not taken.

Theoretical models of over-investment (e.g., Stulz 1990) predict that managers primarily focus on the gross output of the firm (i.e., sales), whereas shareholders focus more on wealth creation (i.e., earnings and stock returns). As new investment in asset growth (rather than asset replacement) should increase a firm's productive capacity, we predict that positive unexpected investments in leased assets will drive sales increases in the next period. If these unexpected investments are value-accretive, we predict that the faster sales growth should also lead to faster future earnings growth. However, if firms experience diminishing marginal returns from unexpected investments in leases, then they will likely trigger slower future earnings growth.

We use the expected and the unexpected investments in leases to predict one-year ahead growth in sales and earnings, while controlling for current period growth in sales and earnings and other factors. We find that unexpected investments in leases relate to faster future sales growth, but slower future earnings growth. In contrast, expected investments in leases relate to faster future sales growth, but have a neutral relation with future earnings growth. That is, expected investments in leases do not reflect over- or under-investment. We also divide the sample based on the sign of the unexpected lease change. The results show that future sales growth is *increasing* but future earnings growth is *decreasing* even within the subsample of firms with *positive* unexpected investments in leases.

Most leases have multi-period effects. Periodic lease expense begins to accrue at inception, yet the leased asset may not generate sales for weeks or months, and may not reach its full revenue- and earnings-generating potential until after the first year. We extend the horizon of our analysis to years +2 and +3 to capture more of the costs and benefits realized over the lease life. We find unexpected investments in leases relate to faster future sales growth and slower future earnings growth over each of the next three years. Again, the effects are concentrated within unexpected increases in leases, which give rise to increasing sales growth but decreasing future earnings growth over the next three years.

To test the share value implications, we estimate the relation between unexpected investments in leases and contemporaneous stock returns, which reflect revisions in investors' expectations of the present value of future cash flows. As unexpected investments in leases relate negatively to future earnings growth over the next three years, they are also likely negatively associated with future cash flows. However, the financing elements of leases increase firms' capital structure leverage, so they also increase the firm's cost of equity capital (Bratten et al. 2013; Dhaliwal et al. 2011). Increases in leases should, therefore, give rise to contemporaneous increases in discount rates, which drive stock prices down, holding expected cash flows constant (e.g., Campbell and Shiller 1988; Vuolteenaho 2001; Campbell and Vuolteenaho 2004). Thus, a negative relation between unexpected investments in leases and contemporaneous stock returns could reflect lower expected future cash flows (an over-investment effect), higher discount rates (a leverage effect), or both. To disentangle these effects, we adapt the Penman and Yehuda (2016) approach to control for changes in expected returns during the period. After controlling for the discount rate effect, the relation between unexpected investments in leases and stock returns becomes *more strongly negative*. Overall, our evidence suggests that when managers make unexpected investments in leases, it leads to faster future sales growth but slower future earnings growth over three years, and lower contemporaneous stock returns.

For comparative analyses, we also find the consequences of unexpected investments in leases are incremental to the consequences of unexpected investments in CapEx. Specifically, future sales growth is increasing while future earnings growth is decreasing in unexpected investments in leases as well as in CapEx. We find similar long-run consequences from unexpected investments in CapEx, which relate positively to three-year sales growth, but relate strongly negatively to three-year earnings growth. Unexpected investments in CapEx and stock returns are also strongly negatively related.

Why would managers over-invest? In general, investments enlarge the firm's economic footprint and the manager's power. Growth in assets and revenues can heighten the visibility and reputation of the firm and the manager; create more perquisites to consume; and give rise to other intangible benefits that a manager can derive from a larger firm. As these benefits are difficult to isolate and measure, we instead explore the impact of unexpected investment on managers' compensation. Studies of executive pay find that firms often create explicit incentives to grow by linking compensation to revenues. Murphy (1998) notes that compensation committees often set base salaries for CEOs through a benchmarking process, selecting peer firms based on size, measured by the level of sales. Core et al. (1999) find that sales is the statistically strongest cross-sectional determinant of executive compensation, exceeding investment opportunities, return on assets, stock returns, and various board, governance, and ownership structure factors. More recently, Huang et al. (2015) report that sales has become the most frequently used explicit performance measure in executive incentive plans.

We examine whether managers experience positive compensation consequences from unexpected investments in leases. We use the Core et al. (1999) model (absent their corporate governance and ownership structure variables) and obtain similar results. We find that CEO compensation is increasing in profitability, investment opportunities, stock returns, and strongly increasing in lagged sales. We also find that CEOs experience compensation increasing in incremental sales growth associated with unexpected investments in leases. Even within the subsample of firms with positive unexpected investments in leases, CEOs receive strongly increasing compensation as a function of sales. By contrast, we find that CEOs of firms with unexpected investments in CapEx do not receive significantly higher total compensation. These results suggest that, for CEOs seeking to drive sales-growth-based compensation, investments in leases are more effective mechanisms than CapEx.

Our findings are important for several reasons. First, for managers, boards, stakeholders and researchers interested in corporate governance and monitoring investment decisions, our results should increase awareness of leasing as a potential mechanism for over-investment. We contribute to research into the impact of agency problems on investment efficiency by showing that, compared to CapEx, unexpected investments in leases are less constrained by negative free cash flows and less sensitive to monitoring. We show that managers may invest in leases to respond to the sales growth incentives set by the board and the compensation committee, even though these investments may not be value-accretive. Boards and compensation committees should consider our results if they contemplate placing more emphasis on sales incentives, as has been the recent trend (Huang et al. 2015).

Second, for researchers, we contribute new evidence and a new approach to the investment efficiency literature. We contribute novel evidence on the consequences of unexpected investments in off-balance sheet leases for future revenue growth, future earnings growth, stock returns, and compensation. For researchers in this area, our approach contributes a series of tests on the economic consequences of investment inefficiency that researchers can use to assess the identification of unexpected investment in a variety of contexts. By showing unexpected investments trigger predictable negative economic consequences, our study and other studies can improve the persuasiveness of evidence based on unexpected investment measures.

Finally, lease accounting has undergone dramatic change (Financial Accounting Standards Board 2016, ASC 842) and operating leases are now being capitalized on balance sheets, beginning in 2019. Our results do not generalize to the current accounting regime under U.S. GAAP or IFRS for operating leases. However, our results establish a baseline for comparison for future research studying the impact of this change in accounting for leases on investment efficiency. Further, our results broaden our understanding of managers' incentives for and the consequences of investment decisions that were not recognized on firms' balance sheets. Our approach can be extended by researchers interested in examining the consequences of other decisions by managers' that are not fully recognized on balance sheets (e.g., equity affiliates, certain types of R&D joint ventures, stock-based compensation, and others).

2. Related Literature and Predictions

First, we discuss the literature on agency problems, compensation, and investment efficiency, and then we discuss the accounting literature on the implications of leases for risk, credit ratings, and the cost of capital, drawing insights from Stein (2003), Murphy (1998), Lipe (2001), and Spencer and Webb (2015). Second, we develop our predictions for the economic consequences associated with unexpected investments in leased assets.

2.1. Agency Problems and Compensation

Starting with Berle and Means (1932) and advanced by Jensen and Meckling (1976) and many others, it is clear that the incentives of shareholders and managers of public firms do not perfectly align. Agency conflicts can manifest in managers having an "excessive taste for running large firms, as opposed to simply profitable ones" (Stein 2003) and over-investing (Baumol 1959; Marris 1964; Williamson 1964; Donaldson 1984; Jensen 1986, 1993). Empire-building and over-investment have been the subject of formal models by Stulz (1990), Harris and Raviv (1990), Hart and Moore (1995), and Zwiebel (1996). These models generally assume that managers enjoy private benefits of control, which are proportional to investment (Hart and Moore 1995) or the gross output of the firm (Stulz 1990).

Managers' compensation contracts create explicit rewards for sales and sales growth, which can exacerbate the incentives for over-investment. The literature on executive pay indicates that firms create incentives to grow by linking manager compensation to sales. Surveying this literature, Murphy (1998) notes that a typical compensation committee establishes the base salary (the fixed component of the compensation package) for the CEO through a benchmarking process, selecting peer firms based on sales levels. Risk-averse executives will prefer a dollar increase in salary over a dollar increase in bonus or incentive-based pay. Moreover, compensation committees link other elements of the compensation package to the base salary level. As Murphy (1998) points out, compensation packages typically set the potential bonus pool as a percentage of base salary, and often set option grants as a multiple of base salary. Murphy (1998) concludes, "each dollar increase in base salary has positive repercussions on many other compensation components," and the primary determinant of base salary is company size as measured by the level of sales.

Empirical studies on executive pay have established the strong influence of sales in the compensation practices of firms. In summarizing this literature, Murphy (1998) notes that a standard result across studies is a cross-sectional elasticity of compensation to sales of about 0.3. Thus, a firm with 10 percent higher sales will pay its executives an average of 3 percent more. Murphy (1985) also notes that this influence of sales is so strong that measures of net performance (e.g., earnings and return on equity) play "at best a minor role." The influence of sales on executive pay even outweighs stock returns. Murphy (1985) finds that, controlling for size, a firm with a 10 percent stock return will pay its executives 1 percent more than a firm with zero percent return. In contrast, holding stock return performance constant, a firm with 10 percent higher sales will pay its executives 2.8 percent more. As Baker et al. (1988) conclude, these results suggest that CEOs can increase their pay by increasing firm sales, even when the increase in sales reduces the firm's market value.

Similarly, Core et al. (1999) find that sales is the statistically strongest cross-sectional determinant of executive compensation, exceeding investment opportunities, return on assets, stock returns, and various board, governance, and ownership structure factors. More recently, Huang et al. (2015) report that sales has become the most frequently used explicit performance measure in executive compensation plans. They find that the proportion of firms using sales as a performance measure increased from 25 percent in 2001 to 34 percent in 2010, and that the sensitivity of executive pay to firm sales has increased over this period. Moreover, they find that the sensitivity of pay to sales remains significant after controlling for earnings and returns.

2.2. Constraints on Over-Investment—Free Cash Flows and Financial Reporting Quality

Studies of over-investment typically focus on the sensitivity of acquisitions and CapEx to free cash flows. Lang et al. (1991) find acquirers with high free cash flows and low investment opportunities are more likely to overpay. Evidence of overpaying for acquisitions and wasteful spending related to agency conflicts can also be found in Lewellen et al. (1985), Harford (1999), Opler et al. (1999, 2001), and Blanchard et al. (1994). Studies also document a positive sensitivity of investment to free cash flows, including Schaller (1993), Bond and Meghir (1994), Calomiris and Hubbard (1995), Chirinko (1995), Gilchrist and Himmelberg (1995), and Lang et al. (1996), among many others. Consistent with Jensen (1986) free cash flows hypothesis, managers often choose to invest free cash flows (rather than distribute them to investors) by acquiring other companies or expanding physical plant, even if such investments are negative net present value projects.

Although it is clear that firms with greater cash on hand and free cash flows invest more, this could be because external financing is costly (Myers and Majluf 1984), because investment opportunities are not independent of past performance, and/or because managers prefer to manage large firms (e.g., Jensen 1986, 1993). Although over-investment is a common explanation (Jensen 1986, 1993), the evidence linking investment/free-cash-flow sensitivity to agency conflict is sparse (Stein 2003), in part due to difficulties in measuring over-investment.

In the accounting literature, Richardson (2006) develops a measure of over-investment by regressing new capital expenditures on proxies for growth opportunities, cash constraints, and leverage. He finds that firms with positive free cash flows over-invest on average. Biddle and Hilary (2006) measure unexpected investment as the residual from regressing capital expenditures on lagged sales. They find lower degrees of unexpected investment for firms with higher financial reporting quality. Biddle et al. (2009) extend these results to show that better financial reporting quality is associated with lower degrees of both over- and under-investment. Elberry and Hussainey (2021) also show the reverse holds—corporate governance and investment efficiency can have complementary effects on corporate disclosure.

In addition, Jensen (1993) argues that issuing debt can be an effective safeguard against managers' over-investments if the firm pays out the debt proceeds to equity holders because this commits the firm to use future free cash flows for debt service rather than over-investment. In contrast, leases impose a potentially more severe agency cost on shareholders: leases do not give rise to upfront cash proceeds that can be paid out to shareholders, yet leases still commit the firm to use future free cash flows for lease service rather than payments to shareholders. Further, Dutta and Reichelstein (2005) develop a model in which managers have private information about future cash inflows from using leased assets, yet cash outflows for leases are known. They conclude that, from a performance measurement perspective, because operating lease accounting essentially amounts to cash accounting, "the operating lease method cannot achieve strong (and hence robust) goal congruence" between managers and shareholders.

For leases, Beatty et al. (2010) find that manufacturing firms with poorer accounting quality hold a greater proportion of leased assets relative to property, plant and equipment. They also find that the influence of accounting quality on leasing diminishes among firms with loans from banks with higher monitoring incentives, suggesting leasing is a contractual mechanism firms can use to circumvent the effects of low accounting quality. The Beatty et al. (2010) study does not, however, examine investment efficiency per se, free cash flow constraints, or economic consequences of leases.

Do the factors that limit managers' propensities to over-invest in CapEx also help control investment inefficiency in leases? In contrast to CapEx, monitoring and free cash flow constraints may have been less effective with leases during our sample period because leases were unrecognized, off-balance sheet arrangements that did not require much upfront cash outflow. Compared to investments in CapEx, we predict managers' investments in leases will be less sensitive to better monitoring through higher financial reporting quality and less sensitive to the availability of free cash flows.

2.3. Economic Consequences Associated with Leases

Studies have examined the economic consequences of leases as a form of leverage (see Lipe 2001; Spencer and Webb 2015). Various studies find that leases increase stock return volatility (Imhoff et al. 1993; Ely 1995). Studies also show that leases increase the cost of equity capital (Bratten et al. 2013; Dhaliwal et al. 2011) even though they do not increase market beta (e.g., Bowman 1980).

Leases also predict distress (Elam 1975), increase credit risk, and the cost of debt. Moody's analysts incorporate leases into their quantitative measures as well as in their qualitative assessments that determine credit ratings (Kraft 2015). Similarly, Sengupta and Wang (2011) find that credit ratings reflect leases. Altamuro et al. (2014) find that operating leases impact loan spreads even in the absence of credit ratings. Bratten et al. (2013) and Dhaliwal et al. (2011) also find that leases increase the costs of debt capital.

In an unpublished working paper, Ge (2006) documents a negative relation between changes in off-balance sheet leases and levels of return on assets next period. Ge (2006) lease measure is somewhat limited as it does not include expected lease payments beyond five years because this item was unavailable in Compustat for the majority of her sample period. Moreover, Ge (2006) is careful to point out that the negative relation between current period lease changes and future return on assets need not reflect over-investment, but may simply reflect declining marginal rates of productivity. A negative relation between current investment and future return on assets is expected, even if a company only invests in positive net present value projects. Thus, the results in Ge (2006) leave open the issue of over-investment in leased assets.

Thus, prior research documents economic consequences associated with leasing as a form of leverage. However, the existing evidence does not examine whether firms over-invest in leases, or the associated consequences.

2.4. Predictions: Over-Investments in Leases Lead to Higher Sales Growth and Greater CEO Compensation but Lower Earnings Growth and Stock Returns

Managers that derive benefit from the gross output of the firm (i.e., sales) rather than only the net output (i.e., earnings) may have incentives to over-invest (Stulz 1990). Managers may over-invest in leased assets to expand the productive capacity and output of the firm. An increase in leased assets in the current period should therefore drive an increase in future sales.

Over-investment occurs when a manager takes projects for which the economic costs, including the cost of capital, outweigh the economic benefits. Costs of capital play a critical role in any analysis of net present value. Costs of capital are inherently difficult to measure, providing researchers a significant obstacle in cleanly identifying whether an investment has a positive or negative net present value. This is less of a concern in our setting because contractual lease payments give rise to lease expense, which represents the required payment from the firm to the lessor for use of the capital. As a result, the reported earnings number should reflect the benefits (stemming from sales increases) net of the incremental costs (lease expense and any related operating expenses) from investments in leased assets. If managers over-invest in leases, the incremental costs should outweigh the benefits, reducing future earnings. In the same vein, when the market observes the firm increasing its investments in leases and understands the implications for future earnings, then we would expect to observe a negative relation with contemporaneous stock returns.

If managers make unexpected investments in leased assets primarily to drive sales growth, and if those managers receive compensation that is a function of sales growth, then we predict unexpected investments in leased assets will also be associated with greater compensation for managers, despite the negative effects of these investments on earnings and stock returns.

To summarize, we predict that unexpected investments in leases trigger higher future sales growth but lower future earnings growth and lower stock returns. We also predict that higher future sales growth arising from unexpected investments in leases will be associated with higher pay for the managers, despite lower future earnings and returns.

3. Research Design and Sample

In this section, we describe key features of our research design, beginning with how we measure investments in leased assets. We also describe our sample selection criteria. We then discuss how we estimate the expected change in investments in leased assets.

3.1. Measuring Investments in Leases Obligation

We develop a measure of the investments in leases (Lease), which consists of two parts: (1) the minimum future payments and (2) the discount rate. We begin with the minimum future lease payments for the first 5 years as reported in Compustat (MRC1, MRC2, MRC3, MRC4, and MRC5), and then spread any remaining future lease payment commitments thereafter (MRCTA) over years +6 and beyond on a straight-line basis, approximating the number of future periods by dividing MRCTA by MRC5, the year +5 lease payment. We cap the stream of future lease payments at a maximum of 15 years, placing any leftover amount into year +15. For the discount rate, we measure a yearly interest rate for each firm by dividing interest expense (XINT) by the average long-term debt (DLTT). We then identify the firm-specific discount rate as the median interest rate for that firm over the sample period. (Our results are robust to this design choice.) Using a firm-specific yet time-invariant discount rate ensures that our measures of changes in the present value of investments in leases arise from changes in future commitments rather than changes in discount rates. In Appendix A we illustrate the lease investment computation using the information from Skywest, Inc.'s 2012 Form 10-K. Skywest disclosed their estimate of the present value of the lease obligation, USD 1.8 billion, which approximates our estimate of the lease investment variable (USD 1.8 billion).

3.2. Selecting the Sample

We begin with all firms in the intersection of Compustat and CRSP from 2000 (when Compustat began providing the 'after 5 years' data for future lease payment commitments) to 2016. Due to their unique accounting and economic characteristics, we eliminate firms in financial services industries (SIC codes between 6000 and 6999). We also require firms to have price greater than USD 1 and a market value of equity greater than USD 50 million. To identify firms for which leasing is important, we only include firms for which the sum of undiscounted lease commitments exceeds five percent of total assets. (Our results are robust to this design choice. See Section 4.5.4 for more information.) Our final sample consists of 12,204 firm-year observations. We mitigate potential effects of outliers by winsorizing the variables in the models at the top and bottom percentile.

We focus on operating leases because capital leases are far less common; only 36.4% of our sample firms also have capitalized leases. Applying our sample selection criteria would yield only 663 firm-year observations with capital leases greater than 5% of total assets from 2000 to 2016 (only 6% of the observations with operating leases in our sample). Moreover, among firms with capital leases, operating leases are a much more important source of investment and capital: capital leases amount to only 1.7% of total assets, whereas the present value of minimum future operating lease payments amount to 19.2% of total assets. Also, capital leases have a more negative impact on earnings in early years of the lease contract because the sum of interest on the lease obligation plus depreciation expense on the leased asset will be a larger total expense than the corresponding rent expense for operating leases (Lipe 2001).

3.3. Descriptive Statistics

Table 1 provides descriptive statistics of lease investments in dollar amounts and as percentages of total assets by year and industry. The mean investment in leases grows over the sample period from USD 296.2 million in 2001 to USD 676.4 million in 2016. In most sample years, leases are roughly between 18 and 20 percent of total assets. Not surprisingly, Panel B reveals that our sample contains the greatest numbers of firm-year observations from the Services, Retail, Durable Manufacturers, and Transportation industries. Firms in the Transportation and Retail industries rely the most heavily on investing in assets using operating leases, averaging USD 1213.9 million and USD 896.2 million, respectively.

Table 1. Descriptive Statistics: Lease Investments.

Panel A: Mean Lease Investments by Year, in Millions of Dollars and Deflated by Total Assets			
Year	**N**	**Lease**	**Lease_def**
2001	912	296.2	0.202
2002	947	277.1	0.205
2003	956	279.8	0.193
2004	973	279.0	0.186
2005	922	307.6	0.193
2006	889	333.4	0.193
2007	837	387.8	0.194
2008	735	450.2	0.185
2009	700	448.1	0.181
2010	666	469.1	0.194
2011	631	505.9	0.189
2012	640	519.0	0.186
2013	647	482.7	0.180
2014	627	516.2	0.189
2015	606	595.1	0.203
2016	516	676.4	0.183
Total	12,204	404.0	0.192
Panel B: Mean Lease Investments by Industry, in Millions of Dollars and Deflated by Total Assets			
Industry	**N**	**Lease**	**Lease_def**
Utilities	76	181.0	0.117
Mining and construction	145	177.4	0.091
Food	164	97.9	0.097
Extractive industries	176	645.4	0.084
Chemicals	202	290.5	0.092
Computers	523	76.3	0.084
Textiles, printing and publishing	682	214.3	0.160
Pharmaceuticals	751	40.7	0.131
Transportation	813	1213.9	0.247
Durable manufacturers	1886	92.2	0.093
Retail	2979	896.2	0.360
Services	3760	173.0	0.150
Other	47	101.2	0.089
Total	12,204	404.0	0.192

The sample includes 12,204 firm-year observations from 2001–2016. Lease equals the present value of future lease payments discounted by a firm-specific discount rate, as detailed in Appendix A. Lease_def equals Lease deflated by total assets at year end. We define industry following Barth et al. (1998).

3.4. Expected Investments in Leased Assets

Firms engage in new leases for a variety of reasons, which we describe below. Expanding substantially on Richardson (2006) CapEx investment model, we estimate the following model to determine expected investments in leases:

$$\begin{aligned} Lease\_change_{i,t} = {} & \alpha + \beta_1 V/P_{i,t-1} + \beta_2 Tobin'sQ_{i,t-1} + \beta_3 SaleGr_{i,t-1} + \beta_4 AssetGr_{i,t-1} \\ & + \beta_5 Lease\_turnover_{i,t-1} + \beta_6 Return_{i,t-1} + \beta_7 Lev_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 OANCF_{i,t-1} \\ & + \beta_{10} Dloss_{i,t-1} + \beta_{11} No\ Dividend_{i,t-1} + \beta_{12} Rating_{i,t-1} + \beta_{13} ROA\_sd_{i,t-1} + \beta_{14} Ret\_sd_{i,t-1} \\ & + \beta_{15} Lease\_def_{i,t-1} + \beta_{16} Age_{i,t-1} + \beta_{17} Size_{i,t-1} + \beta_{18} Lease\_change_{i,t-1} + e_{it} \end{aligned} \quad (1)$$

The fitted values from the model are estimates of the expected investments in leases in year t, which we denote Lease_p, based on firm characteristics in year t − 1. The regression residuals are unexpected investments in leased assets in year t, which we denote Lease_r. We estimate the expected lease model with the following sets of determinants (with more formal definitions in Table 2):

Profitable Growth Opportunities: To capture market expectations for the firm's investment opportunity set, we include Tobin's Q (*TobinQ*) and a ratio of value to price (*V/P*). [V/P is the estimated value of equity (V) divided by market value of equity. We estimate V using the Ohlson (1995) framework, as $(1 - \alpha\,r)BV + \alpha\,(1 + r)X - \alpha\,rd$, where α equals$(\omega/(1 + r - \omega))$; r equals 12%; and ω equals 0.62. ω is the abnormal earnings persistence parameter from the Ohlson (1995) framework. BV is the book value of common equity (CEQ), d is annual dividends (DVC) and X is operating income after depreciation (OIADP).] To capture firms experiencing profitable growth opportunities we also include realized growth in sales (*SalesGr*) and assets (*AssetGr*). We include the ratio of lagged sales to lagged total leases (*Lease_turnover*) to capture the efficiency with which firms use leased assets to generate revenues. We include stock returns (*Returns*) to reflect changes in investor expectations of growth and profitability that may not be captured by our other variables. We predict expected (efficient) investments in leases to be increasing in these factors.

Financial Condition and Constraints: To capture the extent to which financial conditions and constraints influence firms' decisions to lease assets, we include leverage (*Lev*), the available cash balance (*Cash*), lagged operating net cash flows (*OANCF*), and indicator variables equal to one for firm/years with losses (*DLoss*), firms not paying dividends (*No Dividend*), and firms with rated debt (*Rating*). We also include proxies for volatility, with the standard deviation of lagged return on assets (*ROA_sd*) and the standard deviation of lagged stock returns (*Ret_sd*). We include the lagged lease level (*Lease_def*) to control for the firm's propensity to use leases. We expect leases will be increasing among firms that face financial constraints that limit the ability to issue securities to raise capital to finance asset investments, and decreasing in volatility.

Firm Characteristics: We include firm age (*Age*) and size (*Size*) as general firm characteristics, and expect leasing to be more prevalent among younger and smaller firms.

Table 2. Lease Investment Model.

Panel A: Variable Descriptive Statistics

Variable	Mean	Std Dev	P1	Q1	Median	Q3	P99
Lease_change	0.013	0.056	−0.100	−0.009	0.001	0.020	0.272
Profitable Growth Opportunities							
V/P	0.507	0.393	−0.171	0.253	0.434	0.680	1.951
Tobin's Q	1.947	1.705	0.430	0.936	1.403	2.290	8.744
SalesGr	0.089	0.229	−0.628	0.000	0.081	0.187	0.772
Asset Growth	0.131	0.396	−0.401	−0.028	0.061	0.182	1.605
Lease_turnover	12.984	11.753	0.207	4.629	9.604	17.634	59.006
Stock Returns	1.259	0.877	0.209	0.802	1.091	1.457	4.816
Financial Condition and Constraints							
Leverage	1.155	1.955	0.056	0.227	0.617	1.257	10.109
Cash	0.218	0.222	0.001	0.039	0.139	0.330	0.873
OANCF	0.069	0.148	−0.563	0.037	0.092	0.146	0.333
Dloss	0.293	0.455	0.000	0.000	0.000	1.000	1.000
No dividend	0.707	0.455	0.000	0.000	1.000	1.000	1.000
Rating	0.282	0.450	0.000	0.000	0.000	1.000	1.000
ROA_sd	0.030	0.047	0.002	0.007	0.014	0.032	0.248
Ret_sd	0.139	0.083	0.038	0.083	0.118	0.170	0.441
Lease_def	0.189	0.214	0.038	0.063	0.101	0.207	1.036
Firm Characteristics							
Age	2.376	0.978	0.000	1.792	2.485	3.045	4.369
Size	6.301	1.543	3.136	5.208	6.180	7.329	10.152
Maintenance							
$\text{Lease\_change}_{t-1}$	0.025	0.077	−0.102	−0.007	0.005	0.032	0.354

Table 2. *Cont.*

Panel B: Model Estimation			
$Lease_{change i,t}$	$= \alpha + \beta_1 V/P_{i,t-1} + \beta_2 Tobin's Q_{i,t-1} + \beta_3 SaleGr_{i,t-1} + \beta_4 AssetGr_{i,t-1} + \beta_5 Lease_{turnover i,t-1} + \beta_6 Return_{i,t-1} + \beta_7 Lev_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 OANCF_{i,t-1} + \beta_{10} Dloss_{i,t-1} + \beta_{11} No\ Dividend_{i,t-1} + \beta_{12} Rating_{i,t-1} + \beta_{13} ROA_{sd i,t-1} + \beta_{14} Ret_{sd i,t-1} + \beta_{15} Lease\_def_{i,t-1} + \beta_{16} Age_{i,t-1} + \beta_{17} Size_{i,t-1} + \beta_{18} Lease\_change_{i,t-1} + e_{it}$		
Variable	Coefficient	t-statistic	Probability
Profitable Growth Opportunities			
V/P	−0.0031	−2.06	0.039
Tobin's Q	0.0028	8.09	<0.0001
SalesGr	0.027	11.73	<0.0001
Asset Growth	−0.0053	−3.89	<0.0001
Lease_turnover	−0.0001	−1.11	0.266
Stock Returns	0.0038	6.43	<0.0001
Financial Condition and Constraints			
Leverage	−0.0006	−2.30	0.022
Cash	−0.0046	−1.57	0.116
OANCF	0.0268	6.43	<0.0001
Dloss	−0.0062	−4.72	<0.0001
No dividend	0.0056	4.8	<0.0001
Rating	0.0015	1.09	0.275
ROA_sd	−0.0451	−3.97	<0.0001
Ret_sd	−0.0248	−3.38	0.001
Lease_def	0.0368	11.82	<0.0001
Firm Characteristics			
Age	−0.0023	−4.16	<0.0001
Size	−0.0015	−3.25	0.001
Maintenance			
$Lease\_change_{t-1}$	0.13	17.83	<0.0001

Industry Fixed Effects Yes. Year Fixed Effects Yes. Adjusted R^2 0.178. The sample includes 13,147 firm-year observations from 2001–2016 for our lease sample. In Panel A, P1 (P99) is the 1st (99th) percentile of the respective distribution while Q1 (Q3) is the lower (upper) quartile of the respective distribution. We winsorize all continuous variables at the 1% and 99% levels. Each of the independent variables is measured prior to the investment period. Lease_change equals Lease less lagged Lease, divided by lagged total assets. V/P equals the ratio of the value of the firm (V) and market value of equity (csho * prcc_f). We estimate V as $(1 - \alpha\ r)BV + \alpha\ (1 + r)X - \alpha\ rd$ where, α equals$(\omega/(1 + r - \omega))$; r equals 12%; and ω equals 0.62. ω is the abnormal earnings persistence parameter from the Ohlson (1995) framework, BV is the book value of common equity (CEQ), d is annual dividends (dvc) and X is operating income after depreciation (oiadp). Tobin's Q is market value of equity plus the book value of short- and long-term debt scaled by beginning total assets (PRCC_F*CSHO+PSTK+DLTT+DLC)/AT_{t-1}. SalesGr equals the change in sales deflated by beginning total assets. Asset Growth equals the change in total assets deflated by beginning total assets. Lease_turnover equals sales divided by average lease obligations. Return equals the change in market value of the firm over that prior year (MVE/MVE_{t-1}). Lev equals sum of the book value of short term (DLC), long term debt (DLTT) and Lease deflated by the book value of equity (CEQ). Cash equals the balance of cash and short term investments (CHE) deflated by total assets. OANCF equals operating cash flows (OANCF) deflated by total assets. DLoss equals 1 if income before extraordinary items (IB) is less than 0, 0 otherwise. No Dividend equals 0 if dividends paid to common shareholder (DVC) is greater than 0, 1 otherwise. Rating equals 1 if S&P Domestic Long Term Issuer Credit Rating (SPLTICRM) is not missing, 0 otherwise. ROA_sd equals the standard deviation of the last 12 quarters of ROA. Ret_sd equals the standard deviation of the last 12 monthly returns. Lease_def equals Lease divided by lagged total assets. Age equals log of the number of years the firm has been listed on CRSP as of the start of the year or the number of years on Compustat, if not available. Size equals log of total assets (AT) measured at the start of the year. $Lease\_change_{t-1}$ equals Lagged Lease_change.

Lease Maintenance: To control for firms renewing leases, we include the lagged change in leases ($Lease\_change_{t-1}$). This control, together with the control for the lagged lease levels (*Lease_def*), may undermine the model's power to identify firms that repeatedly make inefficient investments.

Economic Factors: In addition, we include industry and year fixed effects to capture additional variation in investments in leases that are triggered by economic differences across industries and time. We do not, however, include a firm fixed effect control because lease investments are firm-level decisions.

Table 2, Panel A provides descriptive statistics. Panel B presents the results from estimating the model. The coefficient estimates generally confirm our predictions for the determinants of expected investments in leases. Whether our model for expected investments is valid, and whether the residuals from our model are valid proxies for inefficient investments in leases (which are of course, unobservable), will depend on whether the residuals exhibit predictable relations with future economic consequences consistent with properties of unexpected investments.

For comparative analyses, we also examine investments in capital expenditures. Specifically, we estimate a substantially expanded version of Richardson (2006) CapEx investment model:

$$\begin{aligned} I\_new_{i,t} &= \alpha + \beta_1 V/P_{i,t-1} + \beta_2 Tobin'sQ_{i,t-1} + \beta_3 SaleGr_{i,t-1} + \beta_4 AssetGr_{i,t-1} + \beta_5 PPE\_turnover_{i,t-1} \\ &+\beta_6 Return_{i,t-1} + \beta_7 Lev_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 OANCF_{i,t-1} + \beta_{10} Dloss_{i,t-1} \\ &+\beta_{11} No\ Dividend_{i,t-1} + \beta_{12} Rating_{i,t-1} + \beta_{13} ROA\_sd_{i,t-1} + \beta_{14} Ret\_sd_{i,t-1} \\ &+\beta_{15} PPE\_def_{i,t-1} + \beta_{16} Age_{i,t-1} + \beta_{17} Size_{i,t-1} + \beta_{18} I\_new_{i,t-1} + e_{it} \end{aligned} \quad (2)$$

The fitted values from this model are estimates of expected investments in CapEx in year t, which we denote *CapEx_p*, based on firm characteristics in year t − 1. The regression residuals are proxies for unexpected investments in year t, which we denote *CapEx_r*.

The lease model in Table 2, Panel B has an adjusted R-square of 17.8 percent, suggesting it does a reasonable job of capturing the determinants of firms' future investments in leases. By comparison, the CapEx model (descriptive statistics in Table 3, Panel A and results in Table 3, Panel B) has an adjusted R-square of 34.2 percent, suggesting it does a better job of capturing the determinants of firms' future CapEx investments. However, the R-squares are not directly comparable because the dependent variables and samples differ across regressions. More importantly, results from our tests of economic consequences help evaluate our identification of expected and unexpected investments.

Table 3. CAPEX Investment Model.

Panel A: Variable Descriptive Statistics

Variable	Mean	Std Dev	P1	Q1	Median	Q3	P99
I_new	0.102	0.162	−0.078	0.005	0.050	0.136	0.814
Profitable Growth Opportunities							
V/P	0.524	0.386	−0.120	0.277	0.454	0.691	1.917
Tobin's Q	1.880	1.579	0.428	0.944	1.371	2.188	8.604
SalesGr	0.073	0.211	−0.595	−0.004	0.062	0.158	0.720
Asset Growth	0.161	0.446	−0.366	−0.020	0.066	0.195	1.988
PPE_turnover	10.772	16.651	0.061	2.522	5.704	10.992	94.042
Stock Returns	1.272	0.869	0.235	0.828	1.101	1.450	4.631
Financial Condition and Constraints							
Leverage	0.894	1.505	0.001	0.124	0.458	1.010	8.073
Cash	0.216	0.229	0.001	0.038	0.129	0.322	0.919
OANCF	0.071	0.136	−0.502	0.039	0.090	0.140	0.320
Dloss	0.264	0.441	0.000	0.000	0.000	1.000	1.000
No dividend	0.629	0.483	0.000	0.000	1.000	1.000	1.000
Rating	0.334	0.471	0.000	0.000	0.000	1.000	1.000
ROA_sd	0.028	0.042	0.002	0.007	0.013	0.030	0.230
Ret_sd	0.131	0.078	0.035	0.078	0.111	0.161	0.414
PPE_def	0.250	0.228	0.008	0.076	0.172	0.357	0.888
Firm Characteristics							
Age	2.487	1.028	0.000	1.946	2.639	3.258	4.407
Size	6.543	1.707	3.206	5.299	6.398	7.644	10.789
Maintenance							
I_new_{t-1}	2.487	1.028	0.000	1.946	2.639	3.258	4.407

Table 3. *Cont.*

Panel B: Model Estimation

$$I_{new\,i,t} = \alpha + \beta_1 V/P_{i,t-1} + \beta_2 Tobin'sQ_{i,t-1} + \beta_3 SaleGr_{i,t-1} + \beta_4 AssetGr_{i,t-1} + \beta_5 PPE_{turnover\,i,t-1} + \beta_6 Return_{i,t-1} + \beta_7 Lev_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 OANCF_{i,t-1} + \beta_{10} Dloss_{i,t-1} + \beta_{11} No\ Dividend_{i,t-1} + \beta_{12} Rating_{i,t-1} + \beta_{13} ROA\_sd_{i,t-1} + \beta_{14} Ret\_sd_{i,t-1} + \beta_{15} PPE\_def_{i,t-1} + \beta_{16} Age_{i,t-1} + \beta_{17} Size_{i,t-1} + \beta_{18} I\_new_{i,t-1} + e_{it}$$

Variable	Coefficient	t-statistic	Probability
Profitable Growth Opportunities			
V/P	−0.0286	−11.47	<0.0001
Tobin's Q	0.0100	15.44	<0.0001
SalesGr	0.0197	4.88	<0.0001
Asset Growth	−0.0564	−26.52	<0.0001
PPE_turnover	−0.0001	−1.32	0.186
Stock Returns	0.0152	15.02	<0.0001
Financial Condition and Constraints			
Leverage	−0.0040	−7.39	<0.0001
Cash	0.1073	22.07	<0.0001
OANCF	−0.1015	−13.73	<0.0001
Dloss	−0.0284	−12.76	<0.0001
No dividend	0.0124	6.56	<0.0001
Rating	0.0077	3.39	0.001
ROA_sd	0.0647	3.03	0.002
Ret_sd	−0.0866	−6.68	<0.0001
PPE_def	0.0281	5.79	<0.0001
Firm Characteristics			
Age	−0.0081	−9.46	<0.0001
Size	−0.0050	−7.28	<0.0001
Maintenance			
I_new_{t-1}	0.2940	52.61	<0.0001

Industry Fixed Effects Yes. Year Fixed Effects Yes. Adjusted R^2 0.342. The sample covers 31,872 firm years with available data on Compustat for the period 2001–2016. In Panel A, P1 (P99) is the 1st (99th) percentile of the respective distribution while Q1 (Q3) is the lower (upper) quartile of the respective distribution. We winsorize all continuous variables at the 1% and 99% levels. Each of the independent variables is measured prior to the investment period.I_new equals the sum of research and development (XRD), capital expenditures (CAPX), and acquisitions (AQC), less sale of property, plant and equipment (SPPE) and depreciation(DLC), deflated by beginning of period total assets. I_new_{t-1} equals the lagged value of I_new. PPE_turnover equals sales divided by average property, plant and equipment (PPENT). PPE_def equals lagged property, plant and equipment (PPENT) divided by total assets (AT). All other variable definitions are equivalent to those in the lease investment model in Table 1.

Comparisons of the estimates from the lease model and the CapEx model reveal important differences in the economic roles of the two forms of investment. Generally, the two forms of investment are similar in their relation to profitable growth opportunities, firm characteristics (Age and Size), and maintenance. However, we observe key differences in measures of financial condition and constraints. Consistent with the relatively low capital needs for leased investments, leasing is neither hampered by high leverage nor heightened by cash on hand. In contrast, leverage curtails CapEx but cash on hand enables it. Leasing is positively related to operating cash flows, whereas CapEx is negatively related to operating cash flows.

We recognize the concerns associated with potential biases arising from using residuals from a first stage regression as dependent variables in second stage tests (e.g., Chen et al. 2018). To be clear, our research design does not face this concern. We use residuals from our first stage expectations models as *independent* variables in second stage tests of economic consequences.

We also recognize that lease investment decisions are likely made in conjunction with the decision to invest in CapEx (the lease vs. buy decision), along with other important decisions, including mergers and acquisitions, debt and equity issues, and capital structure. Ideally, we would like to simultaneously estimate all of these decisions, using a wide array of different determinants, within firms across time. Data limitations prevent such an ambitious undertaking from achieving meaningful and well-specified results. As a consequence, we follow the common approach in this literature, and examine the lease investment decision in its own right, acknowledging that our estimates of expected and unexpected investments in leases will be measured with some degree of error. The noise from this measurement error will limit the power of our tests of economic consequences.

4. Empirical Tests and Results

4.1. Free Cash Flows, Financial Reporting Quality, and Overinvestment

The investment efficiency literature suggests that both under- and over-investment in CapEx are less pervasive among firms with free cash flows constraints (Jensen 1986; Lang et al. 1991; Richardson 2006; and others) and higher quality financial reporting, which enables more effective monitoring. Do these factors also curb investment inefficiency in leases? Unlike CapEx, monitoring and cash flow constraints may have been less effective with leases during our sample period because leases were off-balance sheet arrangements that did not require much up-front cash outflow.

4.1.1. Free Cash Flows

In Table 4, we examine how unexpected investments in leases relate to unexpected investments in CapEx and free cash flows. We first sort firms into quintiles based on Lease_r. If leasing and CapEx are substitute mechanisms for investment, we expect to observe high (low) levels of CapEx_r in low (high) Lease_r quintiles. The results in Table 4 indicate this is not the case. Unexpected CapEx investments are increasing across quintiles of unexpected lease investments. We find that the lowest (highest) Lease_r quintile has the lowest (highest) values of CapEx_r, suggesting they are complementary mechanisms for investments. However, if firms pursue investment strategies through leasing primarily when free cash flows are constrained for CapEx, we expect free cash flows to be low in the high Lease_r quintile. Indeed, we find that the firms in the two highest quintiles of Lease_r have negative free cash flows, and we find that mean (median) free cash flows for the top quintile Lease_r firms are significantly lower than those of the bottom quintile firms. This suggests unexpected investments in leased assets can occur even among firms experiencing cash flow constraints.

Table 4. Unexpected Investments in Leases and Capital Expenditures, and Free Cash Flows Descriptive Statistics by Lease Residual Quintile.

Quintile		Lease_r	CapEx_r	FCF	ROA	Sale_chg
Q1	Mean	−0.052	−0.022	−0.011	0.001	0.075
(lowest)	Median	(−0.041)	(−0.036)	(0.011)	(0.043)	(0.073)
Q2	Mean	−0.016	−0.019	−0.005	0.006	0.084
	Median	(−0.016)	(−0.028)	(0.015)	(0.047)	(0.069)
Q3	Mean	−0.004	−0.009	−0.009	−0.004	0.071
	Median	(−0.004)	(−0.023)	(0.014)	(0.041)	(0.058)
Q4	Mean	0.008	0.000	−0.012	−0.016	0.075
	Median	(0.008)	(−0.015)	(0.013)	(0.033)	(0.052)
Q5	Mean	0.065	0.040	−0.011	0.000	0.201
(highest)	Median	(0.042)	(−0.001)	(0.011)	(0.043)	(0.144)
Difference	Mean	0.117	0.062	0.000	−0.001	0.126
	Pr > |t|	<0.0001	<0.0001	0.4807	0.4437	<0.0001
	Median	0.083	0.035	−0.001	0.000	0.071
	Wilcox−p	0.0000	0.0000	0.7113	0.0982	0.0000

The sample includes 12,204 firm-year observations 2001–2016 for our combined lease and capital expenditure sample. We sort the sample into quintiles based on the size of Lease_r, the estimated residual value from the expected lease investment model in (1). CapEx_r equals the residual value from Equation (2), the estimate of the residual capital expenditure investment. FCF equals free cash flows, defined as operating cash flows less depreciation and amortization plus research and development less expected CapEx investment (based on the fitted value from our estimate of Equation (2), all deflated by average total assets. ROA equals income before extraordinary items, divided by average total assets. Sale_chg equals current sales less lagged sales, deflated by beginning of year assets.

To confirm whether unexpected investments in leased assets and CapEx have different sensitivity to free cash flows, we sort firms into quintiles based on free cash flows. As shown in Figure 1, the slope of Lease_r is relatively flat across free cash flow quintiles, whereas it is steep for CapEx_r. Comparing Lease_r across extreme quintiles of free cash flows (untabulated), we observe a difference of only 0.002 ($p < 0.239$; 0.2% of total assets). In contrast, comparing CapEx_r across extreme quintiles of free cash flows reveals a difference of 0.057 ($p < 0.001$; 5.7% of total assets). Firms with low free cash flows are much more likely to exhibit unexpectedly low CapEx whereas firms with high free cash flows are much more likely to exhibit unexpectedly high CapEx. Unexpected investments in leases are much less sensitive to free cash flows.

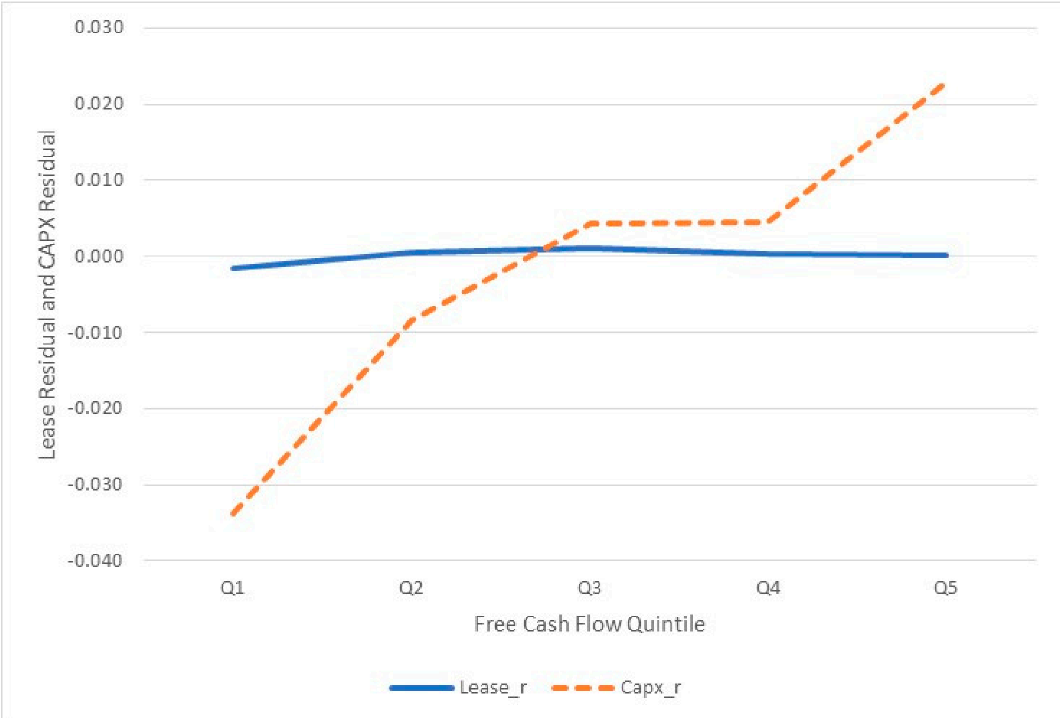

Figure 1. Lease Residuals and CAPEX Residuals by Free Cash Flow Quintiles.

In Figure 1, we group firms into quintiles by free cash flows. For each quintile, we plot the average lease residual and the average CapEx residual. N = 12,204 firm-years.

More formally, we regress unexpected investments in leases and capital expenditures on free cash flows, allowing the coefficient to vary based on the sign of free cash flows. Jensen's (1986) free cash flow hypothesis predicts that the sensitivity of capital expenditures should be asymmetric and more pronounced when free cash flows are positive. In contrast, leasing uses less upfront cash outflow. The results (untabulated) support this prediction. Specifically, CapEx_r is highly sensitive to positive free cash flows, and Lease_r is much less sensitive to positive free cash flows.

4.1.2. Financial Reporting Quality

We now turn our attention to whether better monitoring through higher financial reporting quality, which has been shown to limit firms' propensities to over- and under-invest in CapEx (e.g., Biddle et al. 2009) also help limit investment inefficiency in leases. Compared to investment inefficiencies in CapEx, we predict leases will be less sensitive to better monitoring through higher financial reporting quality. For this analysis, we estimate a modified Dechow and Dichev (2002) accruals model, augmented with property, plant, and equipment and the change in revenues. Our proxy for accounting quality (AQ) is the standard deviation of the residuals from the model over the prior 5 years. To group firms on AQ, we first sort the sample into free cash flow quintiles (to control for free cash flows), and then sort (in descending order) by AQ within each free cash flow quintile. We form portfolios on the second stage sort, so that we have variation in AQ holding FCF relatively constant. To examine unexpected investments, we compute the absolute value of the investment model residuals within each AQ quintile.

Table 5 reports the mean absolute values of Lease_r and CapEx_r within each AQ quintile. For unexpected investments in leases, the absolute value of Lease_r is 0.029 among the firms with the poorest accounting quality (Quintile 1, AQ = 0.094), and the absolute value is 0.027 among the firms with the highest accounting quality (Quintile 5, AQ = 0.016). The pattern across quintiles is not monotonic, and the difference across extreme quintiles is only marginally statistically significant (p = 0.105). For CapEx_r, the absolute value is 0.078 among the firms with the poorest accounting quality, compared to an absolute value of 0.061 among the firms with the highest accounting quality. The pattern across quintiles is monotonic, and the difference across extreme quintiles is statistically significant (p = 0.001). These results suggest that unexpected investments in leases are sensitive to financial reporting quality, but not nearly as sensitive as unexpected investments in CapEx.

Table 5. Free Cash Flows, Accounting Quality and Unexpected Investments in Leases and CAPEX.

Panel A: Quintile Means after Sorting by Free Cash Flows and Accounting Quality							
Quintile	**N**	**FCF**	**AQ**	**Lease_r**	**Lease_rabs**	**CapEx_r**	**CapEx_rabs**
Low quality	1857	−0.003	0.094	0.000	0.029	0.003	0.078
2	1895	0.005	0.055	0.000	0.028	−0.003	0.072
3	1893	0.007	0.039	−0.001	0.028	−0.002	0.068
4	1895	0.012	0.027	0.000	0.029	−0.003	0.062
High quality	1871	0.008	0.016	0.000	0.027	−0.001	0.061

Panel B: Tests of Difference Across Quintiles				
	Lease_r	**Lease_rabs**	**CapEx_r**	**CapEx_rabs**
Low–High difference:	0.000	0.002	0.004	0.016
T Value	0.23	−1.62	−1.12	−5.42
Pr > |t|	0.821	0.105	0.261	<0.0001

The sample includes 9411 firm-year observations 2001–2016 for our combined lease and capital expenditure (Compustat) sample that also have the accounting quality measure. We first sort the sample into quintiles by free cash flows (FCF) in the contemporaneous period. Then, within each of the FCF quintiles, we sort the sample into Accounting Quality (AQ) quintiles. Each cell contains the mean value. AQ is measured using the Dechow and Dichev (2002) model augmented with property, plant, and equipment and change in revenues and equals the standard deviation of the residuals from the model over the prior 5 years. Lease_r equals the residual value from Equation (1), the estimate of the residual lease change. Lease_rabs equals the absolute value of the residual value from Equation (1), the estimate of the residual lease change. CapEx_r equals the residual value from Equation (2), the estimate of the residual capital expenditure investment. CapEx_rabs equals the absolute value of the residual value from Equation (2), the estimate of the residual capital expenditure investment. FCF equals free cash flows, defined as operating cash flows less depreciation and amortization plus research and development, deflated by beginning total assets less expected investment modeled using Equation (2).

4.2. Cross-Sectional Tests of Future Performance

4.2.1. Future Performance: One-Year Ahead Changes in Sales and Earnings

We begin our empirical tests of economic consequences by examining the relationships between expected and unexpected investments in leased assets and changes in the firm's future performance. We estimate the following general model, varying the dependent variable:

$$\begin{aligned} Future\ Performance_{i,t+1} &= \alpha + \beta_1 Lease\_r_{i,t} + \beta_2 Lease\_p_{i,t} + \beta_3 CapEx\_r_{i,t} + \beta_4 CapEx\_p_{i,t} + \beta_5 IB_{i,t} \\ &+ \beta_6 SalesGr_{i,t} + \beta_7 ACC_{i,t} + \beta_8 Size_{i,t} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it+1} \end{aligned} \quad (3)$$

The future performance metrics we examine include one-year-ahead changes in sales and net income before extraordinary items, each measured as next year's value less the current year's value, with the difference then scaled by current year total assets (because of this order of calculation, these variables cannotbe interested as the change in asset turnover or ROA). Our primary test variables are the expected (*Lease_p*) and unexpected (*Lease_r*) investments in leases from Equation (1). We control for current earnings, sales growth, accruals, and size (similar to Doyle et al. 2003). To control for endogeneity, we also include controls for year and industry fixed effects, and conduct all of our statistical tests using clustered standard errors (by gvkey). (In supplemental analyses we also run our tests using two-way clustered standard errors, by gvkey and industry, and obtain similar test results.) We predict that Lease_r will relate positively to future sales growth, but negatively to future earnings growth. For comparative analysis, we also include the expected (*CapEx_p*) and residual (*CapEx_r*) investments in CapEx from Equation (2).

Table 6, Panel A provides descriptive statistics and Panel B provides correlations. The typical firm experienced a change in one-year-ahead sales averaging 8.5 percent of total assets, and a one-year-ahead change in earnings averaging 1.1 percent of total assets. The correlations in Panel B suggest that unexpected leases relate positively to one-year-ahead sales changes (0.136) and negatively to changes in one-year-ahead income before extraordinary items (−0.038).

Table 6. Future Performance Tests.

Panel A: Descriptive Statistics

Variable	Mean	Std Dev	P1	Q1	Median	Q3	P99
Sale1_chg	0.085	0.235	−0.564	−0.015	0.066	0.182	0.845
IB1_chg	0.011	0.132	−0.347	−0.022	0.008	0.034	0.468
IB	0.005	0.172	−0.714	−0.018	0.043	0.090	0.298
SalesGr	0.099	0.245	−0.554	−0.010	0.074	0.195	0.940
ACC	−0.077	0.090	−0.370	−0.113	−0.066	−0.029	0.141
Size	6.390	1.557	3.194	5.290	6.283	7.424	10.362
Lease_p	0.014	0.023	−0.026	−0.001	0.010	0.023	0.095
Lease_r	0.000	0.048	−0.123	−0.020	−0.004	0.012	0.201
CapEx_p	0.095	0.092	−0.049	0.036	0.072	0.129	0.412
CapEx_r	−0.002	0.110	−0.189	−0.059	−0.021	0.025	0.475

Panel B: Correlations

	Sale1_chg	IB1_chg	Lease_r	Lease_p	IB	SalesGr	ACC	Size	CapEx_p	CapEx_r
Sale1_chg		0.165 ***	0.136 ***	0.191 ***	0.150 ***	0.361 ***	0.069 ***	−0.021 **	0.039 ***	0.092 ***
IB1_chg	0.313 ***		−0.038 ***	−0.068 ***	−0.278 ***	−0.072 ***	−0.383 ***	−0.048 ***	−0.049 ***	−0.031 ***
Lease_r	0.106 ***	0.001		0.005	0.010	0.197 ***	−0.011	0.028 ***	0.007	0.201 ***
Lease_p	0.228 ***	−0.065 ***	−0.271 ***		0.275 ***	0.347 ***	−0.040 ***	−0.019 **	0.059 ***	−0.009
IB	0.270 ***	−0.152 ***	−0.007	0.422 ***		0.262 ***	0.413 ***	0.340 ***	−0.460 ***	−0.098 ***
SalesGr	0.424 ***	−0.010	0.114 ***	0.388 ***	0.412 ***		0.116 ***	0.003	0.128 ***	0.160 ***
ACC	0.045 ***	−0.233 ***	0.006	−0.030 ***	0.283 ***	0.115 ***		0.079 ***	−0.073 ***	−0.092 ***
Size	−0.009	−0.029 ***	0.086 ***	0.014	0.249 ***	0.011	0.069 ***		−0.440 ***	0.056 ***
CapEx_p	0.083 ***	−0.024 ***	−0.043 ***	0.118 ***	−0.052 ***	0.209 ***	−0.059 ***	−0.426 ***		0.021 **
CapEx_r	0.089 ***	−0.030 ***	0.181 ***	−0.065 ***	−0.047 ***	0.066 ***	−0.070 ***	0.122 ***	−0.157 ***	

Panel C: Future Performance Tests—Sales and Earnings Growth

$$Future\ Performance_{i,t+1} = \alpha + \beta_1 Lease_{ri,t} + \beta_2 Lease_{pi,t} + \beta_3 CapEx_{ri,t} + \beta_4 CapEx_{pi,t} + \beta_5 IB_{i,t} + \beta_6 SalesGr_{i,t} + \beta_7 ACC_{i,t} + \beta_8 Size_{i,t} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it+1}$$

	Sale1_chg	IB1_chg
Lease_r	0.337	−0.104
	(7.24)	(−3.74)
Lease_p	0.756	−0.069
	(5.33)	(−0.66)
CapEx_r	0.088	−0.108
	(4.20)	(−7.73)
CapEx_p	0.103	−0.290
	(2.43)	(−6.56)
IB	0.099	−0.208
	(4.71)	(−9.52)
SalesGr	0.280	0.051
	(16.63)	(7.01)
ACC	0.022	−0.445
	(0.67)	(−16.17)
SIZE	−0.004	0.000
	(−2.60)	(0.43)
Year Indicators	Yes	Yes
Industry Indicators	Yes	Yes
Adjusted R^2	0.199	0.210

Table 6. *Cont.*

Panel D: Future Performance Tests—Sales and Earnings Growth within Subsamples of Unexpected Lease Changes

$$Future\ Performance_{i,t+1} = \alpha + \beta_1 Lease_{ri,t} + \beta_2 Lease_{pi,t} + \beta_3 CapEx_{ri,t} + \beta_4 CapEx_{pi,t} + \beta_5 IB_{i,t} + \beta_6 SalesGr_{i,t} + \beta_7 ACC_{i,t} + \beta_8 Size_{i,t} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it+1}$$

	Sales Changes		**Earnings Changes**	
	Lease_r > 0	**Lease_r < 0**	**Lease_r > 0**	**Lease_r < 0**
Lease_r	0.119	0.540	−0.213	−0.116
	(1.73)	(4.07)	(−4.82)	(−1.75)
Lease_p	0.966	0.976	0.145	−0.175
	(4.38)	(4.03)	(1.13)	(−1.04)
CapEx_r	0.070	0.121	−0.103	−0.110
	(2.54)	(3.78)	(−6.13)	(−4.54)
CapEx _p	0.092	0.108	−0.321	−0.270
	(1.43)	(1.94)	(−5.56)	(−4.29)
IB	0.093	0.093	−0.229	−0.198
	(2.98)	(3.27)	(−7.62)	(−6.72)
SalesGr	0.272	0.281	0.049	0.052
	(12.33)	(11.60)	(4.83)	(5.21)
ACC	0.024	0.026	−0.418	−0.463
	(0.54)	(0.59)	(−10.20)	(−12.91)
SIZE	−0.006	−0.005	0.000	0.001
	(−2.34)	(−2.39)	(−0.15)	(0.45)
Year Indicators	Yes	Yes	Yes	Yes
Industry Indicators	Yes	Yes	Yes	Yes
Observations	5161	7043	5161	7043
Adjusted R^2	0.225	0.175	0.208	0.213

The sample covers 12,204 firm years with available data on Compustat for the period 2001–2016. Sale1_chg equals one-year-ahead sales less current sales, divided by total assets. IB1_chg equals one-year-ahead IB less current IB, divided by total assets. Lease equals future lease obligations discounted with firm-specific discount rate (as detailed in Appendix A); Lease_change equals lease less lagged Lease, divided by lagged total assets. Lease_r equals the residual value from Equation (1) is the estimate of the residual lease change. Lease_p equals the fitted value from Equation (1) is the estimate of the expected lease change. IB equals income before extraordinary items, divided by lagged total assets. SalesGr equals sales less lagged sales, divided by lagged total assets. ACC equals income before extraordinary items less operating cash flows (OANCF), divided by lagged total assets. Size equals natural log of lagged total assets). CapEx_r (CapEx_p) is the estimate of the residual (expected) capital expenditures, equaling the residual (expected) value from Equation (2). In Panel A, P1 (P99) is the 1st (99th) percentile of the respective distribution while Q1 (Q3) is the lower (upper) quartile of the respective distribution. In Panel B, Pearson (Spearman) correlations are reported above (below) the diagonal and *, **, and *** indicate statistically significant at 0.01, 0.05 and, 0.001 level, respectively. In Panels C and D, t-statistics are clustered by firm and reported in parentheses. We define industry following Barth et al. (1998). Year (industry) Indicators is a vector of indicator variables to capture annual (industry) fixed effects. In Panel D, the second and fourth (third and fifth) columns contain results for firm-years in which Lease_r was greater than (less than) zero. t-statistics are reported in parentheses.

Panel C presents the results from estimating Equation (3). In the first column, we find one year ahead sales growth is increasing in unexpected lease changes (0.337, t-statistic = 7.24). However, in the second column of results, we find that one year ahead earnings growth is decreasing in unexpected lease changes (−0.104, t-statistic = −3.74). These results are consistent with potential over-investments in leases: faster sales growth from additional leases should drive earnings up; however, the additional operating costs and expenses associated with unexpected investments in leases grow even faster, causing slower growth in net income. By contrast, expected lease changes relate positively to future sales growth (0.756, t-statistic = 5.33), but have a neutral relation with future earnings growth.

We find similar results for unexpected CapEx. One year ahead sales growth is increasing in unexpected CapEx (0.088, t-statistic = 4.20) but one year ahead earnings growth is decreasing (−0.108, t-statistic = −7.73). These patterns also extend to expected CapEx, which is positively associated with future sales changes (0.103, t-statistic = 2.43) and negatively associated with future earnings changes (−0.290, t-statistic = −6.56). Thus, expected CapEx has similar empirical properties to unexpected CapEx: both components positively relate to future sales growth but negatively relate to future earnings growth. This finding casts doubt on the ability of our expected CapEx model to cleanly distinguish efficient from inefficient investment.

These results suggest that unexpected investments in both leased assets and CapEx have strong incremental effects increasing firms' future sales growth, but decreasing future earnings growth. The results also confirm that, despite the modest R-square, our lease model appears to produce an empirically valid distinction between efficient and inefficient investment in leased assets. In contrast, the CapEx model is less effective in distinguishing efficient investment from inefficient investment.

4.2.2. Future Performance within Subsamples: Over- vs. Under-Investment

In this section, we examine unexpected investments in leased assets more deeply by splitting the sample into two subsamples based on the sign of the unexpected lease change (Lease_r). We examine whether the consequences of potential over-investments are concentrated within the set of positive unexpected investments in leases. These are more demanding tests because they examine whether sales and earnings consequences arise from the magnitude of unexpected investments.

We sort our subsample of firms with positive unexpected lease changes (Lease_r > 0) into quintiles each year. For each quintile, we calculate the average change in sales and the average change in earnings next year, divided by current year total assets. We depict the results in Figure 2. These patterns show firms generate greater future sales increases but lower future earnings changes with increasing amounts of unexpected investment in leased assets. Our regression-based analyses with controls support these univariate patterns. Table 6, Panel D reports the results from examining the relations between one-year-ahead changes in sales and earnings and unexpected changes in leases within the two subsamples. Within the subsample of firms with Lease_r > 0 (in the first and third columns of results), future changes in sales are increasing in unexpected lease changes (0.119; t-statistic = 1.73), and future changes in earnings are decreasing (−0.213; t-statistic = −4.82). In addition, these future economic consequences are robust and incremental to the consequences associated with expected and unexpected CapEx. These regression results suggest that, among the firms that seemingly over-invest in leases, larger amounts of over-investment relate to larger future sales increases, but lower future earnings changes.

In Figure 2, we group firms into quintiles by positive unexpected lease changes. We estimate unexpected lease changes using the lease investment model in Equation (1). For each quintile, we plot the average change in sales and the average change in earnings for the subsequent year. N = 5161 firm-years.

We also examine the subsample of firms with Lease_r < 0 (columns two and four). Keep in mind that, because these observations are negative numbers (Lease_r < 0), the parameter estimates must be interpreted in the opposite direction. We find that, by contrast, when managers seemingly under-invest in leases, larger amounts of under-investment relate negatively to future changes in sales (0.540; t-statistic = 4.07), and positively to future changes in earnings (−0.116; t-statistic = −1.75).

Table 6, Panel D also reports the results from examining the relations between one-year-ahead changes in sales and earnings and predicted changes in leases (Lease_p) within the two subsamples. In both subsamples, future changes in sales are strongly increasing in predicted lease changes. Predicted lease changes have a neutral relation with future changes in earnings for both over- and under-investment subsamples.

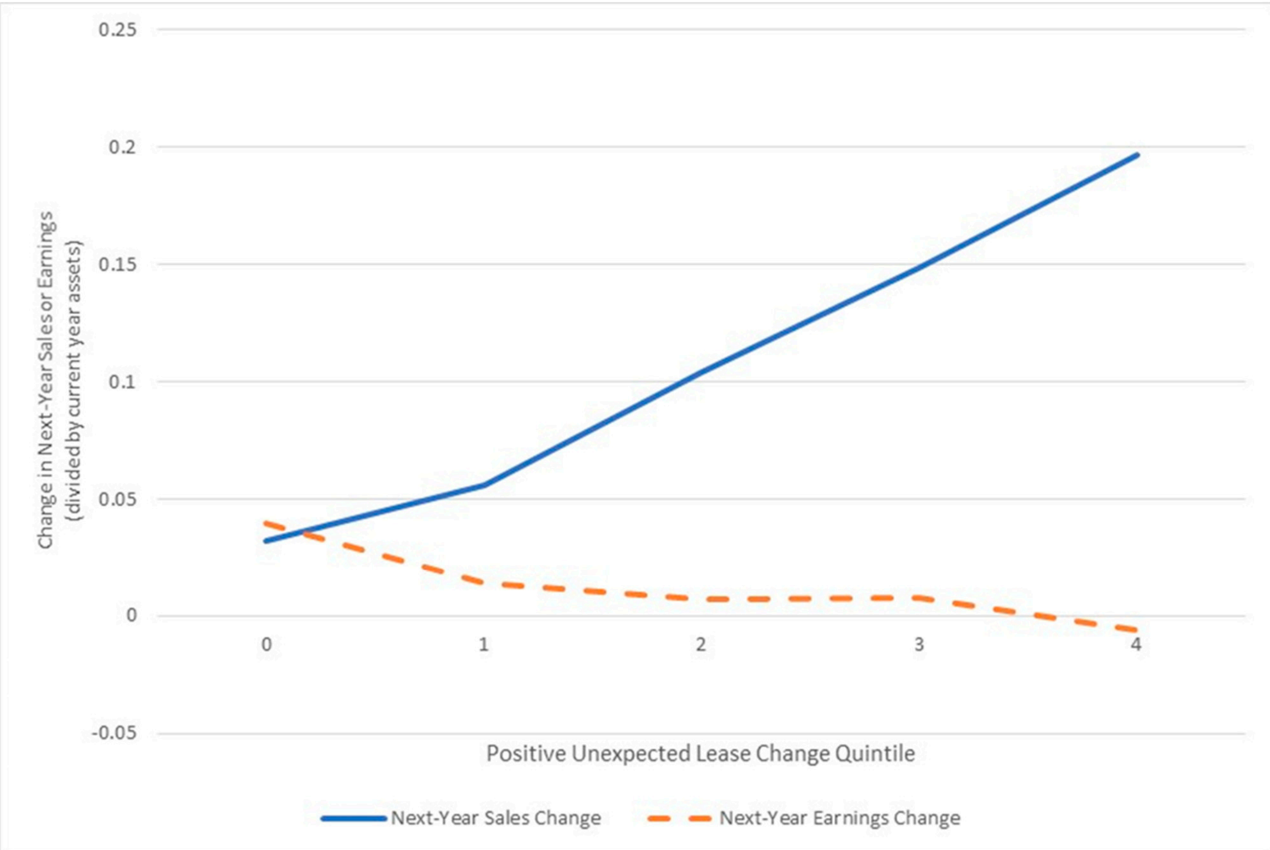

Figure 2. Next-year Changes in Sales and Earnings by Positive Unexpected Lease Change Quintile.

4.2.3. Tests of Longer-Run Future Performance

It may take more than one year for some leased assets to reach their full productive potential for future sales and earnings growth. Periodic lease payments usually begin to accrue upon the inception of the lease, but the leased asset may not generate sales for weeks or months, and may not reach its full revenue and earnings generating potential until well after the first year. To capture the impact of leases on longer-term firm performance we extend the analysis by examining the changes in sales and earnings for years +2 and +3.

The results in Table 7 reveal that the inferences for year +1 are robust and persist to years +2 and +3. Expected and unexpected lease changes are positively associated with sales growth during years +2 and +3. Unexpected lease changes are negatively associated with future earnings changes in year +2 and year +3. Expected lease changes have a neutral association with earnings changes in year +2 and a positive association with changes in earnings for year +3. These results reveal that the sales growth and earnings consequences of unexpected investments in leased assets in year t continue for at least three years. Overall, these results confirm that our expected lease change model effectively decomposes lease changes into efficient and inefficient investments.

For CapEx, unexpected CapEx is unrelated to changes in sales in year +2 but positively related in year +3, and it is negatively related to changes in earnings over years +2 and +3. CapEx_p is strongly positively related to sales changes over years +2 and +3. However, CapEx_p is strongly negatively related to earnings changes over these years. For year +2 and +3, the negative association with future earnings changes is stronger for CapEx_p than for unexpected CapEx. These results suggest that the proxy for the expected component of CapEx contains some degree of inefficient investment.

The last four columns of Table 7 examine the subsample of firm-years with positive unexpected lease investments. Within this subsample, we find positive but not significant associations with changes in sales in year +2 (t = 0.32) and year +3 (t = 0.21). However, we do find significant negative relations with future earnings changes in year +2 (t = −3.36) and year +3 (t = −2.33). Within this subsample, expected lease investments continue to have a positive association with changes in sales and a neutral relation with changes in earnings in year +2 or year +3. Overall, these results reveal that within the subsample of firms with larger than expected investments in leases, earnings growth declines over a three-year horizon.

Table 7. Association between Investments in Leases and Two-Year-Ahead and Three-Year-Ahead Performance.

$$2\ or\ 3 - year\ Future\ Performance_{i,t+2,3} = \alpha + \beta_1 Lease_{ri,t} + \beta_2 Lease_{pi,t} + \beta_3 CapEx_{ri,t} + \beta_4 CapEx_{pi,t} + \beta_5 IB_{i,t} + \beta_6 SalesGr_{i,t} + \beta_7 ACC_{i,t} + \beta_8 Size_{i,t} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it+2,3}$$

					Lease_r > 0	Lease_r > 0	Lease_r > 0	Lease_r > 0
	Sale2_chg	IB2_chg	Sale3_chg	IB3_chg	Sale2_chg	IB2_chg	Sale3_chg	IB3_chg
Lease_r	0.444	−0.078	0.430	−0.073	0.045	−0.205	0.051	−0.178
	(4.71)	(−2.13)	(2.84)	(−1.61)	(0.32)	(−3.36)	(0.21)	(−2.33)
Lease_p	1.903	0.122	2.769	0.287	2.362	0.049	3.246	0.196
	(6.19)	(0.84)	(5.49)	(1.66)	(5.22)	(0.25)	(4.45)	(0.85)
CapEx_r	0.049	−0.112	0.126	−0.113	−0.022	−0.095	0.027	−0.105
	(1.17)	(−5.98)	(1.80)	(−4.53)	(−0.40)	(−3.94)	(0.31)	(−3.46)
CapEx_p	0.328	−0.391	0.441	−0.382	0.379	−0.276	0.646	−0.291
	(3.40)	(−6.55)	(2.71)	(−5.57)	(2.84)	(−3.41)	(3.07)	(−3.21)
IB	0.223	−0.289	0.306	−0.326	0.220	−0.256	0.325	−0.310
	(5.00)	(−9.72)	(4.10)	(−9.38)	(3.60)	(−6.00)	(3.31)	(−6.48)
SalesGr	0.428	0.044	0.614	0.030	0.408	0.042	0.605	0.036
	(11.64)	(4.27)	(11.07)	(2.45)	(9.02)	(2.95)	(8.87)	(2.28)
ACC	0.044	−0.500	−0.003	−0.497	0.065	−0.442	−0.033	−0.483
	(0.67)	(−13.79)	(−0.03)	(−11.83)	(0.69)	(−7.58)	(−0.20)	(−7.29)
Size	−0.014	0.002	−0.032	0.003	−0.016	0.000	−0.029	0.001
	(−3.35)	(1.72)	(−4.38)	(1.80)	(−2.96)	(0.05)	(−3.26)	(0.54)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.174	0.211	0.168	0.196	0.203	0.179	0.212	0.185

The sample covers 10,828 (9574) firm years with available data for the two-year-ahead (three-year-ahead) tests. Sale2_chg (Sale3_chg) equals the two-year-ahead (three-year-ahead) sales less current sales, divided by total assets. IB2_chg (IB3_chg) equals two-year-ahead (three-year-ahead) IB less current IB, divided by total assets. Remaining variables are defined in Table 3. t-statistics, clustered by firm, are shown in parentheses below the coefficients.

4.3. Cross-Sectional Tests of Contemporaneous Returns

In our next set of tests, we examine the extent to which the market incorporates the change in leased assets into share price. If the market observes the firm increasing its investments in leases and understands the negative implications for future earnings, we expect to observe a negative relation with contemporaneous returns. However, increases in lease obligations also increase the cost of capital. Prior research has established that an increase in the present value of lease obligations is associated with increased leverage and credit risk, as well as higher costs of equity capital (Bratten et al. 2013; Dhaliwal et al. 2011), which should trigger a decline in share price. A negative relation between lease changes and returns could therefore reflect greater leverage (a discount rate effect), lower expected future cash flows because of lower future earnings (a cash flow effect), or both.

4.3.1. Controlling for Changes in Expected Returns

Our prior results show unexpected investments in leased assets have a strong negative effect on future earnings, and therefore on future cash flows. We seek to isolate and test whether the capital markets detect and price the negative cash flow effects from unexpected investments in leases, apart from the discount rate effects. Therefore, to isolate the effects of unexpected investments in leases on discount rates from the effects on expectations of future cash flows, we rely on a proxy for the change in the market's expected return, Expret_chg, developed in Penman and Yehuda (2016). Penman and Yehuda (2016) estimate expected returns using the following cross-sectional regression model:

$$R_t = \alpha + \beta_1 \frac{Earnings_{t-1}}{P_{t-1}} + \beta_2 \frac{B_{t-1}}{P_{t-1}} + \beta_3 ACCR_{t-1} + \beta_4 INVEST_{t-1} + \beta_5 \Delta NOA_{t-1} + \varepsilon_t \tag{4}$$

Following Penman and Yehuda (2016), R_t equals the raw buy-and-hold return for year t, calculated as compounded monthly returns from CRSP over the period from three months after the beginning of the fiscal year t to three months after the end. Earnings_{t-1} equals earnings before extraordinary items (Compustat item IB) and special items (item SPI), minus preferred dividends (item DVP), with a tax allocation to special items at the prevailing federal statutory corporate income tax rate for the year. $\text{Earnings}_{t-1}/P_{t-1}$ is the earnings yield for fiscal year t. B_{t-1}/P_{t-1} equals book value of common equity divided by market value of equity. ACCR_{t-1} equals accruals divided by average total assets. We measure accruals as the sum of the change in accounts receivable (item RECT), the change in inventory (item INVT), and the change in other current assets (item ACO), minus the sum of the change in accounts payable (item AP) and the change in other current liabilities (item LCO), minus depreciation and amortization expense (item DP). INVEST_{t-1} equals investment calculated as the change in gross property, plant, and equipment (item PPENT) plus the change in inventory (item INVT)) divided by lagged assets. ΔNOA_{t-1} equals the change in net operating assets divided by average total assets. Although we follow Penman and Yehuda (2016) methodology faithfully, we make two adaptations to incorporate the fact that leased assets are operating assets. Specifically, we include the Lease_change value in both the investment measure (INVEST) and the change in net operating assets measure (ΔNOA).

Following Penman and Yehuda (2016), we estimate this cross-sectional returns model annually, and compute the mean coefficients over a rolling 10-year period prior to year $t-1$. We then estimate the expected return for each firm in year $t-1$ by applying the estimated coefficients in regression (4) to observed accounting variables for each firm out of sample:

$$E_{t-1}(R_t) = \hat{\alpha} + \hat{\beta_1}\frac{Earnings_{t-1}}{P_{t-1}} + \hat{\beta_2}\frac{B_{t-1}}{P_{t-1}} + \hat{\beta_3}ACCR_{t-1} + \hat{\beta_4}INVEST_{t-1} + \hat{\beta_5}\Delta NOA_{t-1} \quad (5)$$

We then estimate the expected return for year t the same way, using the rolling mean coefficients estimated over the 10 years prior to year t. We then compute the change in expected return during period t as $\Delta E_t(R_{t+1}) = E_t(R_{t+1}) - E_{t-1}(R_t)$. We use this measure as the control for changes in firms' discount rates, in order to isolate the cash flow effects of over-investments in leases on stock returns.

In Table 8, Panel A provides descriptive statistics of the variables we use to estimate the expected returns model, and Table B provides correlations. Each of the variables exhibit the expected correlation in Panel B, with the exception of the relationship between Hret_1 and $\text{Earnings}_t/P_t$ in the Pearson correlation. In Panel C, we report the model estimation results we use to compute the change in expected returns, including the mean coefficient estimates and t-statistics. For their 1963–2012 sample period, Penman and Yehuda (2016) report a positive relation between current returns and the lagged earnings yield and the lagged book to price ratio, and a negative relation with lagged accruals, lagged investment, and lagged change in net operating assets. Penman and Yehuda (2016) report an adjusted R-square of 4 percent. For our 2001 to 2014 sample period, we report an adjusted R-square of 3.6 percent, and also find a positive relation for the lagged earnings yield and lagged book to price ratio. In contrast, the accruals, investment, and change in net operating assets variables are not significant.

Table 8. Penman and Yehuda (2016) Model for Expected Returns.

Panel A: Descriptive statistics

Variable	Mean	Std Dev	P1	Q1	Median	Q3	P99
Hret_1	0.114	0.565	−0.870	−0.207	0.068	0.336	2.031
Earn_p	0.002	0.150	−0.546	−0.009	0.035	0.059	0.185
B_P	0.496	0.366	0.044	0.245	0.412	0.646	1.812
Accruals	−0.035	0.058	−0.196	−0.064	−0.034	−0.007	0.131
Invest	0.045	0.105	−0.124	−0.008	0.020	0.068	0.473
Noach	0.055	0.138	−0.231	−0.020	0.030	0.102	0.564

Panel B: Correlations

	Hret_1	Earn_p	B_P	Accruals	Invest	Noach
Hret_1		−0.053 ***	0.150 ***	−0.015 ***	−0.065 ***	−0.074 ***
Earn_p	0.122 ***		−0.122 ***	0.153 ***	0.096 ***	0.174 ***
B_P	0.123 ***	0.170 ***		−0.026 ***	−0.047 ***	−0.057 ***
ACCR	−0.019 ***	0.164 ***	−0.019 ***		0.190 ***	0.384 ***
Invest	−0.060 ***	0.194 ***	−0.072 ***	0.250 ***		0.687 ***
Noach	−0.070 ***	0.195 ***	−0.066 ***	0.441 ***	0.731 ***	

Panel C: Estimation of the Penman and Yehuda (2016) Model for Expected Returns

$$R_t = \alpha + \beta_1 \frac{Earnings_{t-1}}{P_{t-1}} + \beta_2 \frac{B_{t-1}}{P_{t-1}} + \beta_3 ACCR_{t-1} + \beta_4 INVEST_{t-1} + \beta_5 \Delta NOA_{t-1} + \varepsilon_t$$

	Intercept	$Earnings/P_{t-1}$	B_{t-1}/P_{t-1}	$ACCR_{t-1}$	$INVEST_{t-1}$	ΔNOA_{t-1}	Adj. R^2
Coefficient:	0.082	0.191	0.089	−0.003	−0.091	−0.083	0.036
t-statistic:	2.41	2.01	2.66	−0.17	−0.68	−0.66	

The sample we use to estimate the expected returns model consists of all non-financial firms with market value of equity greater than USD 50 million, price greater than USD 1, positive shareholders' equity, and the model variables. The sample covers 29,312 firm years with available data for the period 1999–2017. Hret_1 equals stock return for year t, calculated as buy-and-hold compounded monthly returns from CRSP over the period from three months after the beginning of the fiscal year t to three months after the end. This is the period during which accounting data for fiscal year is reported. Earn_p equals earnings for fiscal-year t before extraordinary items (Compustat item IB) and special items (item SPI), minus preferred dividends (item DVP), with a tax allocation to special items at the prevailing federal statutory corporate income tax rate for the year. $Earnings_{t-1}/P_{t-1}$ is the earnings yield for fiscal year t. B_P equals book value of common equity divided by market value of equity. Accruals equals accruals divided by average total assets. Accruals is measured as the sum of change in accounts receivable (item RECT), change in inventory (item INVT), and change in other current assets (item ACO), minus the sum of change in accounts payable (item AP) and change in other current liabilities (item LCO), minus depreciation and amortization expense (item DP). Invest equals investment calculated as (change in gross property, plant, and equipment (item PPENT) + change in inventory (item INVT) + change in off-balance-sheet leases)/lagged assets. Noach equals the change in net operating assets (after capitalizing off-balance-sheet leases) divided by average total assets. In Panel A, P1 (P99) is the 1st (99th) percentile of the respective distribution while Q1 (Q3) is the lower (upper) quartile of the respective distribution. In Panel B, Pearson (Spearman) correlations are reported above (below) the diagonal. *, **, and *** indicate statistically significant at 0.01, 0.05 and, 0.001 level, respectively.

4.3.2. Testing the Relation between Investments in Leases and Stock Returns

We next turn to our tests of the association between investments in leases and stock returns. To control for the discount rate effects, we incorporate the change in expected returns (Expret_chg), as described above. We also control for various other known determinants of stock returns, including size (MVE) and the book-to-market ratio (BTM), as well as all of the control variables and fixed effects in our tests of future sales and earnings growth. We estimate the following model:

$$\begin{aligned} CSAR_{i,t} = \alpha + \beta_1 Lease\_r_{i,t} \quad &+ \beta_2 Lease\_p_{i,t} + \beta_3 CapEx\_r_{i,t} + \beta_4 CapEx\_p_{i,t} + \beta_5 Expret\_chg_{i,t} \\ &+ \beta_6 IB_{i,t} + \beta_7 SalesGr_{i,t} + \beta_8 ACC_{i,t} + \beta_9 rBTM_{i,t-1} + \beta_{10} rMVE_{i,t-1} + e_{it} \end{aligned} \quad (6)$$

We calculate abnormal returns, CSAR, for each firm-year by compounding the firm's raw return over a one-year holding period and then subtracting the return on the CRSP size-based decile portfolio to which the firm belongs at the beginning of the holding period (Berk 1995). We begin cumulating returns on the first day of the fourth month after the prior fiscal year-end. This allows the market time to impound the financial statement information into share prices. We end the accumulation period one year later and thereby capture price movements caused by investors reacting to information and events during the year that confirm or refute their beliefs about the firm's value. If a firm delists, we include any de-listing return in the calculation of returns, place the funds available after delisting into the size-based decile, and continue cumulating returns through the period.

We predict a negative coefficient on Lease_r, if the market incorporates the negative cash flow news from unexpected investments in leases into share prices, after controlling for discount rate news. To control for changes in discount rates, we include our estimate of Penman and Yehuda's (2016) change in expected return (Expret_chg) in column 2. This variable should capture the relation between stock returns and changes in firms' expected returns (discount rate news), allowing the Lease_r variables to capture the relation between stock returns and changes in the market's expectations about future performance associated with unexpected investments in leases (cash flow news).

We report the results in Table 9. Interestingly, the results in column 1 reveal that capital market prices impound very different implications in expected versus unexpected lease changes. The relation between stock returns and Lease_r is significantly negative (−0.503, t-statistic = −4.01) while the relation with Lease_p is not significant (0.004, t-statistic = 0.01). These results suggest the market prices unexpected investments in leases as value-destructive, consistent with our prior results on future earnings performance. In contrast, the market does not price unexpected CapEx, but prices expected CapEx as value destructive. Consistent with earlier results, expected CapEx seems to capture some degree of inefficient investment.

Table 9. Tests of the Association between Leases and Contemporaneous Stock Returns.

$$CSAR_{i,t} = \alpha + \beta_1 Lease_{ri,t} + \beta_2 Lease_{pi,t} + \beta_3 CapEx_{ri,t} + \beta_4 CapEx_{pi,t} + \beta_5 Expret_{chgi,t} + \beta_6 IB_{i,t} + \beta_7 SalesGr_{i,t} + \beta_8 ACC_{i,t} + \beta_9 rBTM_{i,t-1} + \beta_{10} rMVE_{i,t-1} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it}$$

Model:	**(1)**	**(2) Lease_r > 0**
Lease_r	−0.503	−0.521
	(−4.01)	(−2.25)
Lease_p	0.004	0.297
	(0.01)	(0.53)
CapEx_r	−0.049	−0.077
	(−0.72)	(−0.77)
CapEx_p	−0.644	−0.582
	(−5.34)	(−3.10)
Expret_chg	−1.720	−1.572
	(−8.43)	(−4.89)
IB	1.224	1.310
	(11.02)	(6.90)
SalesGr	0.326	0.304
	(9.27)	(4.95)
ACC	−0.584	−0.495
	(−6.74)	(−3.80)
rBTM	0.093	0.104
	(4.97)	(3.30)
rMVE	−0.062	−0.077
	(−3.69)	(−2.58)
Year Indicators	Yes	Yes
Industry Indicators	Yes	Yes
Observations	8355	3461
Adjusted R^2	0.144	0.129

CSAR equals annual size-adjusted abnormal returns, beginning on the first day of the fourth month of the current fiscal year and extending to the last day of the third month after the fiscal year end. Lease_r (Lease_p) is the estimate of the residual (expected) lease change, equaling the residual (expected) value from Equation (1). CapEx_r (CapEx_p) is the estimate of the residual (expected) capital expenditures, equaling the residual (expected) value from Equation (2). Expret_chg equals change in expected return from Penman and Yehuda (2016) model. IB equals income before extraordinary items, divided by lagged total assets. SalesGr equals sales less lagged sales, divided by lagged total assets. ACC equals Income Before Extraordinary Items less Operating Cash Flows (OANCF), divided by lagged total assets. rBTM equals the yearly quintile rank for beginning of the year. Book value of shareholders' equity divided by market value of equity, standardized to range between 0 and 1. rMVE equals the yearly quintile rank of beginning of the year market value of equity, standardized to range between 0 and 1. T-statistics are reported in parentheses.

Although the results from our tests support the construct validity of our predicted and unexpected lease measures, the results for CapEx are not as clear. In particular, predicted CapEx investments are not associated with subsequent sales growth, relate negatively to future earnings growth in each of the next three years and relate negatively to contemporaneous stock returns. Thus, although unexpected investments in CapEx conform to our predictions about value-destructive consequences of over-investments, the consequences that arise from seemingly efficient investments in CapEx also appear to trigger negative economic consequences. Our results motivate future research to develop better models of investment efficiency in CapEx.

In column two, we examine contemporaneous returns within the subsample of firms with Lease_r > 0. The pattern of results is consistent with column one, confirming our prediction for unexpected investment in leases. Overall, these results indicate the capital markets detect and price the negative cash flow effects from unexpected investments in leases, apart from the discount rate effects.

4.4. Executive Compensation

Why do managers engage in value-destructive investments in full view of the shareholders? In this section, we examine the link between sales, leases and executive compensation. As we discuss in Section 2, executive compensation may provide one potential motive for over-investment in leased assets despite the earnings and return consequences of such investment. As sales growth commonly plays a pre-eminent role in executive pay, some managers have incentives to invest in leased assets to drive sales growth and increase their pay.

To examine the relation between sales and CEO compensation, we adapt the Core et al. (1999) model. Specifically, we estimate variations of the following model:

$$\begin{aligned} COMP_{i,t+1} = \alpha \quad & +\beta_1 Sales_{i,t} + \beta_2 DRES_{i,t} + \beta_3 DRES\_Sales_{i,t} + \beta_2 DCapEx_{i,t} + \beta_3 DCapEx\_Sales_{i,t} + \beta_4 ROA_{i,t} \\ & +\beta_5 MTB_{i,t} + \beta_6 RET_{i,t} + \beta_7 ROA\_vol_{i,t} + \beta_8 RET\_vol_{i,t-1} + e_{it+1} \end{aligned} \tag{7}$$

COMP equals one-year-ahead total compensation as reported in SEC filings, which equals the sum of salary, bonuses, the value of stock awards under FAS 123R, the value of option awards under FAS 123R, non-equity incentive plan compensation, the change in pension value and nonqualified deferred compensation earnings, and all other compensation. Sales is revenues (in USD millions) for the year prior to the year in which compensation is awarded. DRES equals 1 if Lease_r is greater than zero, and 0 otherwise; DRES_Sales is an interaction term equaling Sales multiplied by DRES. DCapEx equals 1 if CapEx_r is greater than zero, and 0 otherwise; DCapEx_Sales is an interaction term equaling Sales multiplied by DCapEx. MTB equals the market to book ratio averaged over the five years ended the year prior to the year of the CEO's compensation. ROA equals the ratio of income before extraordinary items to average total assets for the prior year. RET is the stock return for the prior year. ROA_vol is the standard deviation of ROA for the prior five years. RET_vol is the standard deviation of annual stock market return for the prior five years.

We collect compensation data for our sample firms from the ExecuComp database, which only includes S&P 1500 firms, so our sample for this analysis only includes 3753 firm-year observations. In untabulated analyses, we confirm that our results in Table 6 also hold within this subsample, showing future sales growth is increasing but future earnings growth is decreasing in unexpected investments in leased assets. Table 10 Panel A reports descriptive statistics for our regression variables. The average total CEO compensation for our sample firms was USD 4.577 million. The typical firm in this sample generated USD 5384 million in sales and generated an ROA of 5.3 percent.

We report the results in Table 10 Panel B. The first column examines the role of sales in CEO compensation. Consistent with prior literature, sales is a very strong determinant of CEO compensation in the subsequent year (0.137; t-statistic = 29.13). The second column of Table 10 includes an indicator (DRES) for observations with positive Lease_r. These firms do not exhibit higher levels of executive compensation, as the DRES main effect is positive but not significant (t-statistic = 1.24). However, executive pay for these firms has an elevated sensitivity to sales, as the DRES*Sales interaction is significantly positive (0.058; t-statistic = 6.32). The combined effect of sales on subsequent compensation is strongly positive. [By contrast, Caskey and Ozel (2019) find evidence to suggest managers' leasing decisions are not sensitive to their equity incentives. However, their tests do not examine the indirect links between investments in leases driving sales growth, which in turn drives compensation growth.] In column two, we also control for firms with positive unexpected CapEx. Such firms have a higher compensation level (268.085; t-statistic=1.84). However, the compensation is less sensitive to sales for these firms (−0.053; t-statistic = −5.94).

Table 10. Tests of the Association between Leases and Executive Compensation.

Panel A: Descriptive Statistics

Variable	Mean	Std Dev	P1	Q1	Median	Q3	P99
$TotalComp_{i,t+1}$	4577.040	4600.050	205.385	1565.510	3062.540	5846.000	23,247.170
$Sale_{i,t}$	5383.550	14,299.930	55.557	540.121	1353.490	3744.050	95,758.000
$ROA_{i,t}$	0.053	0.093	−0.294	0.022	0.057	0.099	0.275
$MTB_{i,t}$	3.523	3.755	0.800	1.694	2.485	3.873	20.300
$RET_{i,t}$	14.716	46.894	−71.617	−14.002	9.263	34.585	175.200
$ROA\_vol_{i,t}$	0.049	0.058	0.003	0.015	0.028	0.057	0.294
$RET\_vol_{i,t}$	50.373	45.905	8.866	25.050	38.034	58.564	273.592
$DRES_{i,t}$	0.448	0.497	0.000	0.000	0.000	1.000	1.000
$DCapEx\_r_{i,t}$	0.347	0.476	0.000	0.000	0.000	1.000	1.000

Panel B: Compensation Tests

$$COMP_{i,t+1} = \alpha \quad +\beta_1 Sales_{i,t} + \beta_2 DRES_{i,t} + \beta_3 DRES_{Salesi,t} + \beta_2 DCapEx_{i,t} + \beta_3 DCapEx_{Salesi,t} + \beta_4 ROA_{i,t} + \beta_5 MTB_{i,t} + \beta_6 RET_{i,t} + \beta_7 ROA\_vol_{i,t} + \beta_8 RET\_vol_{i,t-1} + Year\ Fixed\ effects + Industry\ Fixed\ effects + e_{it+1}$$

Model:	**(1)**	**(2)**	**(3) Lease_r > 0**
Sales	0.137	0.143	0.166
	(29.13)	(19.02)	(21.71)
DRES		173.126	
		(1.24)	
DRES_Sales		0.058	
		(6.32)	
DCapEx		268.085	
		(1.84)	
DCapEx_Sales		−0.053	
		(−5.94)	
ROA	1671.531	1712.655	760.639
	(2.16)	(2.22)	(0.63)
MTB	84.940	90.725	146.430
	(4.60)	(4.95)	(4.77)
RET	4.060	3.756	5.000
	(2.71)	(2.52)	(2.27)
ROA_vol	−6449.230	−6288.311	−9726.174
	(−4.90)	(−4.82)	(−4.78)
RET_vol	−4.878	−4.670	−3.928
	(−3.12)	(−3.02)	(−1.59)
Year Indicators	Yes	Yes	Yes
Industry Indicators	Yes	Yes	Yes
Observations	3753	3753	1680
Adjusted R^2	0.278	0.292	0.318

TotalComp equals one-year-ahead total compensation as reported in SEC filings, which equals the sum of SALARY, BONUS, STOCK_AWARDS, OPTION AWARDS, NONEQ_INCENT, PENSION_CHG, and OTHCOMP. Sale is revenues for the year prior to the year in which compensation is awarded. DRES equals 1 if Lease_r is greater than zero, and 0 otherwise. DRES_Sale is an interaction term equaling Sale multiplied by DRES. DCapx equals 1 if CapEx_r is greater than zero, and 0 otherwise. DCapx_Sale is an interaction term equaling Sale multiplied by DCapx. MTB equals the market to book ratio averaged over the five years ended the year prior to the year in which CEO compensation was paid. ROA equals the ratio of income before extraordinary items to average total assets for the prior year. Stock return is the percentage stock market return for the prior year multiplied by 100. ROA_vol is the standard deviation of ROA for the prior five years. RET_vol is the standard deviation of annual percentage stock market return for the prior five years. T-statistics are reported in parentheses.

To corroborate these findings, in the final column of Panel B we report results from estimating (7) using only the set of observations with positive Lease_r. Consequently, we omit DRES and DRES_Sales. Within this subsample, sales are a strong leading indicator of CEO compensation in the subsequent year (t-statistic = 21.71).

We highlight the relative importance of sales to executive compensation using the standard deviations from Panel A and the coefficient estimates from Panel B, model (3). A sales increase of one standard deviation increases compensation by USD 2.374 million (USD 14,299.93 × 0.166). In contrast, a *decrease* in returns of one standard deviation *decreases* compensation by only USD 234 thousand (46.894% × 5.000). A *decrease* in ROA of one standard deviation *decreases* compensation by only USD 71 thousand (9.4% × 760.639). The compensation-related benefits of higher sales from investments in leased assets appear to outweigh the compensation-related costs from lower returns and lower earnings. Thus, executives of firms that make unexpectedly large investments in leased assets derive direct benefits from higher sales in the form of higher compensation, even though these unexpected investments are value-destructive, leading to lower future earnings growth and lower contemporaneous stock returns.

4.5. Additional Tests and Robustness

4.5.1. Endogeneity

In our research design we attempt to alleviate concerns that endogeneity could be driving our results. Endogeneity could arise if, for example, the firms with the strongest growth opportunities were investing most heavily in new leases. To mitigate potential effects of endogeneity in our tests, we include numerous controls for investment opportunities and growth, controls for year and industry fixed effects, and measure standard errors clustered by firm. In addition, in untabulated analyses, we rerun our statistical tests using two-way clustered standard errors and obtain similar test results. It is difficult to identify an endogeneity story that would be consistent with our full panel of results, which align with our predictions: positive unexpected investments in leases are associated with faster future sales growth but slower future earnings growth for up to three years, are associated with lower stock returns but yield greater compensation for the managers.

4.5.2. Future Returns

Given that we show that unexpected investments in leases can negatively impact future earnings for at least three years, it begs a question: How long does it take the market to fully price the implications of over-investments in leases for future performance? Ge (2006) examines the equity pricing implications of operating leases and finds that larger increases in operating lease obligations portend lower future stock returns. Although the evidence on debt ratings, cost of debt, and cost of equity suggest that capital markets price disclosed information about leases, Ge (2006) results suggest that this information is not fully priced in equity markets. We find unexpected lease changes are not related to one-year-ahead returns (0.030, t-statistic = 0.26, untabulated). We find similar results (0.115, t-statistic = 0.98, untabulated) when we control for the change in expected returns based on the Penman and Yehuda (2016) approach. Thus, our evidence of a negative relation between unexpected investments in leases and stock returns does not continue to manifest in returns one year ahead.

4.5.3. Discount Rates

In our main tests, we compute the present value of the operating lease commitments using time-invariant firm-specific discount rates calculated as the median interest rate that the firm experienced during the sample period. To ensure that this research design choice does not drive our results, we re-estimate our tests under several alternative discount rate choices. We allow for a firm- and time-specific discount rate, constant discount rates from 6 percent to 10 percent across all firms (similar to Bratten et al. 2013), as well as a discount rate of 0 percent (i.e., undiscounted sum of expected future lease payments). Our inferences do not change across these various iterations.

4.5.4. Five Percent of Total Assets Threshold

In our main sample, we eliminate a firm if leasing is not an important part of its business: the undiscounted sum of expected lease payments is less than five percent of total assets. To test whether our results are robust to this sample selection criterion, we use cutoffs of four percent, three percent, and zero percent (no cutoff). Our inferences are robust to these alternative cutoff assumptions.

5. Conclusions

This study examines managers' decisions to lease assets and the economic consequences that arise. Our study builds on literature from several areas, including agency conflicts, executive compensation, accounting for leases, investment efficiency, and asset pricing. We build on prior research examining managers' investment efficiency, which has focused primarily on acquisitions and capital expenditures. We develop a model of expected investment in off-balance sheet leased assets based on investment opportunities and fundamental firm characteristics. We use our model to parse new investments in leased assets into expected and unexpected investments. We predict and find that, in contrast to investments in CapEx, unexpected investments in leases are much less sensitive to free cash flow availability and less sensitive to financial reporting quality. Leases appear to be effective mechanisms for managers of firms that seek to gain control of productive assets despite having high accounting quality and constrained or negative cash flows.

While strong priors may exist about unexpected investments being value destructive, little empirical evidence exists on the extent to which expected versus unexpected levels of investments in leases differentially impact earnings and stock prices. We predict and find that unexpected investments in leased assets are strongly associated with future sales growth but negatively associated with future earnings growth through the next three years, and negatively related to contemporaneous stock returns. As sales growth is a common explicit incentive in compensation schemes, we also predict and find that CEO compensation is increasing in sales growth fueled by unexpected investments in leases, even though these investments are value destructive.

As a practical contribution for managers, boards, compensation committees, and stakeholders interested in corporate governance and monitoring investment decisions, our results should increase awareness of leasing as a potential mechanism for over-investment. For investors, boards and stakeholders of firms heavily engaged in leasing, our evidence reveals the implications of managers' investments in leased assets for future firm performance, stock returns, and CEO compensation. Boards and compensation committees should consider our results if they contemplate placing more emphasis on sales incentives, as has been the recent trend.

For researchers, we contribute novel evidence on the consequences of unexpected investments in off-balance sheet leases for future revenue growth, future earnings growth, stock returns, and compensation. In addition, our approach contributes a series of tests on the economic consequences of investment inefficiency that researchers can use to assess the identification of unexpected investment in a variety of contexts. By showing unexpected investments trigger predictable negative economic consequences, our study and other studies can improve the persuasiveness of evidence based on unexpected investment measures.

Finally, lease accounting has undergone dramatic change (ASC 842) and operating leases are now being capitalized on balance sheets, beginning in 2019. Our results do not generalize to the current accounting regime under U.S. GAAP or IFRS for operating leases. However, our results motivate future research on the impact of this accounting change on the investment efficiency of leased assets. Further, our results broaden our understanding of managers' incentives for and the consequences of investment decisions that were not recognized on firms' balance sheets. Our study contributes an approach that can be extended by researchers interested in examining the consequences of other managerial decisions that are not fully recognized on balance sheets (e.g., equity affiliates, certain types of R&D joint ventures, stock-based compensation, and others).

Author Contributions: Conceptualization, T.V.E., C.N., J.W. and M.W.; methodology, T.V.E., C.N., J.W. and M.W.; software, T.V.E., C.N., J.W. and M.W.; validation, T.V.E., C.N., J.W. and M.W.; formal analysis, T.V.E., C.N., J.W. and M.W.; investigation, T.V.E., C.N., J.W. and M.W.; resources, T.V.E., C.N., J.W. and M.W.; data curation, T.V.E., C.N., J.W. and M.W.; writing—original draft preparation, T.V.E., C.N., J.W. and M.W.; writing—review and editing, T.V.E., C.N., J.W. and M.W.; visualization, T.V.E., C.N., J.W. and M.W.; supervision, T.V.E., C.N., J.W. and M.W.; project administration, T.V.E., C.N., J.W. and M.W.; funding acquisition, T.V.E., C.N., J.W. and M.W. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding from sources other than the authors' respective universities.

Data Availability Statement: Data are available from sources identified in the paper.

Acknowledgments: We thank Brian Bratten, Brian Callahan, Amanda Convery, Joe Comprix, Victoria Dickinson, Dave Harris, Shyam Sunder, Jake Thomas, an anonymous reviewer for the 2017 AAA annual meeting, and workshop participants at Binghamton University, Miami University, the University of Mississippi, Syracuse University, the University of Kentucky, and conference participants at Yale University and Penn State University for helpful comments and suggestions. All remaining errors are our own. James Wahlen gratefully acknowledges support from the James R. Hodge Chair of Excellence. Tim Eaton and Matthew Wieland acknowledge support from the Farmer School of Business.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Example: Lease investment calculation.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
For the fiscal year ended 31 December 2012
SKYWEST, INC.

From: CONSOLIDATED BALANCE SHEETS (Dollars in thousands)

	2012	**2011**
LONG TERM DEBT, net of current maturities	1,470,568	1,606,993

From: CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

Interest expense	USD 77,380

From: Footnote 6, Commitments and Contingencies Year ending December 31,

2013	387,999
2014	360,797
2015	309,378
2016	239,989
2017	182,291
Thereafter	720,733
	2,201,187

From Item 1A. RISK FACTORS

We have a significant amount of contractual obligations.

As of 31 December 2012, we had a total of approximately USD 1.6 billion in total long-term debt obligations. Substantially all of this long-term debt was incurred in connection with the acquisition of aircraft, engines and related spare parts. We also have significant long-term lease obligations primarily relating to our aircraft fleet. These leases are classified as operating leases and therefore are not reflected as liabilities in our consolidated balance sheets. On 31 December 2012, we had 568 aircraft under lease, with remaining terms ranging from one to 13 years. Future minimum lease payments due under all long-term operating leases were approximately USD 2.2 billion on 31 December 2012. ***At a 4.7% discount factor, the present value of these lease obligations was equal to approximately USD 1.8 billion on 31 December 2012.*** Our high level of fixed obligations could impact our ability to obtain additional financing to support additional expansion plans or divert cash flows from operations and expansion plans to service the fixed obligations. (Emphasis added)

Yearly Thereafter Lease Obligation Calculation

Number of years past 2017 = Thereafter Amount divided by 2017 amount
= 720,733/182,291 = 3.95

We spread the 720,733 over the next 4 years in the following manner:

2018	2019	2020	2021	Sum of Years 2018–2021
182.3	182.3	182.3	173.9	720.733

Firm-Specific Discount Rate Calculation:

$$\text{Yearly Interest Rate} = xint_t/((dltt_t + dltt_{t-1})/2)$$
2012 Interest Rate: 77,380/((1,470,568 + 1,606,993)/2) = 0.0503

Year:	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Rate:	0.0495	0.0640	0.0891	0.0509	0.0467	0.0586	0.0758	0.0741	0.0629	0.0498	0.0487	0.0480	0.0503	0.0506

Median rate: 0.0507 (average of 2003 and 2013 interest rates).

Present Value Calculation:

	2013	2014	2015	2016	2017	2018	2019	2020	2021
Lease Payment	387.999	360.797	309.378	239.989	182.291	182.291	182.291	182.291	173.86
PV Factor	0.926	0.857	0.794	0.735	0.681	0.630	0.583	0.540	0.500
Present Value	359.258	309.325	245.594	176.399	124.064	114.874	106.365	98.486	86.973

PV Lease Investment 1800.39.

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