Reporting and Non-Reporting Incentives in Leasing[*]

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July 2017

[*] We would like to thank David Aboody, Daniel Aobdia, Tao Chen (discussant), Andrea Eisfeldt, Umit Gurun, John Hughes, William Kinney, Thomas Lys, Adriano Rampini, Daniel Saavedra, Brett Trueman, and workshop participants at Northwestern University, University of Rochester, UCLA Accounting Conference, UCLA Law and Economics Workshop, 2015 Lone Star Accounting Research Conference, and Australian Banking and Finance Conference for helpful comments. We also thank Jeff Gorham, for providing us Schedule B-12 filings and Rob Tomczak for providing us information about significant considerations in aircraft leasing.

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Abstract

The accounting classification of a lease as an operating versus capital lease typically matches the lease classification for bankruptcy and tax purposes. Despite this overlap, extant research on the determinants of leasing either treats the accounting classification of leases as purely cosmetic and focuses on the reporting motivations for leasing (e.g., understating assets and liabilities), or focuses on the non-reporting motivations (e.g., tax benefits, financing capacity) in isolation from reporting motivations. In this study, we conduct an extensive analysis of the relative importance of these incentives in operating lease financing. Using both firm and asset-level data, and an amendment to the bankruptcy law that affected the treatment of certain leases under Chapter 11 bankruptcies, we provide evidence that expanding financing capacity, accommodating volatile operations, and maximizing present value of tax deductions are all important drivers of leasing decisions. While the current off-balance-sheet nature of leases does impact various accounting metrics, we find no evidence that this plays a major role in leasing decisions. This may be because, as we show analytically, it requires a large amount of leases to have a noticeable impact on financial ratios. We discuss implications of these findings for future research, and their relevance for the financial reporting rules for leases.

JEL classification: G32; G33; K34; M41.

Keywords: Bankruptcy code; tax code; operating flexibility; reporting incentives; airlines; lease accounting.

1 Introduction

Research in economics, finance, and accounting has long examined determinants of leasing decisions.[1] Financial accounting rules have criteria that distinguish between capital leases, which are accounted for similar to debt-financing, and operating leases. Current accounting rules treat operating leases as off-balance-sheet rentals. The tax and bankruptcy codes each use similar criteria to distinguish secured financing arrangements from "true leases," so that capital and operating leases receive substantively different legal treatment.[2] Accounting research on leases has focused on the use of leases to avoid capitalization on the balance sheet (e.g., Imhoff and Thomas 1988; Duke, Hsieh, and Su 2009; Cornaggia, Frazen, and Simin 2015), while the economics and finance literatures have focused on the use of leases to provide legal protections to financiers (e.g., Eisfeldt and Rampini 2009) and allocate ownership to taxable entities (e.g., Miller and Upton 1976). In this study, we examine the relative importance of the reporting and non-reporting incentives to lease. We provide evidence that leasing choices relate primarily to non-reporting incentives, which suggests the choice of lease-type is informative about firms' business circumstances.

We examine three non-reporting incentives to obtain financing that accounting rules treat as operating leases: (i) expanding financing capacity, (ii) maximizing the present value of tax deductions, and (iii) accommodating volatile capacity needs. The tax and bankruptcy codes typically classify accounting-basis operating leases as "true leases" that are distinct from secured financing arrangements. True leases, as defined by the Uniform Commercial Code (UCC), enhance financiers' rights in bankruptcy, thereby increasing companies' access to financing (Eisfeldt and Rampini 2009). Companies can use tax-basis true leases to shift ownership in a way that maximizes the present value of cash flows

[1] As we explain later, the terminology used in accounting, and tax and bankruptcy rules for leases is not identical. We use the term "leasing" to refer to leases classified as operating leases under accounting and true leases under tax and bankruptcy rules.

[2] See Eisfeldt and Rampini (2009), Table 1. For example, all three classifications include similar restrictions on economic life, bargain purchase options, and automatic transfers of ownership. Both GAAP and the tax code include restrictions on the value of lease payments relative to the value of the asset, although the UCC does not have a similar stand-alone criterion for lease classification (UCC §1-203). The definitions do not completely overlap. For example, synthetic leases result in a tax classification as secured financing, and true-lease treatment for bankruptcy classification. This allows the lessor to benefit from tax deductions for depreciation while maintaining the financiers' requirement that the bankruptcy code classify it as a true-lease transaction.

from tax deductions (Miler and Upton 1976). The third non-reporting incentive stems from the use of short-term leases, which are classified as operating, to accommodate volatile capacity needs (Gavazza 2011a).

To examine reporting incentives, we first show analytically how much leasing activity is required to have a noticeable impact on financial ratios. For example, we find that a firm must convert 9% of its assets to leases to obtain a 10% improvement in return-on-assets (e.g., from 5% to 5.5% or from 10% to 11%). We also show that there is a complementarity between the reporting and non-reporting incentives to lease. The larger the proportion of operating leases already in the capital structure, the smaller value of assets that need to be replaced with operating leases to achieve a significant improvement in financial ratios. Thus, one should expect to see leases used for window-dressing primarily in settings where: (i) firms have strong window-dressing incentives, (ii) there is an efficient leasing market, so that it is relatively inexpensive to engage in a large amount of leasing, and (iii) the firm is already involved in some leasing activity, so that a given improvement in financial ratios requires a relatively small amount of new leases. These analytical results shed light on when companies will be more likely to use leases to impact financial ratios. For example, if managers only modify leases close to capitalization thresholds to improve financial ratios, this will have a material impact only if the company already has a high amount of leasing and/or many of its leases naturally fall near the capitalization thresholds.

To test reporting incentives, we examine five settings that prior studies have identified as situations where managers have strong incentives to window-dress their financial statements. First, based on prior research that argues managers of publicly-traded firms have greater incentives to misreport (e.g., Beatty, Ke, and Petroni 2002; Beaver, McNichols, and Nelson 2003), we use firms' ownership status as a proxy for incentives to use operating leases to improve reported financial performance.[3] Second, following prior research that finds that going-public transactions provide strong incentives for

[3] While Ge (2006) provides some evidence that investors do not fully price the effects of leases and Dechow et al. (2011) associate leases with allegations of accounting fraud, it is not necessary that leases improve investors' perceptions of the firm for managers to use them to improve financial ratios. See, for example, the Stein (1989) and the related literature on signal-jamming where managers have an incentive to manipulate reports, and do so even though markets can unravel the manipulations.

manipulating financial statements (e.g., Teoh, Welch, and Wong 1998; Rangan 1998) we examine leasing activity around going-public transactions. Third, based on similar arguments, we examine leasing around major borrowing transactions. Fourth, we estimate the relation between leasing and CEO pay incentives, which we measure with portfolio deltas and vegas (Core, Guay, and Verrecchia 2003; Armstrong et al. 2013). Finally, we examine leasing activity around debt covenant violations as prior research suggests that managers make accounting choices to avoid these violations (Sweeney 1994; DeFond and Jiambalvo 1994). Finding that any one of these settings has a significant relation with leases would suggest that reporting incentives play a significant role in leasing decisions.

We conduct our tests using two samples. The first is a comprehensive sample of airlines that make quarterly filings with the US Department of Transportation's (DOT) Bureau of Transportation Statistics (BTS). We focus on airlines for three reasons. First, it allows us to use financial statement data of private firms because the BTS requires US GAAP financial statements from all large certified air carriers, whether the carrier is publicly-traded (hereafter public) or privately-held (hereafter private).[4] The filings also contain aircraft-level data that distinguish between aircraft owned, leased under capital lease, and leased under operating lease, which allows us to examine leasing decisions for specific assets and use an exogenous shock to the bankruptcy treatment of leases for certain aircraft to better quantify the effect of bankruptcy risk on leasing decisions at the aircraft-level.[5] Second, leasing is common and efficient for airlines, particularly for aircraft (Gavazza 2011b), which, as we discuss above and in greater detail in Section 3.1, makes leasing more attractive for purely window-dressing purposes. Third, the use of a single industry, where there is a large variation in lease usage, mitigates the concern that cross-sectional differences in leasing activity could primarily be driven by the nature of different businesses rather than by different financing choices. In this respect, our study is similar to prior research focusing on relatively homogenous samples to examine leasing decisions (e.g., Beatty, Liao, and Weber, 2010; Gavazza 2011a

[4] The BTS defines a large certified air carrier as operating aircraft designed to have a maximum capacity of 60 or more passengers or 18,000 pounds of payload, and operates in at least one terminal outside of the United States. Quarterly filings are required for large certified air carriers with $20 million or more in annual operating revenues.
[5] The BTS uses the US GAAP criteria to identify capital leases. See "Leased Property (Under Capital Leases)" at http://www.rita.dot.gov/bts/dictionary/list.xml?letter=L.

and 2011b). The second sample consists of public firms with data available from Compustat. This sample allows us to examine determinants of leasing decisions in other industries. However, it does not allow for asset-level analyses or a comparison of operating lease use between private and public firms, which we can conduct using the airline sample.

In analyses that use airline-level data, we find evidence that non-reporting incentives play the primary role in leasing decisions. Specifically, the use of operating leases is positively associated with proxies for financial risk and volatile operations, and it is negatively associated with effective tax rates. These associations are statistically and economically significant. For example, one standard deviation change in a lessee's financial risk, volatility, and effective tax rates is associated with approximately five, two, and five percent change in lease usage, respectively. We find no evidence that reporting incentives play the primary role in leasing decisions. In particular, we find that private airlines rely more on leases, and there is no significant difference between public and private airlines' use of operating leases once we control for non-reporting incentives. In addition, examining changes in airlines' operating lease use in the six year period around going public transactions and using a propensity score matched sample, we find that there is no change in airlines' operating lease use around going public transactions.

In aircraft-level tests, an exogenous shock to the bankruptcy treatment of leases allows us to identify a causal effect of bankruptcy risk on leasing decisions. In particular, we examine changes in leasing decisions around the amendment of the U.S. Bankruptcy Code §1110, which diminishes, but does not eliminate, lessors' superior repossession rights for some aircraft leases. In a Chapter 11 reorganization, §1110 gives creditors with loans secured by aircraft similar repossession rights to those given to lessors (ABA 2003). The rule does not apply to Chapter 7 liquidations, to aircraft first put into service on or before October 22, 1994, or to non-aircraft leases, such as office space and gate slots. In aircraft-level tests that control for various aircraft characteristics, we find that aircraft subject to §1110 amendment are 12% less likely to be under operating leases. This is consistent with a diminished incentive for operating leases due to §1110 amendment giving secured loans and leases similar treatment in Chapter 11 reorganizations. Our conclusions regarding other non-reporting incentives and reporting

incentives continue to hold in these tests.

In broad-sample tests, we also find that leasing is associated with non-reporting incentives, but find no evidence that leasing is associated with reporting incentives. Specifically, we find that the use of operating leases is positively associated with firm size, financial risk, and revenue volatility, and negatively associated with ETR and profit margin. We find no association between leasing and reporting incentives, as proxied by the sensitivity of the CEO's portfolio to stock price (delta) and risk (vega).[6] We also find no relation between industry-adjusted leasing activity and major issuances of equity or debt.[7] These results also hold in the airline sample which we report in the online appendix. Additionally, we find no significant change in operating lease usage around debt covenant violations.

In additional tests, we examine whether the use of leases provides incremental information about bankruptcy risk conditional on firms' overall debt level, including *pro forma* capitalized operating leases. On the one hand, if operating leases are motivated primarily by reporting incentives and therefore differ only cosmetically from capital leases, then they should not be incrementally informative about bankruptcy risk after controlling for a firm's overall debt level. On the other hand, if the use of operating leases stems from managing financial risk, then we expect to see more financial distress in firms that rely more on operating leases. Consistent with operating leases stemming, at least in part, from managing financial risk, we find a greater reliance on operating leases among firms that eventually file for bankruptcy. Controlling for variables from Ohlson (1980) model, we find that a greater fraction of capital under operating leases is associated with a higher likelihood of bankruptcy. These findings suggest that lease terms, or more specifically disclosures that quantify the amount of operating leases, provide useful information about financial risk.

Our study adds to the literature on the determinants of leasing decisions. Sharpe and Nguyen

[6] We focus on equity-based incentives because they are the predominant form of CEO pay (Core, Guay, and Verrecchia 2003), and include both delta and vega because Armstrong et al. (2013) show that both are associated with misreporting.

[7] If firms delay purchases of new assets until after capital market transactions, then this would tend to increase the pre-transaction fraction of leased assets and bias in favor of identifying an effect. For debt issuances, we observe a post-transaction decrease in leasing, which likely stems from the use of the proceeds to purchase new assets rather than from anything to do with reporting incentives.

(1995), Eisfeldt and Rampini (2009), and Rampini and Viswanathan (2013) find that leasing expands firms' borrowing capacity. We provide evidence of a causal relation between legal treatment and leasing using an exogenous shock to the bankruptcy treatment of certain aircraft, which allows us to better quantify the impact of bankruptcy laws on leasing decisions. Prior studies typically focus on associations rather than such natural experiments. Our findings also corroborate prior findings on the role of tax rules (e.g., Miller and Upton 1976; Graham, Lemmon, and Schallheim 1998) and operating flexibility (e.g., Gavazza 2011a) in leasing decisions. Similar to Gavazza (2010; 2011a) we use the airline setting in some of our tests to study leasing decisions. However, Gavazza focuses on the role of operating flexibility and asset liquidity whereas we study a different question and consider the relative importance of reporting and non-reporting incentives in leasing decisions. While prior research considers the reporting incentives in leasing decisions, unlike our study, these studies either consider reporting incentives in isolation from non-reporting incentives (e.g., Collins, Pasewark, and Riley 2012) or are based on cross-sectional analyses of heterogeneous and fairly small samples (e.g., El Gazzar, Lilien, and Pastena 1986). Extant studies in accounting also often do not consider that the tax and bankruptcy codes typically require different treatments for operating and capital leases (e.g., Spencer and Webb 2015).

Our findings are important in light of debates surrounding the accounting for leasing activities for over 30 years and recent changes to the lease accounting standards. The overlap in lease classifications among accounting, bankruptcy, and tax rules allows financial statement users to use operating leases as a proxy for companies' use of true leases, and the underlying economic effects that accompany true leases. The current lease standard issued by the FASB maintains an operating-lease-type distinction (ASU 2016-02, subtopic 842-10-25-2). Our findings indicate that this distinction provides information to investors about a firm's financial risk, tax management, and uncertainty of cash flows.

The paper proceeds as follows. Section 2 provides background information. Section 3 presents empirical findings on the relation between operating lease use and incentives to lease using airline data. Section 4 provides empirical findings on the relation between operating lease use and the incentives to lease using the broad sample. Section 5 provides evidence that the proportion of operating leases to total

outside financing is incrementally informative about bankruptcy risk. Section 6 concludes.

2 Background

2.1 Non-reporting incentives for leasing

We focus on the following three non-reporting incentives for leasing. First, leasing can provide otherwise unavailable financing to risky companies. Second, leases can be structured to maximize the present value of tax deductions associated with the ownership of assets. Third, leasing entails relatively low transaction costs compared to secured borrowing, which reduces the cost of adjusting capacity.

Prior studies provide evidence that the use of true leases expands firms' borrowing capacity (Sharpe and Nguyen 1995; Eisfeldt and Rampini 2009; Rampini and Viswanathan 2013). True leases, as classified by the bankruptcy code, facilitate repossession when lessees fail to make payments, which allows lessors to avoid the cost and time of navigating a bankruptcy settlement (Littlejohns and McGairl 1998). Beatty, Liao, and Weber (2010) find evidence that manufacturers with low accounting quality use more leases, consistent with leases increasing financing capacity by reducing financiers' risk.[8] In support of the use of leases to expand borrowing capacity, the CFO of a large aircraft lessor stated that "the large US carriers, who have the best access to the capital, bank and EETC [enhanced equipment trust certificates] markets, and who generally prefer to keep their aircraft for their entire useful lives, generally have the lowest percentage of aircraft under true operating leases."[9] A further reason for financially risky airlines to lease rather than buy is that financially distressed airlines often incur substantial discounts when selling aircraft (Shleifer and Vishny 1992; Pulvino 1998).

Miller and Upton (1976) state that when firms face differential tax rates in an otherwise Modigliani-Miller setting, they would not be indifferent between leasing and buying. All else equal, low tax rate firms are better off by leasing since the incremental cash flows from leasing are positive in the earlier periods and negative in later periods (Myers, Dill, and Bautista 1976). In other words, the tax

[8] For example, Dominion Bond Rating Service views flexible leases as reducing risk relative to leases with limited flexibility, while it views high lease usage as reflective of higher risk (DBRS 2016).

[9] The quote is from our direct correspondence with the CFO. EETCs refer to financing collateralized by aircraft, and may be reported as either long-term debt or operating leases. For example, American Airlines reports $10.9B of EETCs as long-term debt and $12.7B (undiscounted) as operating leases in its 10-K for the year ended December 31, 2016.

code's asymmetric treatment of losses makes it tax efficient for relatively unprofitable firms to lease assets from relatively profitable firms that can utilize deductions for depreciation (e.g., Graham, Lemmon, and Schallheim 1998; Berk and DeMarzo 2011, Ch. 25).

Lastly, the operating flexibility provided by leases is often considered a major reason for choosing operating leases (Gavazza 2011a). Operating leases typically provide short-term commitments and simple procedures for transferring assets back to the lessor prior to the end of the lease term. For example, GE Capital Aviation Services states that operating leases provide flexibility to introduce new routes or aircraft models and quickly change capacity. Airlines with volatile capacity needs face relatively greater uncertainty predicting their needs, and benefit from the flexibility afforded by leases.

2.2 Reporting incentives for leasing

Both the academic and practitioner literatures cite reporting incentives as a motivation for the use of operating leases as opposed to on-balance-sheet financing, often without referring to any other incentive.[10] For example, Dechow et al. (2011) state that "Therefore, the use of operating leases…could be indicative of managers who are focused on financial statement window-dressing." Similarly, Revsine, Collins, and Johnson (2005, p. 645) state that "A reasonable conjecture is that they [companies with few capital leases relative to operating leases] have chosen to keep these leases 'off the balance sheet' to improve ratios like debt-to-equity and return-on-assets."[11] These statements are in part built on the findings in the literature that recognized liabilities have a stronger association with market values than disclosed liabilities (Davis-Friday et al. 1999; Yu 2013; Michels 2017) and that managers display more bias with recognized than disclosed liabilities (Clor-Proell and Maines 2014). FASB's 2013 proposal to

[10] In addition to structuring around the definitions of *leases*, companies can also use accounting and tax differences in the consolidation of *entities* to impact the accounting for leases. Synthetic leases rely on the use of an entity that is consolidated for tax but not for accounting purposes, allowing the lessee to obtain tax deductions that are associated with ownership (e.g., Little 1997; Altamuro 2006). Importantly, synthetic leases also satisfy the financiers' demand for true lease treatment for bankruptcy purposes.

[11] Also see Kieso, Weygandt, and Warfield (2008, p.1091) and Harrison, Horngren, and Thomas (2013, p.546) for similar statements. In a steady-state, the net income is the same if the company leases assets as when it buys them with debt financing; however, the reported assets and liabilities are greater with debt-financed assets. This lowers return-on-assets and increases leverage ratios. The effect of leasing versus debt-financing tends to be greater for growing companies because the effective interest method tends to front-load expenses.

change accounting rules was primarily motivated by similar concerns (FASB 2013).[12]

The amount of leases required to impact a financial ratio can be substantial. Suppose, for example, that a company wants to replace some of its assets with operating leases to increase its return on assets. Assuming relatively small impact on net income, the additional lease asset amount satisfies:[13]

$$\frac{\text{Net income}}{\text{Avg. Assets} - \Delta\text{Leases}} = \text{ROA} \times (1+x) \quad \Rightarrow \quad \Delta\text{Leases} = \text{Avg. Assets} \times \frac{x}{1+x}. \tag{1}$$

For example, a company would need to convert about 9% of its assets to leases to increase ROA from 5% to 5.5% (x = 0.1). To the extent that assets are already low because of high leasing activity, a company would need less in additional leases to obtain a given improvement in ROA. Figure 1, Panel A illustrates the amount of leasing required to obtain a given improvement in ROA.

(Insert Figure 1 about here)

Similarly, consider the effect of swapping on-balance-sheet debt for operating leases on a leverage ratio such as liabilities-to-assets. If a company wanted to swap debt for leases to reduce its liabilities-to-assets ratio, the additional lease amount satisfies:

$$\frac{\text{Liabilities} - \Delta\text{Leases}}{\text{Assets} - \Delta\text{Leases}} = \frac{\text{Liabilities}}{\text{Assets}} \times (1-x) \quad \Rightarrow \quad \Delta\text{Leases} = \text{Assets} \times \frac{x \times \frac{\text{Liabilities}}{\text{Assets}}}{1-(1-x) \times \frac{\text{Liabilities}}{\text{Assets}}}. \tag{2}$$

For example, a company with a liabilities-to-assets ratio of 0.80 would need to convert about 29% of its assets to leases to reduce its liabilities-to-assets ratio from 0.80 to 0.72 (x = 0.1). To the extent that the liabilities-to-assets ratio is already low because of high leasing activity, a company would need to convert fewer of its liabilities to operating leases to obtain a given improvement in the liabilities-to-assets ratio. Figure 1, Panel B illustrates the amount of leasing required to obtain a given improvement in liabilities-to-assets.

[12] For example, see the FASB and IASB criticisms of the off-balance-sheet treatment of operating leases, as quoted in Altamuro et al.'s (2014) discussion of Reason (2005). Somewhat in contrast, the September 9, 2013 comment letter from the FASB's Investor Advisory Committee clearly states a preference for the current income and cash flow treatment of operating leases, although the letter is partially supportive of recognizing lease liabilities.

[13] To the extent that leases push expenses into the future, the required leasing for a given ROA increase will be lower than given in expression (1).

The preceding computations and the plots in Figure 1 illustrate that companies must engage in a substantial amount of leasing to materially impact their accounting ratios – it is likely not worthwhile to alter small amount of leases right around the capitalization thresholds if the objective is to improve accounting ratios. That, in turn, increases the costs of any inefficiencies associated with lease- versus debt-financing, and the chances that the leasing activity draws sufficient attention to defeat the purpose of using leases to improve accounting ratios. This suggests that reporting incentives need to be rather strong for firms to use operating leases for window-dressing.

2.3 Empirical proxies for reporting incentives to lease

The literature has identified three broad categories of reporting incentives that managers have for manipulating financial statements: capital market incentives, such as obtaining underpriced financing and meeting analyst expectations; contracting incentives, such as increasing compensation or debt covenant slack; and regulatory incentives, such as avoiding a breach of capital requirements and anti-trust actions (Healy and Wahlen 1999). Our tests focus on capital market and contracting incentives in leasing decisions. We do not expect regulatory concerns to impact lease decisions in our airline sample because airlines do not face capital requirements and we exclude financial institutions, which do face capital requirements, from our broad sample. Additionally, anti-trust regulators focus on market share rather than profitability or capital structure.[14]

To study whether capital market incentives play a major role in firms' use of leases to manipulate financial reports, we use three settings that are commonly used in prior literature. First, we use firms' public status to proxy for reporting incentives related to pressure to meet financial reporting benchmarks (See Penno and Simon 1986; Cloyd, Pratt, and Stock 1996; Beatty and Harris 1999; Beatty, Ke, and Petroni 2002; Beaver, McNichols, and Nelson 2003; Givoly, Hayn, and Katz 2010).[15,16] For example,

[14] See, for example, the section on "Merger Enforcement Standards in the Airline Industry" in the Congressional testimony at http://www.justice.gov/atr/public/testimony/4955.htm.

[15] Burgstahler, Hail, and Leuz (2006) find evidence of greater earnings management by private firms in the EU, and that this is somewhat explained by tax-motivated earnings management. We classify taxes as a non-reporting incentive because the objective is to maximize cash flows rather than to misinform financial statement users. Burgstahler et al. focus on the effects of investor demands for high quality information from public firms, and do not discuss why, aside from taxes, private firms might engage in more earnings management.

[16] While prior research typically focuses on incentives to manipulate earnings, these studies view the objective of

Beatty and Harris (1999) argue that private firms have more concentrated ownership with greater access to non-accounting information, which reduces pressure to manipulate financial reports. Cronqvist and Fahlenbrach (2013) find that 80% of firms taken private by private equity firms compensate executives based on EBITDA, which penalizes leases relative to buying since EBITDA excludes the interest and depreciation expenses associated with debt-financed purchases. To the extent that this practice is representatives of private firms, overall, this provides further reason to expect more leasing in public firms. We base the second setting on findings in the literature that firms window-dress prior to public equity offerings (e.g., Teoh, Welch, and Wong 1998; Rangan 1998). Third, to the extent that firms use operating leases to lower investors' perception of their financial risk, we expect to find greater use of operating leases in periods leading to major borrowings. Tests based on the ownership status focus on sticky reporting incentives whereas the latter two analyses focus on major events that could lead to temporary changes in leasing behavior.

For the analyses of firms' contracting incentives for operating lease use, we focus on two settings. First, because changes in equity dominate executive incentives (Core, Guay, and Verrecchia 2003), we use equity-based incentives to examine the role of contracting incentives in leasing. Armstrong et al. (2013) show that it is important to control for both portfolio deltas (sensitivity to stock price) and portfolio vegas (sensitivity to volatility) when examining the relation between equity incentives and misreporting, and prior studies suggest that the use of operating leases are associated with misreporting (e.g., Dechow et al. 2011). We therefore measure the association between leases and both of these measures of equity incentives. Second, we examine operating lease use around debt covenant violations following prior research that shows that firms alter their accounting choices in order to avoid debt covenant violations (e.g., Sweeney 1994; DeFond and Jiambalvo 1994).

3 Leasing in the Airline Industry

In this section, we analyze leasing in the airline industry using tests that exploit the availability of

managers as reporting stronger financial performance (e.g., higher ROA). Similarly, we view any window-dressing tool such as manipulating accruals, real earnings management, or manipulating reported assets/liabilities as a means to the end of having better reported financial performance.

data on private firms and on individual aircraft. We first discuss why we would expect to see airlines use leases for window-dressing, to the extent to which companies use leases for window-dressing, at all. We then test the relative importance of reporting and non-reporting incentives to lease using public-status and going-public as proxies for incentives to window-dress. We then use a change in the bankruptcy code to provide a causal test of the impact of the bankruptcy code on leasing.

3.1 Airline industry and the complementarity between reporting and non-reporting incentives

The use of leases for window-dressing depends on the incentives to window-dress versus the costs. We do not have a prior belief that airlines face more or less incentives to window-dress; however, there is compelling evidence that airlines face low costs of using leases to window-dress. First, airlines have a very efficient leasing market (Joiner 2010; Gavazza 2010). As a result, it is less costly for airlines to use leases for window-dressing than for companies in industries where leases are more costly relative to debt.

Second, airlines need relatively small changes in leasing activity to obtain a given improvement in financial ratios. To explain, the examples in Section 2.2 illustrate that companies must engage in a substantial amount of leasing to materially impact their accounting ratios. That, in turn, increases the chances that the leasing activity draws the attention of financial statement users, which would defeat the purpose of using leases to improve accounting ratios. The more leases a company already has, the less additional leases it needs to improve their financial ratios. Airlines typically have high levels of operating leases. Thus airlines can obtain a material improvement in financial ratios by adding a relatively inconspicuous amount of leases.

3.2 Data

We obtain airlines' quarterly financial data from their filings with the BTS. These filings are uniform across air carriers and are prepared in accordance with US GAAP.[17] We utilize data from Form

[17] Part 241 of Code of Federal Regulations Title 14 requires the filings. Section 2-1, Paragraph (a) of Part 241 states that the accounting figures follow US GAAP as defined by the FASB unless the Office of Airline Information (OAI) releases an accounting directive stating otherwise. A list of accounting and reporting directives issued by OAI is available at http://www.rita.dot.gov. For carriers that operate in more than one region the balance sheet and income statement data are provided separately for each region. We aggregate these data items over regions for each carrier.

41, Schedules B-1 (Balance sheet), P-1.2 (Income statement), P-6 (Operating expenses), B-12 (Cash flow statement), B-43 (Inventory of airframe and aircraft engines), and T-100 Market (Flight origins/destinations). With the exception of Schedules B-12 and B-43, all schedules are available on a quarterly basis from the first quarter of 1990 through the last quarter of 2012. Schedule B-12 is available on a quarterly basis from the third quarter of 1997 through the last quarter of 2012 and Schedule B-43 is available on an annual basis from 1992 to 2012.[18]

We collect data on the ownership status (private/public) of each air carrier in a given quarter using searches on *SEC Edgar*, *CRSP*, *Compustat*, *Bureau van Dijk's Zephyr* database, and the companies' official websites. When necessary we also use additional online resources through Google searches. To the extent possible, we crosscheck the dates among these sources to ensure the validity of classifications. For carriers that are held by a parent company, we base ownership status on the parent company. We do not combine airlines held by the same company. For example, American Airlines and American Eagle appear as separate airlines, though AMR Corporation owns both of them. This process identifies the ownership status of all airlines during the sample period. While in the reported analyses we focus on the public/private status based on the ownership status of equity, in untabulated tests, we redefine public firms as those that make quarterly filings with the SEC. This definition includes firms with publicly-traded debt as well as those with publicly-traded equity. Our results remain unchanged.

Table 1 presents our sample selection. We begin with an initial sample of 144 airlines and 5,679 airline-quarters. Of this initial dataset, we exclude Southern Air Transport which was once owned by and later operated as a front company for the Central Intelligence Agency (Farnsworth 1987). We also exclude 28 transition quarters during which an airline's ownership status switched from public to private or from private to public. Additionally, we exclude 197 airline-quarters that lack valid data on total assets, total revenues, net income, shareholders' equity, current assets, rental expense, and depreciation. Our final

[18] Cash flow statement (Schedule B-12) data are not available as a machine readable dataset from the BTS. Accordingly we obtained actual filings from the DOT for all periods the records were kept (2004Q1-2012Q4) and acquired filings for 1997Q3-2003Q4 from a third-party data vendor (www.airlineinfo.com). The filings for prior periods were not available in either source or in any other that we have contacted.

dataset includes 142 airlines and 5,421 airline-quarters.

(Insert Table 1 about here)

3.3 Variable definitions and summary statistics

We use three measures of the fraction of capital under operating leases. The first two measure the fraction of total capital under operating leases, including non-aircraft assets such as office space and gates. The third measures the fraction of aircraft under operating leases. We define the first two measures as follows:

$$\%\ Leased\left(I/S\right) = \frac{rental\_expense}{rental\_expense + depreciation + r \times noncurrent\_assets},$$
$$\%\ Leased\left(B/S\right) = \frac{8 \times rental\_expense_{q-3 to q}}{noncurrent\_assets + 8 \times rental\_expense_{q-3 to q}}. \quad (3)$$

The income statement measure *% Leased* (*I/S*) in (3) uses the ratio of rental expense to the sum of rental expense and an estimate of the implicit rental cost of non-current assets (Sharpe and Nguyen 1995; Eisfeldt and Rampini 2009). The balance sheet measure *% Leased* (*B/S*) in (3) assumes capitalization of rolling-four-quarter operating leases using an "8x" multiple, a common practice among investors and rating agencies (e.g., Moody's 2004).[19] Rental expense (P-6, *rentals*) reflects the cost of operating leases, depreciation is the depreciation expense (P-6, *depreciation*), and *r* is the firm's effective interest rate (defined as interest expense on long-term debt and capital leases (P-6, *interestlongdebt*) divided by total long-term debt and capital leases (B-1, *longtermdebt*, *longdebtcurmat*, *currobcaplease*, and *nonrecobcapls*)). When the effective interest rate is missing, non-positive, or greater than one, we use the average of one quarter lagged and one quarter ahead cost of borrowing and when only one of the lagged

[19] Some analysts (e.g., Standard and Poor's) follow an alternative approach to the "8x" used by Moody's. This approach computes the present value of the future minimum lease payments disclosed in the financial statement notes. The dataset we use does not provide future lease payment disclosures, which precludes this approach for the private airlines in our sample. In untabulated tests, we find that for publicly traded airlines the present value of minimum lease payments calculated based on Compustat data and the "8x" multiple values based on Form 41 data have a Pearson (Spearman) correlation of 77% (83%). Similarly, in the analyses discussed in Section 4.1 we find that among all firms with data available from Compustat, the two measures have a Pearson (Spearman) correlation of 89% (91%).

or future cost of borrowing is available we use that value.[20] When both of the values are missing we set *r* equal to the median borrowing cost of all airlines in that quarter. We define non-current assets as total assets minus current assets (B-1, *assets* and *currassets*).

Our third measure is an aircraft-only measure of leasing, which uses annual data from Schedule B-43 that became available beginning 1992:

$$\%Leased(Count) = \frac{\#\ of\ \ aircraft\ under\ operating\ lease}{total\ \#\ of\ \ aircraft}. \quad (4)$$

This count-based measure has the advantage of avoiding the noise inherent in the estimate of the interest component of the other two measures. It has the disadvantage of excluding non-aircraft leases, which can be substantial.[21] In reported analyses we present results for *%Leased* (*I/S*). For the sake of brevity, we report results using *%Leased* (*B/S*) and *%Leased* (*Count*) in the online appendix, which are qualitatively similar to those reported in the paper.

We use the following proxies to measure non-reporting incentives to lease. We measure financial risk using Chava and Jarrow's (2004) private-firm application of the Shumway (2001) hazard model for predicting bankruptcy:[22]

$$Financial\ risk_{iq} = \Lambda\left(-8.2909 - 3.5646 \times \frac{Net\ income_{iq-3to\,q}}{Total\ assets_{iq}} + 3.5618 \times \frac{Total\ liabilities_{iq}}{Total\ assets_{iq}}\right), \quad (5)$$

where Net income is four-quarter-rolling net income (computed from P-1.2, *netincome*) and Total liabilities is total assets less shareholders' equity (B-1, *assets* minus *shldequitnet*). Due to the benefits of operating leases in bankruptcy as discussed in detail in Section 2.1, we expect *Financial risk* to have a positive association with the fraction of capital under operating leases. In the online appendix, we report results in which we replace *Financial risk* with three proxies for debt capacity used in Eisfeldt and

[20] We set missing long-term debt and capital lease values to zero. All findings remain similar when we treat these observations as missing instead.
[21] For example, in its 2016 10-K, Southwest Airlines reports a total of $932M of rental expense for operating leases, $229M of which is for aircraft rentals and over 70% of which pertains to non-aircraft leases such as terminal space.
[22] The coefficients are from the 'Private firm model with industry effects' model in Chava and Jarrow (2004, Table III, Panel A), for the 'transportation, communications, and utilities' (IND3) grouping. We follow the definitions Chava and Jarrow used when estimating the model, and therefore do not adjust the inputs for operating leases.

Rampini (2009), namely leverage, cash flow to assets ratio, and an indicator variable for airlines paying dividends. We find that these alternative proxies have, respectively, significant and positive, significant and negative, and insignificant associations with lease usage in multivariate tests, and our findings on the remaining non-reporting and reporting proxies remain qualitatively similar.

We proxy for an airline's tax incentives using the effective tax rate (*ETR*), defined as the quarterly income tax expense divided by pre-tax income (P-1.2, *incometax*/ *incomepretax*) averaged over the five quarters centered on the current quarter. We require quarterly *ETR* values to be in between zero and one, and treat values that do not satisfy this criterion as missing.[23]

We use two measures of the importance of flexible capacity: firm size (*log(Total revenues)*), defined as the logarithm of total revenues (P-1.2, *oprevenues*) and volatility of operations (*Volatility*), defined as the variance of seasonal revenue growth ((*oprevenues*$_t$ / *oprevenues*$_{t-4}$)-1) over the previous 12 quarters. We require that data for all quarters be available for volatility calculation. The many routes flown by large airlines provide some diversification and they have a greater ability to redeploy aircraft or equipment than small airlines. Also, operating lease use declines with size and profitability/cash flows (Sharpe and Nguyen 1995; Eisfeldt and Rampini 2009). We therefore expect that small airlines place a greater value on an exit strategy and avoiding residual value risk, as facilitated by leases. Airlines with unpredictable capacity needs are more likely to value flexibility and shorter term commitments. Thus, we expect operating lease use to have a negative association with *log(Total revenues)* and a positive association with *Volatility.*

In addition to these measures, similar to Sharpe and Nguyen (1995) and Eisfeldt and Rampini (2009), we include *Profit Margin*, defined as the quarterly net income divided by total revenues averaged over the five quarters centered on the current quarter in our multivariate analyses as a variable to control

[23] Some prior studies truncate ETR at zero and one as the number of outliers is typically small (e.g., Eisfeldt and Rampini 2009). In our setting, because losses are not uncommon among airlines, these "outliers" account for about 40% of quarterly observations. Our findings for ETR are sensitive to this treatment. The pre-lease *marginal* tax rate, rather than the ETR, should determine tax incentives for leasing (e.g., Graham, Lemmon, and Schallheim 1998). We use the ETR because we can obtain data on marginal tax rates for only public airlines and do not have the software to compute the rates, ourselves. The use of a noisy proxy for tax incentives possibly plays a role in the relatively weak relation we find between tax incentives and lease usage.

for a firm's ability to generate cash flows internally from its sales. We note that our main findings remain qualitatively unchanged when this variable is not included.

Table 2, Panel A presents descriptive statistics. We winsorize all variables at the 1% and 99% levels. Consistent with operating leases being a major source of financing in the airline industry, all three measures have median proportions of operating lease that exceed 50%. There is also a large variation in operating lease use as evidenced by interquartile ranges that are close to 50%. Total revenues and total assets exhibit high skew. Mean revenues are $525 million and median revenues are $75 million. Airlines are highly levered, with a median leverage of 0.82. The effective tax rates are close to the federal corporate tax rate of 35%. The sample includes a roughly equal number of public and private airlines.

(Insert Table 2 about here)

Table 2, Panel B shows pairwise Pearson and Spearman correlations among variables. The income statement and balance sheet-based measures of operating lease financing have correlations of 91% suggesting that these two measures capture operating lease use similarly. Because the aircraft-count-based measure (*%Leased(Count)*) is available annually, we calculate correlations with this measure under the assumption that it measures lease use as of the last quarter of any given year. The correlations of financial statement-based measures with the aircraft-count-based measure are somewhat weaker, ranging from 74% to 79%, consistent with differences in the costs of different aircraft and the count-based measure not reflecting financing on other equipment and facilities such as office space and gates.

In general, the correlations between measures of operating lease use and proxies for non-reporting incentives are in the expected directions and statistically significant. Small, volatile, and financially risky airlines use more operating leases whereas airlines with higher tax rates use operating leases less. However, correlations between measures of operating lease use and public status are negative, suggesting that private airlines use more operating leases than public airlines.

3.4 Airline-level analyses: Non-reporting incentives and leasing in public versus private firms

In this section, we estimate the relation between lease usage and non-reporting and reporting incentives where we use airlines' public status as a proxy for reporting incentives. Managers in public

firms have heightened focus on share prices and greater concern for reported accounting numbers than managers in private firms. Prior research predicts and finds evidence consistent with public firms being more prone to financial statement manipulations than private firms (e.g., Penno and Simon 1986; Cloyd, Pratt, and Stock 1996; Beatty and Harris 1999; Beatty, Ke, and Petroni 2002; Beaver, McNichols, and Nelson 2003; Givoly, Hayn, and Katz 2010).

We use fractional logit models to examine the role that reporting and non-reporting incentives play in leasing. The fractional logit model takes into account the fractional and bounded nature of the operating lease usage within the unit interval, and, unlike linear models, the predicted value of the dependent variable can be recovered using fractional logit models.[24] The fractional logit regressions are of the following form for airline *i* and quarter *q*:

$$\begin{aligned} \%Leased_{iq} = \Lambda(\beta_0 + \beta_1 Log(Total\ revenues)_{iq} + \beta_2 FinancialRisk_{iq} \\ + \beta_3 ETR_{iq} + \beta_4 Volatility_{iq} + \beta_5 Public_{iq} + e_{iq}). \end{aligned} \quad (6)$$

The function Λ denotes the logistic function $e^x/(1 + e^x)$, *%Leased* denotes operating leases as a fraction of total capital, and the other variables represent proxies for the need to expand financing capacity (financial risk), tax motivations (effective tax rate), the importance of flexible capacity (total revenues and volatility of operations**)**, and reporting incentives (public).

As we discuss in Section 2.1, we expect a positive association between financial risk and leasing because financially risky firms have relatively limited access to debt financing. We expect a negative relation between tax rates and leases because it is tax-efficient for low-tax-rate firms to lease from high-tax-rate firms. We expect high volatility firms to use more operating leases to facilitate capacity adjustments, and large firms to use less because they have more ability to redeploy aircraft within their own routes. Finally, if reporting incentives stemming from the separation of ownership and control play an important role in operating lease use, we expect public firms to lease a higher percentage of their

[24] See Papke and Wooldridge (1996) for a more detailed discussion, and for applications see Armstrong, Core, and Guay (2014), Aobdia, Caskey, and Ozel (2014), Hochberg, Lindsey, and Westerfield (2015), and Goetz, Laeven, and Levine (2016). In the online appendix, we replicate our analyses using OLS, with and without firm fixed effects, and Tobit. We find qualitatively similar results with the exception that ETR and Volatility becomes insignificant in the OLS model with firm fixed effects.

capital, compared to private firms.

Because we have limited data for private firms, we do not control for differences in public and private firms' reporting incentives related to contracting (i.e., compensation and private debt contracts); however, we do not expect these differences to be material. Both public and private airlines show low sensitivity of management compensation to earnings.[25] Both lenders and rating agencies consider operating leases when evaluating borrowers' risks (Kraft 2015; Altamuro et al. 2014), and debt agreements include fewer balance sheet-based covenants when the borrower has more operating leases (Demerjian 2011). Consistent with this, in our broad-sample analysis in Section 4 we find no association between leases and compensation, and between leases and covenant violations. Also, loans to firms without SEC filings face more stringent monitoring (Sufi 2007), which can mitigate any window-dressing impact of leases.

Table 3 presents the estimates from the fractional logit model in equation (6), where the dependent variable is *%Leased (I/S).* In all specifications we cluster standard errors at the parent firm-level and include time fixed-effects to control for time-specific common factors. Columns (1) - (6) present associations between operating lease use and individual non-reporting incentives, and the public-status proxy for reporting incentives. Column (7) shows results with all of the proxies. To avoid sample attrition due to missing values of variables, we set missing values to zero and include dummy variables that indicate missing values.[26]

(Insert Table 3 about here)

Columns (1)-(4) of Table 3 show that all proxies for non-reporting incentives are in the predicted

[25] While we do not have data to compute the sensitivity of executive pay, as we do for the broad sample in Section 4, the BTS does provide data on total management pay. Following Davila and Venkatachalam (2004) who examine sensitivity of managerial compensation to return on assets in the airline industry, and Ke, Petroni, and Safieddine (1999) who compare sensitivity of managerial compensation to return on assets in public and private firms, we regress manager compensation on ln(Assets), return-on-assets, public status, and return-on-assets interacted with public status. Similar to Davila and Venkatachalam (2004), we find an insignificant association between airlines' manager compensation and return-on-assets for both public and private firms, and a positive association with size.

[26] The results reported in Columns (1)-(6) of Table 3 remain similar if we do not include the dummy variables for the missing values. The sample size in Column (7) drops by more than 50% when we require all variables to be available and in this specification ETR and Volatility variables become statistically insignificant although they remain in the same direction as in Table 3. Qualitatively, the results for the remaining variables are unchanged.

directions. *log(Total revenue)* and *ETR* have significantly negative associations with operating lease use, consistent with larger firms and firms with higher tax rates relying less on operating leases. *Financial risk* and *Volatility* have positive associations with operating lease use, consistent with the financial risk and the need for flexibility playing a significant role in the operating lease choice. Column (5) shows a negative, but statistically insignificant, association between profit margin and lease usage. Column (6) shows that on average, public airlines rely less on operating leases than private airlines. In Column (7), the coefficient on *Public* becomes insignificant, which indicates that reporting incentives do not dominate non-reporting incentives in leasing. This also suggests that the non-reporting incentives drive private airlines' greater use of operating leases. *log(Total revenue), Financial risk, Volatility, and ETR* remain significant in the predicted directions. The economic magnitude of the relation between these proxies and lease usage is also significant. For example, marginal effects based on results reported in Column (7) indicate that one standard deviation change in *log(Total revenue), Financial risk, Volatility, and ETR* is associated with four, five, two, and five percent change in lease usage, respectively.

In Column (8), we run the full model using post-2002 as our sample period to examine whether implementations of FASB Interpretation No. (FIN) 45 and 46, which reduced firms' incentives to use synthetic leases, has an impact on our results. Here again we find that *log(Total revenue), Financial risk*, and *Volatility* are statistically significant in the predicted directions and *Public* is insignificant, suggesting that the role of these factors in operating lease use have not changed after FIN 45 and FIN 46. The coefficient on *ETR* becomes insignificant in this model.

Finally, in Column (9) we restrict sample to similar-sized airlines for better comparability. This sample includes airlines that operate in at least 50 and at most 250 flight routes as of the end of observation year. 33% of public airline observations, or 906 airline-quarters, and 32% of private airline observations, or 889 airline-quarters, fall into this range. The majority of the remaining public (private) airline observations operate in more (fewer) routes. In Column (9), findings remain qualitatively similar to those in Column (7) with the exception that *log(Total revenue)* is insignificant, consistent with the sample having relatively little variation in airline size.

One concern with our use of public-status to proxy for reporting incentives is that it may have weak power. In order to assess the ability of the regressions to reveal whether public firms lease more, we conduct simulations that we report in the online appendix. In these simulations, we randomly assign public status to airlines, increment the leases of airlines specified as public to the amount required to obtain a given improvement in either return-on-assets or the liabilities-to-assets ratio, and recompute any variables affected by the change in leases. We conduct 1,000 such simulations and measure the fraction of iterations where the public-status variable is significant and positive at the 5% level. Note that these tests are conservative to the extent that airlines already have leases, because the analysis in Section 2.2 shows that companies with already-high leasing activity need relatively little additional leases to impact financial ratios. The simulations indicate that the regressions perform well in identifying leases engaged to improve the liabilities-to-assets ratio, consistent with the discussion in Section 2.2 showing the large amount of leases required to impact the liabilities-to-assets ratio.[27] The simulations also indicate that the tests perform well in identifying if public firms use leases for large changes in return on assets, but not for small changes.[28]

In sum, the results in Table 3 indicate that non-reporting incentives – especially operating flexibility and financial risk – play a major role in operating lease use. On average, private airlines rely more on operating leases than their public counterparts. Controlling for the non-reporting incentives for operating lease use, we find no statistically significant difference between private and public airlines' use of operating leases, which suggests that reporting considerations are dominated by non-reporting considerations in the choice of operating leases versus other forms of financing.

3.5 Airline-level analyses: Changes in operating lease use around going public transactions

In this section, we use going-public transactions as another setting for examining incentives to

[27] For changes in leases required to obtain a 5% reduction in liabilities-to-assets (e.g., from 50% to 47.5%), the simulations show significant positive coefficients for between 70% of the iterations for the similar-sized sample and 98% of the iterations for the full sample. The proportions are all above 90% for the change in leases required to obtain a 10% reduction in liabilities-to-assets.

[28] For changes in leases required to obtain a 10% improvement in ROA (e.g., from 5% to 5.5%), the simulations show significant positive coefficients for between 80% of the iterations for the post-2002 sample and 93% of the iterations for the full sample. The proportions range from 32% to 44% for the change in leases required to obtain a 5% improvement in ROA.

manipulate financial reports. Prior research provides evidence on window-dressing prior to public offerings (e.g., Teoh, Welch, and Wong 1998; Rangan 1998; Shivakumar 2000). Analogously, if airlines use operating leases to improve investors' view of their financial condition, we expect to see greater leasing activity among airlines that undergo one of these transactions. Our sample includes 20 private airlines that became public. 12 of these airlines went public through an equity offering and the remaining eight were acquired by a public company but continued to operate under their own carrier name. While we report our results using all 20 airlines, in untabulated tests we find that results for the two subsamples are qualitatively similar to reported results.

Table 4, Panel A reports raw and abnormal changes in operating lease use, measured using *%Leased (I/S)*, around the quarter the firm becomes public, similar to Rangan (1998) and Shivakumar (2000). We use two measures of the abnormal change in operating lease use: (i) the raw value of *Δ%Leased (I/S)* minus the median value of *Δ%Leased (I/S)* of all airlines for the same quarter, (ii) the raw value of *Δ%Leased (I/S)* minus the median value of *Δ%Leased (I/S)* of private airlines for the same quarter. For both raw and abnormal changes in operating leases, the changes are neither statistically significant nor consistently positive prior to or following becoming public. Only ten-to-eleven of the 24 quarters the changes have a positive sign and none of these observations is significantly different from zero. These results provide no evidence that airlines alter their operating lease use prior to or after becoming public. Additionally, in tests reported in the online appendix, we replicate the analysis in Table 4 by analyzing the financing choices for only the new aircraft acquisitions. In these tests, we again find no significant change in operating lease use around going public transactions, which suggests that findings reported in Table 4 are not driven by lack of new aircraft acquisitions around going public transactions.

(Insert Table 4 about here)

In order to control for factors related to going public, Table 4, Panel B reports a comparison of a sample matched using propensity scores. As a measure of the propensity to be a public airline, we first estimate the following logit model using a pooled sample:

$$P(Public_{it}) = \Lambda(\beta_0 + \beta_1 \log(Total\ revenues_{it}) + \beta_2 \frac{Net\ income_{it}}{Total\ assets_{it}} + \beta_3 \frac{Total\ liabilities_{it}}{Total\ assets_{it}} + \beta_4 \frac{Retained\ earnings_{it}}{Total\ assets_{it}} + \beta_5 \log(Age_{it}) + e_{it}) \quad (7)$$

where *Retained Earnings* is the *retearnings* variable from Schedule B-1 and *Age* is the difference between current year and the year the airline was founded, which we identify from either the official website of the airline or through Google searches. We match each airline that becomes public to an airline that does not switch its ownership type, based on the closest matches of predicted values from (7). We then compare the changes in *%Leased (I/S)* for the quarter before the treated firm becomes public.

Table 4 Panel B, reports the coefficients from equation (7) and a comparison of the propensity score matched samples. We lose one airline due to data limitations. Estimates from equation (7) indicate that size, leverage, and profitability are predictors of public/private status. The model has a pseudo-R^2 of 0.40. The matched sample analysis indicates that the operating lease use by treatment sample (the airlines that switch from private to public in the following quarter) stays almost constant. The average treatment effect is statistically insignificant, and has a negative sign, neither of which supports the argument that managers might use operating leases to improve reported financial performance prior to going public.

3.6 Aircraft-level analyses: Evidence from an exogenous shock to bankruptcy code

To provide evidence on the causal relation between non-reporting incentives and leasing decisions, we use the modification to Chapter 11 of the bankruptcy code (§1110) as an exogenous shock to lessors' versus secured lenders' comparative rights in bankruptcy. For Chapter 11 filings, the §1110 amendments grant all aircraft financiers equal ability to waive automatic stay rules, which reduces the incremental advantage of true leases (ABA 2003; Mayer 2005). The §1110 amendments do not apply to Chapter 7 filings or non-aircraft assets, and apply in Chapter 11 only for aircraft initially placed into service after October 22, 1994 (post-§1110 aircraft). If bankruptcy risk plays a significant role in operating lease decisions, then pre-§1110 aircraft should be more likely to be leased than post-§1110 because leasing does not provide as significant of an incremental advantage for post-§1110 aircraft. An added benefit of this analysis is that it allows us to control for additional factors, such as aircraft capacity

and age, that could affect the financing choice.[29]

We estimate logit regressions of the following form for aircraft *a* acquired by firm *i* in quarter *q*:

$$\begin{aligned} \mathrm{P}(Leased_{aq}) = \Lambda(&\delta_0 + \delta_1 Age_{aq} + \delta_2 Age_{aq}^2 + \delta_3 Log(AirlineFleetSize_{iq}) + \delta_4 Log(AircraftPerType_{aq}) \\ &+\delta_5 Log(1+YearsSinceIntro_{aq}) + \delta_6 \,\mathrm{Log}(1+Capacity_{aq}) + \delta_7 Log(1+Seats_{aq}) \\ &+\delta_8 \,\S1110 Exempt_{aq} + e_{aq}), \end{aligned} \tag{8}$$

where *§1110Exempt* is an indicator for aircraft that are not subject to the §1110 modification. Following Gavazza (2010), we control for the linear and non-linear effects of age of the aircraft (*Age and Age*^{2}), airline's total fleet size (*AirlineFleetSize*), total available aircraft of the same model across all airlines (*AircraftPerType*), and the number of years since the first delivery of the aircraft model (*YearsSinceIntro*). We also control for the payload capacity (*Capacity*) and number of seats (*Seats*).

We use data from annual Schedule B-43 filings to identify acquisitions of aircraft, as well as the aircraft's manufacturer, passenger and payload capacity, operating status, and the year the aircraft is first placed into service. We exclude aircraft that do not have a valid tail number as well as those that are listed as inoperable since such aircraft could be purchased for alternative purposes such as harvesting parts. We also exclude aircraft that do not fit the DOT's definition of large aircraft (i.e., aircraft with more than 60 seats or 18,000 payload capacity), which eliminates helicopters and commuter planes that may not be comparable to large commercial aircraft. The final dataset includes 7,752 aircraft representing 39 different models from 16 manufacturers.

Table 5, Panel A provides summary statistics at the aircraft-level as of the end of acquisition year. The median age is zero, indicating that new aircraft comprise most of the acquisitions. The number of large aircraft in the acquiring airlines' inventories as of the end of acquisition year, *Airline fleet size*, has a median of 184 and a mean of 238. The total stock of aircraft of the same model (i.e., total number of same model aircraft held by all airlines), *Aircraft per type*, at the end of the acquisition year, has a mean of 491

[29] Given the potential incidental parameters problem with using panel fixed effects in nonlinear models (see Greene 2002), in untabulated tests we also run a linear probability model with the same set of dependent and independent variables. Our findings remain qualitatively unchanged in such a model. Our findings are also unchanged when we include airline fixed effects into the model.

and a median of 330. This suggests that most models of aircraft have fairly liquid markets. The median aircraft has been in production for 24 years and, consistent with narrow-body/single-aisle aircraft being the most widely used model of aircraft, has capacity of 128 seats and 40,800 pounds. Since the dataset provides only the year the aircraft is first placed into service, we consider aircraft placed into service before 1995 (about 40% of the sample) as exempt from §1110 amendments.

(Insert Table 5 about here)

Table 5, Panel B presents the distribution of aircraft by manufacturer and the percentage of aircraft acquired under operating lease agreements. A few large manufacturers dominate the aircraft market. Boeing, Airbus, McDonnell-Douglas (now owned by Boeing), Embraer, Bombardier, and Canadair (now part of Bombardier) account for about 94% of the aircraft acquisitions. Close to half of all large aircraft acquisitions are financed with operating leases, although there appears to be some variation, especially among small manufacturers.

Table 6 presents results from the logit regression where the dependent variable equals one if the aircraft is acquired under an operating lease and zero otherwise. Following Gavazza (2010, Table 3), we cluster standard errors at the aircraft model-year level and include aircraft-model fixed-effects. The table excludes 99 observations for which fixed-effects perfectly predict financing type. Column (1) includes the explanatory variables from Gavazza (2010). Similar to the first column in Gavazza (2010, Table 3), we find a significant and positive coefficient on *Age*, significant and negative coefficients on Age^2, and *log(Airline fleet size)*, and a negative and insignificant coefficient on *log(1+Years since introduction)*. The only difference between his and our findings is that we find a negative coefficient on *log(Aircraft per type)* whereas he finds a positive coefficient. This may be a result of differences in sample composition as well as the differences in measurement of this variable where he uses cross-sectional data from April 2003 that includes international air carriers.

(Insert Table 6 about here)

Table 6, Column (2) includes an indicator for aircraft covered by the §1110 exemption. We also include two measures of aircraft size based on capacity and number of seats. The coefficient on

§1110Exempt is positive and significant. This is consistent with the §1110 amendment reducing the advantages of leases for aircraft financing, which suggests that bankruptcy risk is an important consideration in operating lease decisions. The marginal effect of the coefficient is around 0.12 in different models, indicating that exempt aircraft have 12 percent higher likelihood of being leased. The results also indicate that larger aircraft are more likely to be acquired under operating leases, consistent with a greater need for financing of more expensive aircraft. Column (3) adds proxies for the non-reporting incentives to lease, measured as of the beginning of the first quarter of the acquisition year. We exclude *log(Airline fleet size)* since it has over 90% correlation with *log(Total revenues).* Similar to Column (2), we find a statistically significant positive coefficient on *§1110Exempt*.

The coefficients for non-reporting incentives and public-status in Table 5, Column (3) are consistent with Table 3. The negative and significant coefficient on *Public* is consistent with non-reporting incentives dominating any reporting incentives that stem from being publicly traded. Columns (4) and (5) yield similar results after restricting the sample to large manufacturers (Boeing, Airbus, McDonnell-Douglas, Embraer, Bombardier, and Canadair) in order to ensure that the results do not rely on the different clientele of small manufacturers.

In sum, the findings in Table 6 highlight the importance of the financial risk in financing decisions. Our findings indicate that aircraft for which creditor protections in case of Chapter 11 will be substantially stronger under true lease classification, as proxied by operating leases, than under secured financing agreement, are more likely to be leased.

4 Leasing in the Broad Cross-Section

In this section, we analyze the relation between leasing and incentives to lease for the broad cross-section of firms in the CRSP/Compustat merged data. While we do not have data for private firms or asset-level data for this sample, this sample allows us to examine the generalizability of our conclusions to public firms in all industries. We first examine leasing around major equity and debt issuances. We then examine reporting incentives from the contracting perspective. Specifically, we examine the relation between CEO compensation and leasing, and changes in leasing around debt

covenant violations. The online appendix shows similar results for these tests using the airline sample, with the exception that data limitations preclude analysis of leasing around debt covenant violations.

4.1 Data and variable definitions

Our broad-sample tests use annual data since accounting rules do not require quarterly reporting of rent expense, which is necessary for our calculations. Our sample excludes financial firms (SIC codes 6000-6999) and our sample period and variable definitions follow those in the airline setting with minor modifications. In particular, the sample period is 1990-2012 and we define size as *log(Total revenue)*, *Financial risk* as Chava and Jarrow's (2004) financial risk measure based on their coefficients for public firms, *ETR* as income tax expense divided by pre-tax income, averaged over the three-years centered on the current year, *Volatility* as the standard deviation of revenue growth over the past five years, and profit margin as the ratio of net income to annual revenues. Unlike the airline setting, we do not have data on private firms and therefore cannot compare the operating lease use of private firms and public firms.

Similar to our analyses in the airline setting, we calculate *%Leased (I/S)* as the ratio of rental expense to the sum of rental expense, depreciation expense, and the effective interest rate on long-term debt times net property, plant and equipment. For firms without long-term debt or with missing values for the effective interest rate, we use the average borrowing rate in the same sic code-year. In addition, we calculate two alternative measures:

$$\frac{\%\ Leased}{(B/S\text{-}M)} = \frac{8 \times rental\_expense}{NetPPE + 8 \times rental\_expense}, \qquad \frac{\%\ Leased}{(B/S\text{-}SP)} = \frac{NPVofMLP}{NetPPE + NPVofMLP}. \tag{9}$$

%Leased (B/S-M) assumes capitalization of rolling-four-quarter operating leases using an "8x" multiple, and *%Leased (B/S-SP)* follows S&P's method for capitalizing operating leases and it assumes capitalization of minimum future lease payments by discounting them at the effective interest rate. In the calculation of *%Leased (B/S-SP)* we assume that the lease payments beyond the fifth year, which are reported as an aggregate value in Compustat, are distributed equally at the fifth year's level until the total amount is paid. We require that all observations have non-missing and valid values for the independent variables as well as for *%Leased (I/S)* in order to be included in the sample. We winsorize all continuous

variables at the top and bottom percentiles. For the sake of brevity, we report our findings using *%Leased (I/S)*, however all of our inferences remain similar using the other two measures.

4.2 Broad sample analyses: Non-reporting incentives to lease

Table 7, Panel A reports descriptive statistics for the sample. *%Leased(I/S)* and *%Leased(B/S-SP)* have similar distributions. Fewer observations have data for *%Leased(B/S-SP)* because its calculation requires availability of minimum future lease payments. The distribution of *%Leased(B/S-M)* differs noticeably from the other two measures with higher mean and quantile values. This could be because "8x" multiple is overestimating the capitalization of operating leases. Not surprisingly, there is a greater variation in the values of proxies for non-reporting incentives compared to the airline sample.

(Insert Table 7 about here)

For comparison with the results in Table 3, Table 7 Panel B reports results from the fractional logit regressions. To control for industry-specific factors that can affect lease usage, such as the availability of leasing options, we include industry-fixed effects based on two-digit SIC codes in the models. The results from Panel B largely confirm our findings that are reported in Table 3. In particular, we find that operating leases are negatively associated with *log(Total revenue)*, *ETR*, and *Profit margin*, and positively associated with *Financial Risk* and *Volatility*. Compared to the analyses of the airlines, the size of the effects is similar for *log(Total revenue)* and smaller for the remaining variables. Based on the marginal effects, a one standard deviation change in *log(Total revenue)* is associated with a three percent change in operating lease use, versus four percent in the airline industry. A one standard deviation change in each of *Financial risk, ETR,* or *Volatility* is associated with a half percent change in operating lease use, compared to five, two, and five percent, respectively, in the airline industry.

4.3 Broad sample analyses: Leasing around security issuances

As proxies for incentives to window-dress, we examine changes in the operating lease use over the four years surrounding equity offerings and major debt borrowings in this larger sample. We compute changes in *%Leased(I/S)* for years -2 through +2 relative to a major equity issuance or borrowing, defined

as proceeds over 10% of beginning assets.[30] We also report industry-adjusted changes, defined as the firms' change in *%Leased(I/S)* less the median change in the same year for firms in the same two-digit SIC code. We identify the size of the issuances using proceeds from total equity or debt issuance as reported in the cash flow statement. Table 8 presents the results.

(Insert Table 8 about here)

We find little evidence of an increase in operating lease use in the two years prior to these events or in the two years following these events. Specifically, Table 8 shows no statistically significant increase in industry-adjusted leases around major transactions. The year prior to borrowing shows a statistically significant increase in *%Leased(I/S)*; however, the industry-adjusted change is insignificant and suggests that the increase relates to industry-wide factors as opposed to the borrowing. We observe a statistically significant decline in industry-adjusted leasing after major borrowings, consistent with companies using debt proceeds to purchase assets.

4.4 Broad sample analyses: Leasing and equity-based compensation

CEOs' compensation incentives provide another proxy for reporting incentives. We focus on equity incentives since they are the primary form of CEO incentives (Core, Guay, and Verrecchia 2003). We use both portfolio deltas (sensitivity to stock price) and portfolio vegas (sensitivity to volatility) because Armstrong et al. (2013) have shown that both are associated with misreporting, which we conjecture is closely related to the incentive to window-dress. We report results for both log sensitivities (e.g., log(1 + delta)) and sensitivities scaled the CEO's portfolio value (e.g., delta/value of shares plus options).

We use Capital IQ to identify the CEO and to obtain unexercised options and unvested restricted stock. We use RiskMetrics to obtain the CEO's current shareholdings. In years for which detailed compensation data are available, we compute deltas and vegas for each vintage of options using the individual expiration dates and strike prices; otherwise, we estimate the strike prices from the summary

[30] All results remain the similar when we set the cutoff at 5% of beginning assets. We exclude cases where firms issue equity/debt more than 10% of assets in consecutive years, creating an overlap between years -1, 0, and 1.

data and use Core and Guay's (2002) 6- and 9-year guidelines for the time-to-expiration for exercisable and unexercisable options, respectively. When available, we use the company-reported values for dividend yields and volatility (*Compustat* data items *OPTDR* and *OPTVOL*, respectively). Otherwise, we base the dividend yield on the company's current annual dividend, and the volatility from historical data in *CRSP* using all available monthly observations for the prior 60 months.

Table 9 reports the estimated relations between lease usage and equity incentives. Column (1) includes only the variables from Table 7 as a baseline showing the effect of using the smaller sample with available compensation data. Similar to the full-sample results in Table 7, *Financial risk* and *Volatility* are positively associated with leasing, and profit margin is negatively associated with leasing. *Log (Total Revenue)* and *ETR* do not show a significant association with leases in this sample. Untabulated results show that all of the control variables exhibit less variation in the compensation sample, with the smaller sample consisting of larger firms with higher ETRs that are more tightly distributed.

(Insert Table 9 about here)

Table 9, Columns (2) and (3) include the CEOs' deltas and vegas as proxies for the CEO's equity incentives. When we control for CEO incentives, financial risk continues to have a significant positive relation with leasing in the scaled specification, but not in the log specification. The inclusion of CEO incentives has almost no impact on the coefficients for volatility and profit margin, with both continuing to be statistically significant positive and negative, respectively. Overall, Table 9 provides no evidence that equity incentives motivate the use of leases.

4.5 Broad sample analyses: Leasing around debt covenant violations

Debt contracts can also incentivize managers to window-dress their financial statements using operating leases. Most private debt agreements include covenants based on the total amount of debt a firm can have (e.g., Dichev and Skinner 2002). Prior research focuses on the time periods around covenant violations to examine whether debt covenants influence accounting choices (e.g., Sweeney 1994; DeFond and Jiambalvo 1994). We follow this approach to examine firms' lease use around covenant violations.

We identify covenant violations using data available from Michael Roberts' website (Roberts and

Sufi 2009). The dataset includes all covenant violations of publicly traded firms reported in the SEC filings during the period 1996 to 2012. The dataset does not contain information about which covenant(s) were violated. Therefore, similar to prior research using this dataset, we use all covenant violations.

Table 10 presents the raw and abnormal changes in *%Lease (I/S)* around covenant violations. The results in the table shows that there is little change in operating lease use around covenant violations. The only figure that is marginally significant and positive is the raw change in *%Lease (I/S)* two years prior to the violation. However, the industry-adjusted change in *%Lease (I/S)* is statistically insignificant. Thus, our results provide no evidence that firms use operating leases to avoid covenant violations.

(Insert Table 10 about here)

5 Are Operating Lease Disclosures Informative about Bankruptcy Risk?

We now examine whether operating leases provide incremental information about financial risk to shed some light on the information content of accounting standards that separately identify operating leases. We measure the overall use of financing as the sum of debt, capital leases, and an estimate of the liabilities associated with operating leases. If operating leases reflect a borrower's financial risk, then we expect that the percentage of outside financing provided through operating leases will be associated with financial risk after controlling for the overall use of outside financing. If operating leases are fundamentally no different than other forms of financing, then we expect that operating leases have no association with financial risk after controlling for outside financing.

To identify *ex post* financial risk, we use the LoPucki bankruptcy database (http://lopucki.law.ucla.edu/), which includes bankruptcies of firms with assets above $100 million in 1980 dollars. In the few cases where a firm files for bankruptcy more than once within a five-year period, we use the earliest filing and remove the bankrupt firm from the sample for the five years following the filing. For example, we treat Chapter 11 followed by Chapter 7 as a single bankruptcy event. We classify firm-years that precede a bankruptcy by up to two years as pre-bankruptcy firm-years and the remaining firm-years as non-bankrupt firm-years. For example, for a bankruptcy in 2005, we classify 2003 and 2004 as pre-bankruptcy years and omit observations from 2005 through 2009. Similar to our main tests, the

sample period for this analysis is 1990-2012.

Table 11, Panel A provides a univariate analysis of differences in operating lease use between non-bankrupt firms and firms approaching bankruptcy. Because industry factors can impact both leasing and bankruptcy filings, we industry-adjust *%Leased (I/S)* by subtracting the median *%Leased (I/S)* for the same one-digit SIC code-year. We use one-digit SIC code-year, because bankruptcies are not common and the use finer industry classifications lead industry fixed effects to perfectly predict the majority of outcomes in multivariate tests. 385 firms in our sample filed for Chapter 11 at least once and 26 were liquidated after filing for Chapter 7. The average industry-adjusted *%Leased (I/S)* during quarters prior to bankruptcy filing is 8.1% for Chapter 7 filers and 2.2% for Chapter 11 filers. Both of these percentages are statistically significantly different from the average industry-adjusted *%Leased (I/S)* for the remaining observations. The higher leasing of bankruptcy-filers suggests that riskier firms rely more on operating leases. While Chapter 7 filers have more operating leases than Chapter 11 filers, on average, the difference between the two is not statistically significant. However, in the tests reported in the online appendix, we find that this difference is statistically significant in the airline sample.

(Insert Table 11 about here)

When assessing the information content of leases, we use Ohlson's (1980) accounting-based bankruptcy prediction model, modified with *pro forma* capitalization of operating leases. We estimate whether, for a given level of financial obligations, operating leases are associated with bankruptcy. We do not use market variables as in Shumway (2001) because if investors impound the information in operating lease disclosures into prices, then market returns will subsume the direct measured effect of leases. Our tests indicate whether operating leases provide incremental information, rather than whether or not investors impound that information into prices.

We modify the variables from Ohlson (1980) with *pro forma* adjustments to capitalize operating leases, following the Moody's (2006) methodology. We estimate the capitalized value of operating leases as eight times the annualized value of operating leases, and add this to both total assets and total liabilities. We add 1/3rd of the annualized rental expense to operating profit as an estimate of imputed

interest operating leases. We add the remaining 2/3rd of annualized rental expense, which represents the non-imputed-interest portion of rental expense, to current liabilities as an estimate of the short-term portion of capitalized operating leases.

Table 11, Panel B reports estimates from Ohlson's (1980) bankruptcy prediction model with *%Leased (I/S)* as an additional explanatory variable. Columns (1)-(4) report estimates from ordered logit models where the dependent variable equals zero for non-bankrupt firm-years, one for firm-years that precede a Chapter 11 filing, and two for firm-years that precede a Chapter 7 filing. Columns (5)-(8) report estimates from a logit model where the dependent variable equals zero for non-bankrupt firm-years, and one for firm-years that precede a Chapter 7 or 11 filing.

Column (1) of Table 11, Panel B reports that *%Leased (I/S)* is significantly positively associated with the likelihood of bankruptcy. Column (2) reports a benchmark with the non-lease controls. In the combined regression in Column (3), *%Leased (I/S)* remains positive and statistically significant at the 1% level. This indicates that the fraction of capital under operating leases has incremental information about likelihood of bankruptcy. In Column (4) we add time-fixed effects to the model and our findings remain similar. Columns (5)-(8) show that we obtain similar results using a single indicator for both Chapter 11 and Chapter 7 bankruptcies.

Our findings in Table 11 suggest that firms approaching bankruptcy rely more heavily on operating leases than healthier firms. This likely results from firms' inability to receive debt financing as their financial condition deteriorates. Hence, we conclude that identification of lease terms through the operating lease classification is informative for investors in predicting future bankruptcies. Relatedly, the results suggest that to the extent they exist, reporting incentives do not render lease disclosures uninformative about underlying non-reporting incentives. These results illustrate the value of the FASB maintaining a distinct operating lease category in the revised lease accounting standard.

6 Conclusion

The bankruptcy and tax criteria for leases largely overlap with the accounting criteria for operating leases. For example, leases structured to provide lessors with bankruptcy protections typically

receive operating lease classification. Furthermore, firms with volatile capacity needs often obtain short-term, or otherwise flexible, leases that receive operating lease classification. However, critics of the current financial reporting for leases have emphasized that managers can structure financing for the purpose of avoiding the recognition of lease liabilities. We take a positive view on this discussion and let the data speak for itself.

We find that firms with greater financial risk and more volatile capacity needs tend to use more operating leases and, depending on the test, firms with higher effective tax rates use less operating leases. Our findings indicate that reporting incentives play a less important role in leasing decisions. In particular, we find no association between lease usage and public status of airlines after controlling for the non-reporting incentives for leasing and no association between leasing and airlines' going-public transactions. Aircraft-level tests confirm these findings, and our analyses based on an exogenous shock to the bankruptcy treatment of certain aircraft suggest that bankruptcy rules play an important role in leasing decisions. In the broad sample tests, we find no association between leasing and security issuances, CEOs' equity-based incentives, and debt covenant violations. Moreover, we find that the proportion of operating leases to overall outside financing is incrementally informative about firms' financial distress risk.

Our results add to the literature on the determinants of leasing and shed light on the information that investors can glean from companies' use of operating leases. The results suggest a value to disclosures that separately identify operating leases, regardless of whether they appear on- or off-balance-sheet. The use of leases may tell investors that managers are attempting to hide financial obligations, but it more likely tells them that managers have limited access to non-lease financing or face uncertainty about their capacity needs.

References

Aobdia, D., J. Caskey, and B. Ozel. 2014. Inter-industry network structure and the cross-predictability of earnings and stock returns. *Review of Accounting Studies* 19(3): 1191-1224.

Altamuro, J., 2006. The determinants of synthetic lease financing and the impact on the cost of future debt. Working paper, The Ohio State University.

Altamuro, J., R. Johnston, S. Pandit, and H. Zhang. 2014. Operating leases and credit assessments. *Contemporary Accounting Research* 31(2): 551-580.

American Bar Association (ABA). 2003. Special provisions relating to Chapter 11 airline cases. M. Jacob (ed), *Reorganizing Failing Businesses, 2003 Supplement*. Chapter 15. Chicago, IL: American Bar Association.

Armstrong, C., J. Core, and W. Guay. 2014. Do independent directors cause improvements in firm transparency?. *Journal of Financial Economics* 113(3): 383-403.

Armstrong, C., D. Larcker, G. Ormazabal, and D. Taylor. 2013. The relation between equity incentives and misreporting: The role of risk-taking incentives. *Journal of Financial Economics* 109(2): 327-350.

Beatty, A., and D. Harris. 1999. The effects of taxes, agency costs and information asymmetry on earnings management: A comparison of public and private firms. *Review of Accounting Studies* 4(3-4): 299-326.

Beatty, A., B. Ke, and K. Petroni. 2002. Earnings management to avoid earnings declines across publicly and privately held banks. *The Accounting Review 77*(3): 547-570.

Beatty, A., S. Liao, and J. Weber. 2010. Financial reporting quality, private information, monitoring, and the lease-versus-buy decision. *The Accounting Review* 85(4): 1215-1238.

Beaver, W., M. McNichols, and K. Nelson. 2003. Management of the loss reserve accrual and the distribution of earnings in the property-casualty insurance industry. *Journal of Accounting and Economics* 35(3): 347-376.

Berk, J., and P. DeMarzo. 2011. *Corporate Finance* (2nd edn). Boston, MA: Pearson Education.

Burgstahler, D., L. Hail, and C. Leuz. 2006. The importance of reporting incentives: Earnings management in European private and public firms. *The Accounting Review* 81(5): 983-1016.

Chava, S., and R. Jarrow. 2004. Bankruptcy prediction with industry effects. *Review of Finance* 8(4): 537-569.

Clor-Proell, S., and L. Maines. 2014. The impact of recognition versus disclosure on financial information: A preparer's perspective. *Journal of Accounting Research* 52(3): 671-701.

Cloyd, C., J. Pratt, and T. Stock. 1996. The use of financial accounting choice to support aggressive tax positions: Public and private firms. *Journal of Accounting Research* 34(1): 23-44.

Collins, D., W. Pasewark, M. Riley. 2012. Financial reporting outcomes under rules-based and principles-based accounting standards. *Accounting Horizons* 26(4): 681-705.

Core, J., and W. Guay. 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting Research* 40(3): 613-630.

Core, J., W. Guay, and R. Verrecchia. 2003. Price versus non-price performance measures in optimal CEO compensation contracts. *The Accounting Review* 78(4): 957-981.

Cornaggia, K., L. Franzen, and T. Simin. 2015. Managing the balance sheet with leases. Working paper, Pennsylvania State University and Loyola Marymount University.

Cronqvist, H., and R. Fahlenbrach. 2013. CEO contract design: How do strong principals do it? *Journal of Financial Economics* 108(3): 659-674.

Davila, A., and M. Venkatachalam. 2004. The relevance of non-financial performance measures for CEO compensation: Evidence from the airline industry. *Review of Accounting Studies* 9(4): 443-464.

Davis-Friday, P., L. Folami, C. Liu, and H. Mittelstaedt. 1999. The value relevance of financial statement recognition vs. disclosure: Evidence from SFAS No. 106. *The Accounting Review* 74(4): 403-423.

Dechow, P., W. Ge, C. Larson, and R. Sloan. 2011. Predicting material accounting misstatements. *Contemporary Accounting Research* 28(1): 17-82.

Defond M., and J. Jiambalvo. 1994. Debt covenant violation and manipulation of accruals. *Journal of Accounting and Economics* 17 (1-2): 145-176.

Demerjian P. 2011. Accounting standards and debt covenants: Has the "balance sheet approach" led to a decline in the use of balance sheet covenants?. *Journal of Accounting and Economics* 52 (2-3): 178-202.

Dichev, I., and D. Skinner. 2002. Large sample evidence on the debt covenant hypothesis. *Journal of Accounting Research* 40(4): 1091-1123.

Dominion Bond Rating Service (DBRS). 2016. *Methodology: Rating Companies in the Airline Industry* (February 2016).

Duke, J., S. Hsieh, and Y. Su. 2009. Operating and synthetic leases: Exploiting financial benefits in the post-Enron era. *Advances in Accounting* 25(1): 28-39.

Eisfeldt, A., and A. Rampini. 2009. Leasing, ability to repossess, and debt capacity. *Review of Financial Studies* 22(4): 1621-1657.

El Gazzar, S., S. Lilien, and V. Pastena. Accounting for leases by lessees. *Journal of Accounting and Economics* 8(3): 217-237.

Farnsworth, C. 1987. 'The company' as big business. *The New York Times* January 4, 1987.

Financial Accounting Standards Board (FASB). 2013. *Proposed Accounting Standards Update (Revised): Leases (Topic 842)*. Exposure Draft. Norwalk, CT: FASB.

Gavazza, A. 2010. Asset liquidity and financial contracts: Evidence from aircraft leases. *Journal of Financial Economics* 95(1): 62-84.

Gavazza, A. 2011a. Leasing and secondary markets: Theory and evidence from commercial aircraft. *Journal of Political Economy* 119(2): 325-377.

Gavazza, A. 2011b. The role of trading frictions in real asset markets. *American Economic Review* 101(4): 1106-1143.

Ge, W. 2006. Off-balance-sheet activities, earnings persistence and stock prices: Evidence from operating leases. Working paper, University of Washington.

Givoly, D., C. Hayn, and S. Katz. 2010. Does public ownership of equity improve earnings quality? *The Accounting Review* 85(1): 195-225.

Goetz, M., L. Laeven, and R. Levine. 2016. Does the geographic expansion of banks reduce risk? *Journal of Financial Economics* 120(2): 346-362.

Graham, J., M. Lemmon, and J. Schallheim. 1998. Debt, leases, taxes, and the endogeneity of corporate tax status. *The Journal of Finance* 53(1): 131-162.

Greene, W. 2002. The bias of the fixed effects estimator in nonlinear models. Working paper, New York University.

Harrison, W., C. Horngren, and C. Thomas. 2013. *Financial Accounting* (9th edn.). Upper Saddle River, NJ: Pearson Education.

Healy, P., and J. Wahlen. 1999. A review of the earnings management literature and its implications for standard setting. *Accounting Horizons* 13(4): 365-383.

Hochberg, Y., L. Lindsey, and M. Westerfield. 2015. Resource accumulation through economic ties: Evidence from venture capital. *Journal of Financial Economics* 118(2): 245-267.

Imhoff, E., and J. Thomas. 1988. Economic consequences of accounting standards: The lease disclosure rule change. *Journal of Accounting and Economics* 10(4): 277-310.

Joiner, S. 2010. Grab the airplane and go: How to repossess an airliner without getting shot, or thrown into jail, or beat up, or slammed into a wall, or… *Air & Space* (May 2010).

Ke, B., K. Petroni, and A. Safieddine. 1999. Ownership concentration and sensitivity of executive pay to accounting performance measures: Evidence from publicly and privately-held insurance companies. *Journal of Accounting and Economics* 28(2): 185-209.

Kieso, D., J. Weygandt, and T. Warfield. 2008. *Intermediate Accounting* (12th edn). Hoboken, NJ: John Wiley & Sons.

Kraft, P. 2015. Do rating agencies cater? Evidence from rating-based contracts. *Journal of Accounting and Economics* 59 (2-3): 264-283.

Little, N. 1997. Unraveling the synthetic lease. *Probate & Property* 11 (January/February): 22-26.

Littlejohns, A., and S. McGairl. 1998. *Aircraft Financing* (3rd edn). London, UK: Euromoney Books.

Mayer, D. 2005. True leases under attack: Lessors face persistent challenges to true lease transactions. *Journal of Equipment Lease Financing* 23(3): 1-25.

Michels, J. 2017. Disclosure versus recognition: Inferences from subsequent events. *Journal of Accounting Research* 55(1): 3-34.

Miller, M., and C. Upton. 1976. Leasing, buying, and the cost of capital services. *The Journal of Finance* 31(3): 761-786.

Moody's Investors Service. 2004. *The Analysis of Off-Balance Sheet Exposures*. (July 2004).

Moody's Investors Service. 2006. *Moody's Approach to Global Standard Adjustments in the Analysis of Financial Statements for Non-Financial Corporations.* (February 2006).

Myers S., D. Dill, and A. Bautista. 1976. Valuation of financial lease contracts. *The Journal of Finance* 31(3): 799-819.

Ohlson, J. 1980. Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research* 18(1): 109-131.

Papke, L., and J. Wooldridge. 1996. Econometric methods for fractional response variables with an application to 401 (K) plan participation rates. *Journal of Applied Econometrics* 11(6): 619-32.

Penno, M., and D. Simon. 1986. Accounting choices: Public versus private firms. *Journal of Business Finance & Accounting* 13(4): 561-569.

Pulvino, T. 1998. Do asset fire sales exist? An empirical investigation of commercial aircraft transactions. *The Journal of Finance* 53(3): 939-978.

Rampini, A., and S. Viswanathan. 2013. Collateral and capital structure. *Journal of Financial Economics* 109(2): 466-492.

Rangan, S. 1998. Earnings management and the performance of seasoned equity offerings. *Journal of Financial Economics* 50(1): 101-122.

Reason, T. 2005. Hidden in plain sight. *CFO Magazine*, November 2005.

Revsine, L., D. Collins, and W. Johnson. 2005. *Financial Reporting & Analysis* (3rd edn.). Upper Saddle River, NJ: Prentice Hall.

Roberts, M., and A. Sufi. 2009. Renegotiation of financial contracts: Evidence from private credit agreements. *Journal of Financial Economics* 93(2): 159-184.

Sharpe, S., and H. Nguyen. 1995. Capital market imperfections and the incentive to lease. *Journal of Financial Economics* 39(2): 271-294.

Shivakumar, L. 2000. Do firms mislead investors by overstating earnings before seasoned equity offerings?. *Journal of Accounting and Economics* 29(3): 339-371.

Shleifer, A. and R. Vishny. 1992. Liquidation values and debt capacity: A market equilibrium approach. *The Journal of Finance* 47(4): 1343-1366.

Shumway, T. 2001. Forecasting bankruptcy more accurately: A simple hazard model. *Journal of Business* 74(1): 101-124.

Spencer, A., and T. Webb. 2015. Leases: A review of contemporary academic literature relating to leases. *Accounting Horizons* 29(4): 997-1023.

Stein, J. 1989. Efficient capital markets, inefficient firms: A model of myopic corporate behavior. *Quarterly Journal of Economics* 104(4): 655-669.

Sufi, A. 2007. Information asymmetry and financing arrangements: Evidence from syndicated loans. *The Journal of Finance* 62(2): 629-668.

Sweeney, A. Debt-covenant violations and managers' accounting responses. *Journal of Accounting Research* 17(3): 281-308.

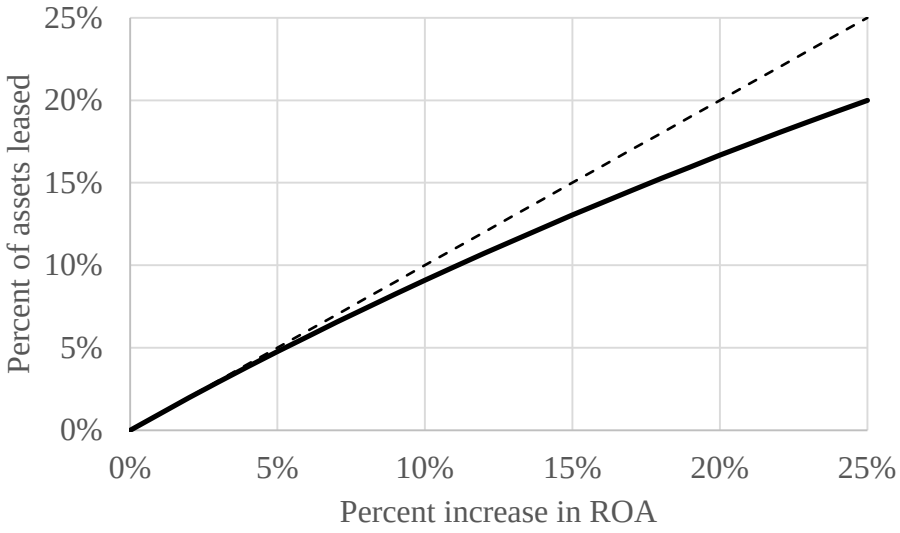
Teoh, S. H., I. Welch, and T.J. Wong. 1998. Earnings management and the long-run market performance of initial public offerings. *The Journal of Finance* 53(6): 1935-1974.

Yu, K. 2013. Does recognition versus disclosure affect value relevance? Evidence from pension accounting. *The Accounting Review* 88(3): 1095-1127.

Figure 1: Effect of leases on financial ratios

This figure illustrates the percentage of assets that must be converted to leases to obtain a given improvement in financial ratios. The thin-dashed line has a slope of one for comparison purposes. Panel A illustrates the amounts required for return-on-assets (ROA). For example, a 10% improvement in ROA from 5.0% to 5.5% requires that 9% of assets be converted to operating leases. Panel B illustrates the amounts required for liabilities-to-assets (L/A). For example, a 10% reduction in L/A from 0.45 to 0.41 requires that 8% of assets be converted to operating leases; a 10% reduction from 0.60 to 0.54 requires converting 13% of assets; and a 10% reduction from 0.85 to 0.77 requires converting 36% of assets.

Panel A: Return-on-assets (ROA)



Panel B: Liabilities-to-assets (L/A)

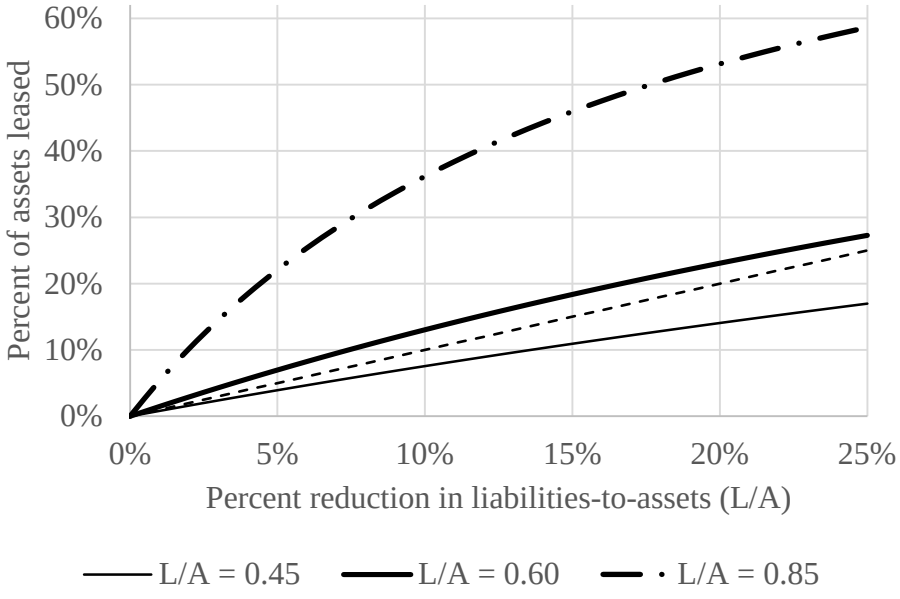


Table 1: Sample construction

This table details the sample attrition. Quarterly financial data items for airlines are obtained from Form 41 filings with the Department of Transportation. In addition to one airline that is linked to the Central Intelligence Agency (CIA) and transition quarters, observations that fail the following data requirements are deleted: missing or non-positive total assets or total revenues; missing or negative data for rental expense, depreciation, or current assets; missing net income, or shareholders' equity.

	Airlines	Airline-Quarters
All airlines with an Airline ID filing Form 41	144	5,679
Less Airline linked with the CIA	-1	-33
Less Transition quarters	-	-28
(Public to private or private to public)		
Less Observations not meeting data requirements	-1	-197
Final sample		
Publicly-traded airlines	63	2,664
Privately-held airlines	102	2,757
Less Airlines that switch between public and private during the sample period	-23	
Total	142	5,421

Table 2: Summary statistics

Panel A provides descriptive statistics for the sample. The sample period is 1990Q1-2012Q4 except for *%Leased (Count)* which is measured annually for 1992-2012 period. Panel B provides pairwise correlations with p-values in parentheses. We obtain data from Schedules B-1 (quarterly balance sheets), P-1.2 (quarterly income statements), P-6 (quarterly operating expenses), B-43 (annual inventory of airframe and engine), and T-100 (origins/destinations). *% Leased* (*I/S*) equals the current quarter rental expense (P-6: rentals) divided by the sum of current quarter rental expense and the implicit rental cost of non-current assets. *% Leased* (*B/S*) equals capitalized value of operating leases calculated as eight times the four-quarter rolling rental expense divided by the sum of the capitalized value and the value of non-current assets (B-1:assets- currassets). *% Leased* (*Count*) is equal to the fraction of aircraft under operating leases at the end of the year (from B-43). *Total revenue*, *Total assets*, and *Total liabilities*, are self-explanatory and are measured in millions of dollars (P-1.2: oprevenues, B-1: assets, and B-1: (assets-shhldequitnet), respectively); *Net income* is four-quarter rolling net income measured in millions of dollars (P-1.2: netincome); *Financial risk* is the bankruptcy risk measure based on Chava and Jarrow (2004, Table III); *ETR* is equal to quarterly income tax expense divided by pre-tax income (P-1.2: incometax/ incomepretax) averaged over the five quarters centered on current quarter; *Volatility* is defined as the variance of seasonal revenue growth over the past twelve quarters; *Public* is an indicator variable that equals one if the airline or its parent company has publicly-traded equity and zero otherwise; *Profit margin* equals quarterly net income divided by total revenues averaged over the five quarters centered on current quarter. All variables are winsorized at the top and bottom 1%.

Panel A: Descriptive statistics

	N	Mean	St.Dev.	25%	50%	75%
% Leased (I/S)	5,421	0.565	0.283	0.343	0.572	0.828
% Leased (B/S)	4,889	0.605	0.280	0.372	0.624	0.877
% Leased (Count)	1,097	0.609	0.364	0.286	0.692	1.000
Total revenue	5,421	525	1,142	25	75	274
Total assets	5,421	2,291	5,216	41	162	1,124
Total liabilities/Total assets	5,421	0.882	0.471	0.618	0.818	0.985
Net income/Total assets	4,920	-0.012	0.255	-0.058	0.015	0.074
Financial risk	4,920	0.049	0.167	0.002	0.004	0.009
Effective tax rate (ETR)	3,817	0.296	0.154	0.209	0.358	0.392
Volatility	3,412	0.132	0.482	0.009	0.023	0.064
Public	5,415	0.491	0.500	0.000	0.000	1.000
Profit margin	5,415	-0.019	0.113	-0.052	0.007	0.045

Panel B: Correlations (Pearson below diagonal, Spearman above diagonal)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	% Leased (Count)		0.75	0.79	-0.31	-0.45	0.17	-0.14	0.21	-0.15	-0.13
			(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
(2)	% Leased (I/S)	0.74		0.91	-0.22	-0.42	0.10	-0.17	0.16	-0.18	-0.06
		(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(3)	% Leased (B/S)	0.78	0.91		-0.36	-0.57	0.12	-0.18	0.23	-0.27	-0.08
		(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(4)	Total revenue	-0.33	-0.22	-0.31		0.93	0.00	0.12	-0.51	0.65	0.11
		(0.00)	(0.00)	(0.00)		(0.00)	(0.82)	(0.00)	(0.00)	(0.00)	(0.00)
(5)	Total assets	-0.35	-0.27	-0.37	0.95		0.01	0.16	-0.49	0.66	0.07
		(0.00)	(0.00)	(0.00)	(0.00)		(0.71)	(0.00)	(0.00)	(0.00)	(0.00)
(6)	Financial risk	0.19	0.18	0.23	-0.09	-0.10		-0.24	0.15	-0.06	-0.59
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
(7)	ETR	-0.10	-0.18	-0.20	-0.00	0.00	-0.25		-0.25	0.18	0.16
		(0.00)	(0.00)	(0.00)	(0.88)	(1.00)	(0.00)		(0.00)	(0.00)	(0.00)
(8)	Volatility	0.14	0.15	0.17	-0.12	-0.12	0.13	-0.07		-0.39	-0.12
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)
(9)	Public	-0.11	-0.16	-0.25	0.41	0.41	-0.14	0.19	-0.14		0.07
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		(0.00)
(10)	Profit margin	-0.10	-0.05	-0.08	0.02	0.00	-0.44	0.15	-0.06	0.07	
		(0.00)	(0.00)	(0.00)	(0.13)	(0.80)	(0.00)	(0.00)	(0.00)	(0.00)	

Table 3: Determinants of lease usage

This table presents fractional logit regressions where the dependent variable is the income-statement estimate of operating lease usage, *% Leased* (*I/S*). Models are estimated using quarterly data. For each independent variable with one or more missing values, there is a missing observation indicator that equals to one for the missing values and zero for non-missing values. Table 2 provides detailed definitions for the remaining variables. Post-2002 column presents results using the sample period 2003Q1-2012Q4. Similar-sized column presents results when the sample is restricted to airlines that operate in least 50 and at most 250 flight routes as of the end of the observation year. Standard errors are clustered at the parent firm-level. R^2's are computed as in OLS (1-SSR/SST) following Papke and Wooldridge (1996). *, **, and *** denote significance at a two-sided 10%, 5%, and 1% level, respectively.

	Full Sample							Post-2002	Similar-Sized
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Total revenue)	-0.141***						-0.096*	-0.159**	-0.024
	(-3.41)						(-1.86)	(-2.23)	(-0.23)
Financial risk		1.497***					1.193***	1.404***	1.148**
		(4.67)					(3.70)	(2.83)	(2.12)
ETR			-1.327**				-1.097*	-0.483	-1.827***
			(-2.51)				(-1.84)	(-0.69)	(-3.05)
Volatility				0.443***			0.278**	0.281*	0.286**
				(3.36)			(2.50)	(1.89)	(2.56)
Profit margin					-0.580		0.568	-0.246	-0.857
					(-1.07)		(0.85)	(-0.24)	(-0.87)
Public						-0.375**	-0.003	0.124	0.226
						(-2.22)	(-0.01)	(0.43)	(0.96)
Missing obs. indicators	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.07	0.06	0.07	0.05	0.03	0.05	0.12	0.11	0.13
Obs. count	5,421	5,421	5,421	5,421	5,421	5,421	5,421	2,602	1,795

Table 4: Changes in operating lease usage around changes in ownership type

This table presents changes in operating lease usage around ownership type changes from privately-held to publicly-traded. Panel A reports quarterly raw and abnormal changes in *% Leased* (*I/S*) where abnormal change equals to Δ*% Leased* (*I/S*) minus the quarterly median of Δ*% Leased* (*I/S*) for all airlines or for only private airlines in the sample. Panel B reports the estimates from the model to calculate propensity scores where the dependent variable is the public status of the firm in the next quarter. Panel B also presents the comparison of Δ*% Leased* (*I/S*) for each of the 19 airlines that switched ownership from private to public to that of a propensity score matched non-switching airline for the quarter prior to the switch. In Panel B, log(*Age*) is the logarithm of the age of airline in years. Table 2 provides detailed variable definitions. *, **, and *** denote significance at a two sided 10%, 5%, and 1% level, respectively.

Panel A: Changes in operating lease use

		Δ% Leased (I/S)		*Δ%Leased(I/S) – Median$_{All}$*		*Δ% Leased(I/S)- Median$_{Private}$*	
Quarter	Obs. count	Mean	t-value	Mean	t-value	Mean	t-value
-12	11	-0.006	-0.17	-0.008	-0.23	-0.009	-0.25
-11	11	-0.025	-0.39	-0.026	-0.41	-0.026	-0.41
-10	12	0.017	0.63	0.018	0.66	0.018	0.68
-9	13	0.005	0.63	0.005	0.61	0.004	0.40
-8	14	0.040	1.31	0.040	1.30	0.040	1.31
-7	14	-0.056	-1.40	-0.054	-1.37	-0.054	-1.39
-6	15	-0.002	-0.15	-0.001	-0.08	0.000	0.03
-5	16	0.003	0.17	0.003	0.19	0.002	0.15
-4	16	-0.013	-0.99	-0.013	-0.96	-0.013	-0.97
-3	17	0.014	1.08	0.014	1.02	0.014	1.06
-2	18	-0.012	-0.64	-0.011	-0.62	-0.013	-0.70
-1	20	-0.026	-1.06	-0.026	-1.06	-0.025	-1.05
0	-	-	-	-	-		
1	20	0.069	1.32	0.068	1.31	0.069	1.34
2	19	-0.014	-0.54	-0.012	-0.47	-0.012	-0.48
3	19	0.008	1.30	0.010	1.54	0.011	1.84
4	17	-0.007	-0.54	-0.006	-0.43	-0.006	-0.42
5	16	-0.008	-0.45	-0.008	-0.48	-0.010	-0.59
6	15	0.022	0.63	0.022	0.62	0.021	0.59
7	14	-0.039	-1.26	-0.037	1.24	-0.038	-1.23
8	14	0.031	1.07	0.031	1.10	0.030	1.04
9	12	-0.021	-1.91*	-0.020	-1.83*	-0.021	-1.85*
10	11	-0.008	-1.01	-0.007	-0.90	-0.008	-0.96
11	11	-0.027	-1.60	-0.026	-1.57	-0.025	-1.59
12	11	0.003	0.15	0.003	-0.28	0.003	-0.54

Table 4: Changes in operating lease usage around changes in ownership type (continued)

Panel B: Propensity score matching

	Coefficient (t-stat)
log(Total revenues)	1.386 ***
	(6.48)
Total liabilities/Total assets	-1.470 **
	(-2.21)
Net income/Total assets	-1.523 **
	(-2.11)
Ret. earnings/Total assets	-0.232
	(-1.45)
log(Age)	-0.266
	(-0.84)
Fixed effects	Time
Clusters	Firm
Pseudo- R^2	0.40
Obs. count (Switching/Non-switching)	19/ 4,734

	Δ% Leased (I/S) in the quarter prior to ownership type switching
Switching airlines	-0.002
Match airlines	0.025
Difference (ATT)	-0.027
t-stat	-1.34
Number of matched groups	19

Table 5: Summary statistics for acquired aircraft

This table presents summary statistics at the aircraft-level for new large aircraft acquisitions based on data obtained from Schedule B-43. Data presented is as of the year of acquisition. Panel A provides descriptive statistics. *Age of aircraft* is the difference in years between the acquisition year and the year the aircraft is first placed in service; *Airline fleet size* is the total number of large aircraft in the acquiring airline's fleet as of the end of acquisition year; *Aircraft per type* is the total number of aircraft of same model held among all carriers as of the end of acquisition year; *Years since introduction* is the difference in years between the acquisition year and the earliest year an airline in the sample acquired an aircraft of same model; and *§1110Exempt* equals to one if the aircraft is first placed into service before or during 1994 and zero otherwise. *Number of seats* and *Capacity* are self-explanatory. Panel B presents the distribution of aircraft and percentage of aircraft under operating lease by manufacturer.

Panel A: Descriptive statistics

	N	Mean	St.Dev	25%	50%	75%
Age of aircraft	7,752	6	10	0	0	12
Airline fleet size	7,752	238	222	33	184	383
Aircraft per type	7,752	491	434	147	330	883
Years since introduction	7,752	26	16	12	24	39
Number of seats	7,752	118	80	69	128	160
Capacity (in pounds)	7,752	64,229	61,491	33,700	40,800	77,750
§1110Exempt (1=Yes, 0=No)	7,752	0.40	0.49	0.00	0.00	1.00

Panel B: Distribution of aircraft and percentage of operating lease by manufacturer

Manufacturer	N	% Acquired under operating lease
Boeing	3,850	47.7%
Airbus	1,254	46.6%
McDonnell-Douglas	1,141	52.1%
Canadair	507	30.8%
Bombardier	296	57.7%
Embraer	255	53.7%
ATR	118	75.4%
Dehavilland	75	49.3%
Fokker	74	13.5%
Lockheed	48	52.1%
BAE	44	100.0%
Other manufacturers	90	87.8%
Total	7,752	47.3%

Table 6: The effect of §1110 modifications on aircraft financing

This table presents logit regressions using aircraft-level data where the dependent variable is equal to one if the aircraft is financed under an operating lease agreement and zero otherwise. Aircraft related variables are measured as of the end of acquisition year and financial statement data are measured as of the beginning of the first quarter of the acquisition year. Table 2 and Table 5 provide detailed definitions for the firm-level and aircraft-level variables, respectively. *, **, and *** denote significance at a two-sided 10%, 5%, and 1% level, respectively.

	All Manufacturers			Large Manufacturers	
	(1)	(2)	(3)	(4)	(5)
§1110Exempt		0.611 **	1.134**	0.720**	1.234***
		(2.16)	(2.53)	(2.48)	(2.78)
Age of aircraft	0.091 ***	0.058	0.128	0.483	0.135
	(3.26)	(1.63)	(1.57)	(1.33)	(1.63)
(Age of aircraft)^2	-0.005 ***	-0.004 ***	-0.010***	-0.004***	-0.011***
	(-5.32)	(-3.77)	(-3.62)	(-3.53)	(-3.64)
log(Airline fleet size)	-0.777 ***	-0.793 ***		-0.784***	
	(-11.59)	(-11.86)		(-11.49)	
log(Aircraft per type)	-0.501 ***	-0.548 ***	-0.883***	-0.552 **	-0.946***
	(-2.41)	(-2.64)	(-2.86)	(-2.63)	(-3.02)
log(1+Years since intro.)	-0.301	0.046	-0.341	0.113	-0.149
	(-0.90)	(0.12)	(-0.73)	(0.30)	(-0.32)
log(1+Capacity)		0.033	0.106	0.024	0.110
		(0.62)	(1.38)	(0.40)	(1.44)
log(1+Seats)		0.229 ***	0.316***	0.222***	0.315***
		(4.80)	(3.30)	(4.52)	(3.27)
log(Total revenues)			-0.908***		-0.878***
			(-8.45)		(-8.27)
Financial risk			5.539*		5.025 *
			(1.75)		(1.64)
ETR			-2.208 **		-2.205 **
			(-2.25)		(-2.23)
Volatility			5.208 *		5.072
			(1.65)		(1.62)
Profit margin			-2.757		-3.141
			(-1.36)		(-1.52)
Public			-0.873 **		-0.916***
			(-2.12)		(-2.24)
Aircraft-model fixed effects	Yes	Yes	Yes	Yes	Yes
Clusters	Model-year	Model-year	Model-year	Model-year	Model-year
Pseudo-R^2	0.21	0.22	0.29	0.22	0.27
Obs. count	7,653	7,653	4,371	7,296	4,207

Table 7: Determinants of lease usage - All industries

This table provides descriptive statistics for (Panel A) and analyses of (Panel B) the non-reporting determinants of lease usage for the Compustat sample that includes all industries. The sample period is 1990-2012. *% Leased* (*I/S*) equals the rental expense divided by the sum of rental expense and the implicit rental cost of net property, plant, and equipment. *% Leased* (*B/S-M*) equals capitalized value of operating leases calculated as eight times the rental expense divided by the sum of the capitalized value and the value of net property, plant, and equipment. *% Leased* (*B/S-SP*) equals capitalized value of operating leases calculated as the net present value of future minimum rental commitments divided by the sum of the capitalized value and the value of net property, plant, and equipment. *Total revenue* is self-explanatory and is measured in millions of dollars; *Financial risk* is the bankruptcy risk measure based on Chava and Jarrow (2004, Table III); *ETR* is equal to income tax expense divided by pre-tax income averaged over the three years centered on current year; *Volatility* is defined as the variance of revenue growth over the past five years; *Profit Margin* equals net income divided by total revenues. All variables are winsorized at the top and bottom 1%. Panel B presents fractional logit regressions. Standard errors are clustered at the parent firm-level. R^2's are computed as in OLS (1-SSR/SST) following Papke and Wooldridge (1996). *, **, and *** denote significance at a two-sided 10%, 5%, and 1% level, respectively.

Panel A: Descriptive statistics

	N	Mean	St.Dev	25%	50%	75%
% Leased (I/S)	59,758	0.281	0.198	0.122	0.240	0.407
% Leased (B/S-M)	59,758	0.450	0.277	0.205	0.431	0.697
% Leased (B/S-SP)	35,050	0.302	0.248	0.083	0.233	0.497
Total revenue	59,758	2,494	11,375	70	296	1,240
Financial risk	59,758	0.015	0.024	0.003	0.007	0.016
Effective tax rate (ETR)	59,758	0.275	0.150	0.178	0.327	0.380
Volatility	59,758	0.856	5.312	0.008	0.028	0.102
Profit margin	59,758	-0.161	1.000	-0.022	0.031	0.074

Panel B: Regression analyses

	% Leased (*I/S*)						*Post-2002*	*% Leased* (*B/S-M*)	*% Leased* (*B/S-SP*)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(Total revenue)	-0.085***					-0.074***	-0.082***	-0.122***	-0.114***
	(-15.94)					(-11.87)	(-9.90)	(-17.04)	(-12.95)
Financial risk		2.395***				0.971***	1.034**	1.796***	1.849***
		(9.86)				(4.02)	(2.38)	(6.12)	(4.78)
ETR			-0.618***			-0.120**	-0.195**	-0.618***	-0.490***
			(-10.76)			(-2.02)	(-2.29)	(-8.61)	(-5.47)
Volatility				0.009***		0.004***	0.004**	0.004***	0.006***
				(7.49)		(2.86)	(2.15)	(2.76)	(3.04)
Profit margin					-0.081***	-0.014*	-0.025**	-0.021**	-0.033***
					(-11.36)	(-1.76)	(-2.20)	(-2.05)	(-2.60)
Time and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clusters	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
R^2	0.353	0.334	0.338	0.334	0.337	0.355	0.365	0.444	0.392
Obs. count	59,758	59,758	59,758	59,758	59,758	59,758	25,814	59,758	35,050

Table 8: Changes in operating lease usage around security issuance-All industries

This table presents changes in operating lease usage around equity offerings (Panel A) and around major debt borrowings (Panel B). We identify observations with an equity offering or major borrowings as those where proceeds from total equity or debt issuance as reported in the cash flow statement exceed 10% of beginning assets. Panels report raw and abnormal changes in *% Leased* (*I/S*) where abnormal change equals to Δ*% Leased* (*I/S*) minus the median Δ*% Leased* (*I/S*) for all firms in the same industry-year. *, **, and *** denote significance at a two sided 10%, 5%, and 1% level, respectively.

Panel A: Changes in operating lease use around equity offerings

		Δ% Leased (I/S)		*Δ%Leased(I/S) – Median$_{Ind}$*	
Year	Obs. count	Mean	t-value	Mean	t-value
-2	1,214	0.001	0.25	-0.001	-0.22
-1	1,214	0.004	1.44	0.003	1.01
0	-	-	-	-	-
1	1,214	0.002	0.57	0.000	0.14
2	1,214	0.001	0.54	0.000	-0.17

Panel B: Changes in operating lease use around major borrowings

		Δ% Leased (I/S)		*Δ%Leased(I/S) – Median$_{Ind}$*	
Year	Obs. count	Mean	t-value	Mean	t-value
-2	2,471	0.001	0.44	-0.001	-0.69
-1	2,471	0.004	2.64***	0.002	1.39
0	-	-	-	-	-
1	2,471	-0.003	-1.26	-0.005	-2.24**
2	2,471	0.005	3.51***	0.003	1.93*

Table 9: Lease usage and equity incentives-All industries

This table presents fractional logit regressions where the dependent variable is the income-statement estimate of operating lease usage, *% Leased (I/S*). The equity sensitivities *Delta* and *Vega* are the estimated sensitivities of the CEO's equity portfolio to a 1% change in stock price and 0.01 change in volatility, as described in Section 4.4. In the *Scaled* column, we scale *Delta* and *Vega* by the value of the CEO's equity portfolio. In the *Log* column, we use the natural logarithm of one plus *Delta* and *Vega*. Table 7 provides detailed definitions for the remaining variables. Standard errors are clustered at the firm-level. R^2's are computed as in OLS (1-SSR/SST) following Papke and Wooldridge (1996). *, **, and *** denote significance at a two-sided 10%, 5%, and 1% level, respectively.

	Baseline	Scaled sensitivities	Log(Sensitivities)
	(1)	(2)	(3)
Sensitivities:			
Delta		-5.583	-0.001
		(-0.42)	(-0.06)
Vega		0.534	-0.006
		(0.53)	(-0.96)
log(Total revenue)	-0.007	-0.006	-0.006
	(-0.45)	(-0.40)	(-0.37)
Financial risk	2.827*	2.802*	2.793
	(1.69)	(1.67)	(1.61)
ETR	0.013	0.012	0.007
	(0.08)	(0.07)	(0.05)
Volatility	0.017**	0.017**	0.017**
	(2.05)	(2.04)	(2.03)
Profit margin	-0.261***	-0.261***	-0.263***
	(-4.01)	(-4.01)	(-4.03)
Time and industry fixed effects	Yes	Yes	Yes
Clusters	Firm	Firm	Firm
R^2	0.47	0.47	0.47
Obs. count	8,565	8,565	8,565

Table 10: Changes in operating lease usage around debt covenant violations-All industries

This table presents changes in operating lease usage around debt covenant violations. Debt covenant violation data are taken from Michael Robert's website. The table reports raw and abnormal changes in *% Leased* (*I/S*) where abnormal change equals to Δ*% Leased* (*I/S*) minus the median Δ*% Leased* (*I/S*) for all firms in the same industry-year. *, **, and *** denote significance at a two sided 10%, 5%, and 1% level, respectively.

		Δ% Leased (I/S)		*Δ%Leased(I/S) – Median$_{Ind}$*	
Year	Obs. count	Mean	t-value	Mean	t-value
-2	700	0.006	1.67*	0.006	1.47
-1	700	0.001	0.15	-0.001	-0.23
0	700	0.001	0.14	-0.013	-0.29
1	700	0.016	1.06	0.013	0.86
2	700	-0.012	-0.55	-0.015	-0.66

Table 11: Lease usage and bankruptcy filings by chapter- All industries

This table presents results from tests of the relation between operating lease use and likelihood of bankruptcy. The sample includes firm-years covered in LoPucki bankruptcy database (i.e., firms with assets above $100 million in 1980 dollars). Panel A reports the mean *%Leased(I/S)* for Chapter 11 and Chapter 7 filers and for all remaining firm-years. For Chapter 11 and Chapter 7 filers the mean is reported based on the last available observation prior to the filing date, provided that there is an observation available within two years prior to the filing date. Panel B Columns (1)-(4) present ordered logit regressions where the dependent variable equals two for a Chapter 7 filing, one for a Chapter 11 filing, and zero for non-bankruptcy years. Columns (5)-(8) present logit regressions where the dependent variable equals one for either type of bankruptcy filing. For firms that file for bankruptcy we set the bankruptcy indicators to one for the last available observation prior to the filing date, provided that there is an observation available within two years prior to the filing date and exclude subsequent observations up to five years after the filing. The explanatory variables in Panel B are calculated as in Ohlson (1980) except that we adjust *Total assets*, *Total liabilities*, *Current liabilities*, and *Operating profits* to include *pro forma* adjustments for operating leases. *Negative equity* is an indicator variable that is equal to one if shareholder's equity is negative and zero otherwise. *Negative income* is an indicator variable that is equal to one if net income for the current and prior year are both negative, and zero otherwise. *Change in income* is the difference between current and prior year's net income divided by the sum of absolute values of current and prior year's net income. Standard errors are clustered at the firm-level in both panels. *, **, and *** denote significance at a two-sided 10%, 5%, and 1% level, respectively.

Panel A: Bankruptcy filings and operating lease use

	Observations that precede Chapter 7	Observations that precede Chapter 11	Remaining Observations
Obs. count	26	385	37,159
Industry-Adjusted %Leased(I/S)	0.081	0.022	-0.003
t-tests			
vs. Remaining	2.73***	3.08**	-
vs. Chapter 11	1.57	-	-

Table 11: Lease usage and bankruptcy filings by chapter- All industries (Continued)

Panel B: Predicting bankruptcy and outcome using operating leases

	Ordered logit (2 = Chapter 7; 1 = Chapter 11)				Logit (1 = Chapter 7 or Chapter 11)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
% Leased (I/S)	0.714***		1.051***	1.153***	0.714***		1.050***	1.146***
	(2.75)		(4.06)	(3.66)	(2.75)		(4.04)	(3.63)
log(Total assets/GDP index)		-0.240***	-0.238***	-0.230***		-0.240***	-0.239***	-0.228***
		(-5.39)	(-5.28)	(-4.83)		(-5.38)	(-5.28)	(-4.76)
Total liabilities/Total assets		4.387***	4.121***	3.984***		4.393***	4.130***	3.991***
		(10.37)	(9.59)	(9.09)		(10.37)	(9.61)	(9.12)
Working capital/Total assets		-2.599***	-2.978***	-3.352***		-2.620***	-3.005***	-3.377***
		(-4.26)	(-4.70)	(-5.08)		(-4.26)	(-4.69)	(-5.04)
Current liabilities/Current assets		0.235*	0.211*	0.195		0.239*	0.212*	0.205
		(1.92)	(1.69)	(1.50)		(1.92)	(1.67)	(1.54)
Negative equity		-0.383*	-0.288	-0.227		-0.377*	-0.285	-0.215
		(-1.85)	(-1.38)	(-1.06)		(-1.83)	(-1.37)	(-1.00)
Net income/ Total assets		-2.375***	-2.496***	-2.879***		-2.443***	-2.578***	-2.968***
		(-3.62)	(-3.86)	(-4.08)		(-3.68)	(-3.94)	(-4.15)
Operating profit/ Total liabilities		-2.132***	-2.261***	-1.909***		-2.121***	-2.242***	-1.883***
		(-4.12)	(-4.33)	(-3.32)		(-4.03)	(-4.23)	(-3.26)
Negative income		1.024***	1.050***	1.091***		1.022***	1.047***	1.092***
		(6.95)	(7.17)	(7.37)		(6.93)	(7.15)	(7.38)
Change in income		-0.887***	-0.881***	-0.768***		-0.889***	-0.882***	-0.768***
		(-6.44)	(-6.45)	(-5.35)		(-6.45)	(-6.45)	(-5.35)
Time and industry fixed effects	-	-	-	Yes	-	-	-	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Cut points (1/2)	4.73/7.51	7.55/10.51	7.60/10.56	6.83/9.84	-	-	-	-
Pseudo-R^2	0.002	0.288	0.292	0.322	0.002	0.301	0.305	0.337
Observations	39,772	39,772	39,772	39,772	39,772	39,772	39,772	39,772