Corporate Diversification and Capital Structure[1]

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Abstract

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JEL classification: G32

Keywords: Capital Structure, Corporate Diversification, Conglomerates, Coinsurance

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Corporate Diversification and Capital Structure

Abstract

We examine how corporate diversification affects financial leverage. Our results suggest economically large financing advantages of diversified firms, which allows them to borrow more than comparable focused firms. We identify causal effects in a novel shock-based difference-in-differences research design using the introduction of new segment reporting standards (SFAS No. 131) as a quasi-natural experiment. SFAS 131 forced some firms to reveal previously hidden information about their level of firm diversification to outsiders, allowing us to exploit plausibly exogenous variation on a firm's diversification status. Firms that newly revealed information about their diversification strategies substantially increased leverage after the introduction of the standard. We use standalone firms that disclosed their diversification strategies already prior to the introduction of SFAS No. 131 as a counterfactual. Our findings identify the reduction of cash flow volatility as the main channel of the coinsurance effect.

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1. Introduction

Over the past decades, corporate diversification has received considerable attention from academics and management practitioners. This line of research addresses the fundamental question of how firm boundaries are set and how they affect firm outcomes. From a theoretical finance point of view, corporate diversification offers firms both *investment* and *financing* advantages (see Stein, 2003 and Maksimovic and Philipps, 2007). First, access to internal capital markets allows diversified firms to redeploy scarce resources in favor of divisions with low cash flow but strong investment opportunities (Stein, 1997). Second, diversified firms may exploit coinsurance across imperfectly correlated businesses to reduce their risk of default, which allows them to carry a higher leverage relative to comparable focused firms (Stein, 1997; Lewellen, 1971). Empirically, most studies focus on examining investment behavior and the efficiency/inefficiency of capital allocation across divisions of diversified firms relative to external capital markets (see, e.g., empirical studies by Shin and Stulz, 1998; Rajan, Servaes and Zingales, 2000; Maksimovic and Philips, 2002; Ozbas and Scharfstein, 2010; Matvos and Seru, 2014). However, we know relatively little about the relationship between corporate diversification and financing, in particular capital structure. This is a major limitation in our understanding how firm boundaries affect financial policy.

In this paper, we provide evidence on this question and analyze empirically how corporate diversification affects financial leverage. We find that diversified firms have, on average, higher leverage than comparable portfolios of stand-alone firms. Unconditionally, the average leverage of diversified firms is almost 32% higher than the leverage of standalone firms. From 1981 to 2015, diversified firms held on average 26.3% of their assets in (short- and long-term) debt, whereas standalone firms held 20.0% on average. Figure 1 compares the evolution of total book leverage (the ratio of total debt to book assets) for diversified and standalone firms from 1981 to 2015. The figure suggests persistent and economically meaningful differences in debt levels between diversified and standalone firms. As we will show in more detail below, this difference in leverage cannot be explained by leverage determinants known from prior literature (see e.g., Graham and Leary, 2011; Lemmon, Roberts and Zender, 2008; Welch, 2011).

In the baseline empirical analysis, we estimate a set of regressions with different measures of (industry-adjusted) leverage as the dependent variable. Our results suggest statistically significant and economically large financing advantages of diversified firms relative to matching portfolios of comparable standalone firms. For total book leverage (the measure that produces the most conservative results), we find that diversified firms are associated with a 4.1 percentage-point higher industry-adjusted book leverage ratio, which is about 21% (30%) higher than the average (median) debt ratio in the standalone sample.[3] For the median diversified firm, this effect is associated with USD 70.1mn (converted in 2015 dollars) in additional debt financing. We estimate these magnitudes after controlling for standard determinants of leverage such as size, tangibility, profitability, dividend payments, and the market-to-book ratio. The results also hold, with smaller magnitudes, when we estimate regressions with firm fixed effects exploiting within-firm variation across time in the organizational status of firms.

Figure 1 plots the average book leverage ratio (y-axis) of diversified firms (blue lines) and standalone firms (gray lines) over the period from 1980 to 2015. Firms are classified as "diversified" when they report two or more business segments in different four-digit SIC code industries and as "standalone" otherwise. In the left-hand plot, leverage is defined as the ratio of total debt (the sum of short-term debt and long-term debt) over total book assets. The right-hand plot shows industry-adjusted total book leverage (IAL-TBL), defined as the difference between a firm's actual leverage ratio and the firm's imputed leverage, which is the asset-weighted leverage of standalone firms in the same industry and year.

An important concern of research in the area of corporate diversification is that a firm's organizational structure is endogenous, which makes causal tests of the effects of diversification challenging. Self-selection into diversification may bias empirical estimates (see e.g., Maksimovic and Phillips, 2007; Li and Prabhala, 2007). Another potential (and related) concern is the possibility of reverse causality. Firms may increase leverage through debt issuances to fund diversifying investments (Denis and McKeon, 2012, 2016). To address these problems, we propose a novel empirical test for the effect of corporate diversification on capital structure. We interpret the

[3] This result continues to hold for the whole class of standard book and market measures, introduced by prior literature (see Online Appendix, Figure A1).

mandatory adoption of SFAS 131[4] following fiscal years after 1997 as quasi-exogenous shock to lenders' information about the level of a borrower's reported diversification. SFAS 131 forced (some) firms to reveal previously hidden information about their level of firm diversification to outsiders, allowing us to exploit plausibly exogenous variation on a firm's (publicly observed) diversification status. Under the prior standard, SFAS 14, firms frequently reported either no segment data, i.e., a single segment, despite operating in multiple distinct industries or even aggregated dissimilar lines of businesses into broad industry segments. The new standard forced firms to report segments consistent with their organizational structures (management approach).

There is one major attraction of the SFAS 131 shock that we exploit in our identification strategy. Typically, regulatory shocks affect all firms in the economy, which implies that there is frequently no true control group. In our setting, some firms already complied to SFAS 131 prior to its enactment, and we use a subset of these firms to control for common temporal trends. Our identification strategy builds on a difference-in-differences (DiD) design, which compares leverage outcomes before and after the implementation of SFAS 131 across two different groups of firms. The treatment group (labeled "change firms") contains firms that disclosed a single segment prior to the introduction of SFAS 131 and appeared as if they operated as *standalone firm* in a single (4-digit SIC code) industry. However, these self-proclaimed standalone firms in fact ran businesses in more than one industry and were forced to reveal their previously hidden diversification status upon adoption of the new standard. We identify these firms with an algorithm proposed by Berger and Hann (2003), which allows us to interpret the transmission of new segment information as exogenous shock on the main variable of interest, the firm's (observed) diversification status. We proxy the behavior of treated firms absent the shock with a control group of firms that were standalone pre- *and* post-SFAS 131 (labeled "no-change firms"). These standalone firms already complied with the new rule prior to its introduction and, as we show, behaved otherwise similarly before the shock compared to firms in the treatment group.

Figure 1 presents the novel result captured by our identification strategy. Consistent with a causal effect of corporate diversification on a firm's capital structure, we detect a sharp increase in leverage among the treatment group after the shock, but no such change among the control group. The average treatment effect amounts to 4.0 percentage-points and is statistically and economically large.

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[4] SFAS 131 is FASB Statement No. 131, *Disclosures about Segments of an Enterprise and Related Information* (FASB, 1997) and superseded SFAS 14, *Financial Reporting for Segments of a Business Enterprise*. SFAS 131 became effective in January 1998 and required firms to report business segments consistent with their internal organization.

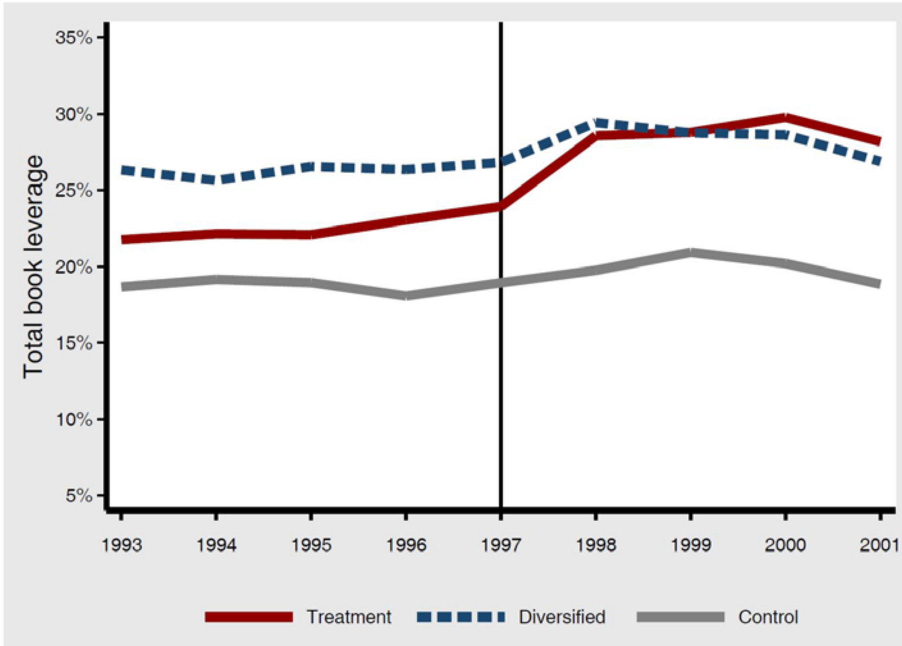

Figure 2 This figure reports the evolution of average total book leverage ratio (y-axis) of treatment firms (red line) and control firms (gray line) for the period from 1994 to 2003. SFAS 131 was announced by the Financial Accounting Standards Board (FASB) in June 1997. The dashed line represents a benchmark group of diversified firms, that already complied with the management approach under the prior standard SFAS 14.

A core threat to the internal validity of our identification strategy is that the mandatory adoption of SFAS No. 131 might affect capital structure through channels other than *revealed diversification*. We conduct several robustness tests to rule out alternative channels and corroborate our results.

First, it is possible that our shock operates through increased information disaggregation, i.e. less opaqueness at the segment level (the transparency channel).[5] We construct a placebo test that enables us to distinguish the effect of increased segment reporting transparency on firms' capital structure after the shock from the effect of revealed diversification strategies. The placebo sample of treated firms consists of firms that reveal an increased number of operating segments through the implementation of SFAS 131 while still operating in a single industry (i.e. focused multi-segment firms). We find no evidence for an increase in leverage for firms in the placebo group upon the implementation of the new reporting standard relative to the control group.

[5] Prior studies find that disaggregated segment data are important to financial statement users and that equity analysts consider segment reporting data as one of the most useful data for investment decisions (Epstein and Palepu, 1999, Berger and Hann, 2003, Cho, 2015).

Second, it is possible that the mandatory adoption of SFAS No.131 forced firms to reveal more and higher-quality information beyond their diversification strategies, which might confound our results. One central issue related to the provision of additional information could arise if treated firms conceal their segments' industry affiliation and systematically report their high-leverage-industry segments during the pre-treatment era, while segments of low-leverage industries remain hidden under SFAS 14 (the industry composition channel). Then, SFAS No. 131 may reveal industry affiliation instead of diversification strategies, and specifications using (industry-adjusted) leverage as the dependent variable would mechanically overestimate the effect of revealed diversification. Therefore, we test if the shock induced by SFAS No.131 affected the asset-weighted median leverage-ratio of the industries in which a firm operates (i.e. its imputed leverage). Our results rule out this alternative explanation.

A third concern with our identification strategy is that firms may have incentives to conceal inefficient cross-segment transfers in favor of poorly performing business segments under the prior standard SFAS 14. To the extent that agency problems are negatively related to leverage, we expect our shock-based research design to underestimate the effect of diversification on capital structure if some of the firms in our sample pursue agency motives that the new standard reveals. We therefore construct a measure (introduced by Berger and Hann, 2007) that identifies inefficient cross-segment transfers for the final fiscal year before the adoption of SFAS No. 131. By constructing a hand-collected data set of restated SFAS No. 14 data, we identify a subset of firms with pronounced (but previously hidden) cross-segment subsidization in capital allocation suggesting agency problems at the segment level during the pre-treatment era. We then re-estimate our main difference-in-differences specification for both subsamples and find evidence that leverage increased around the shock only in the subsample of firms without agency problems.

We conduct further robustness checks to demonstrate functional form independence of our results. The magnitude or even the sign of the DiD estimator may be sensitive to its functional form assumption, when average outcomes for control and treatment group are very different at baseline. Our results continue to hold if we consider relative changes in debt levels instead of absolute changes in debt levels.

We also address the concern that firms systematically self-select into treatment ("change firms") and control group ("no change firms"). We match treatment and control firms based on different propensity scores prior to the introduction of SFAS 131 and perform a matched, conditional DiD analysis. We rely on theories of disclosure that guide our specification of the propensity score models. Our results continue to hold; statistical and economical significance remain unchanged.

Finally, we use alternative proxies for diversification and measures of coinsurance (see Duchin, 2010; Hann et al., 2013). When examining the subsample of diversified firms, we find that diversified firms with higher cash-flow coinsurance levels obtain higher levels of debt.

2. Related Literature and Empirical Predictions

Our paper makes several contributions to the literature. First, our paper empirically establishes the importance of corporate diversification as an important determinant of the firm's capital structure. Previous research provides inconclusive results. Early cross-sectional studies such as Berger and Ofek (1995) and Comment and Jarrell (1995) find either no or weak associations between diversification and leverage. However, the evidence in these seminal studies is difficult to interpret given limited sampling intervals. For instance, Berger and Ofek (1995, p. 59) report that after adjusting for industry differences and controlling for size, profitability and growth opportunities, the debt ratio of multi-segment firms is 1 percentage point higher than those of standalone firms during the 1986-1991 period. Comment and Jarrell (1995) examine the 1978-1989 period, but provide only broad summary statistics and infer no association between corporate diversification and leverage. Although these influential studies were not mainly concerned with capital structure and its relation with corporate diversification, subsequent research concluded that there is little evidence for an economically important effect of corporate diversification on leverage (see, e.g., Stein, 2003 or Maksimovic and Phillips, 2007). This general consensus may have discouraged researchers to turn their attention to the capital structure of diversified firms until recently. Kuppuswamy and Villalonga (2015) find that during the financial crisis when capital becomes rationed, coinsurance induced diversified firms to become 8 percentage points more leveraged relative to comparable standalone firms. They employ a nuanced empirical strategy that provides first evidence consistent with the "coinsurance" hypothesis of diversification. However, they are not able to exploit exogenous variation in the main variable of interest, and it remains unclear how/if their "out-of-equilibrium" findings extend to a more general setting without severe shortage of credit. The potential importance of the coinsurance argument is also supported by recent survey evidence. Hoang, Gatzer, and Ruckes (2018) show that CFOs frequently claim that corporate diversification has a potentially large positive impact on their firm's ability to raise external funds. In contrast to their work, we study firms' actions, not their CFOs' beliefs.

Second, our paper contributes to the literature on corporate diversification. A large literature focuses on the value consequences of corporate diversification and its benefits and costs (e.g., Lang and Stulz, 1994; Berger and Ofek, 1995; Campa and Kedia, 2002; Graham, Lemmon and Wolf, 2002; Villalonga, 2004). The majority of this literature examines how corporate diversification affects the asset side of the balance sheet, for instance, through channels such as capital (re-)allocation (e.g., Rajan, Servaes and Zinagles, 2000; Scharfstein and Stein, 2000; Scharfstein and Ozbas, 2010), labor/asset productivity (e.g., Schoar, 2002; Maksimovic and Phillips, 2002; Tate and Yang, 2015), corporate R&D (e.g., Seru, 2014), or cash holdings (e.g., Duchin, 2010). Our paper provides evidence for another important potential benefit of diversification resulting from positive financial synergies of coinsurance on the right-hand side of the balance sheet.

The literature on corporate diversification has also shown that firms self-select into their organizational form. By using the introduction of SFAS 131 as exogenous shock on the (observable) organizational status of the firm for identification, we mitigate some of the concerns that arise from this endogenous choice (for a review, see Maksimovic and Phillips, 2007 or Maksimovic and Phillips, 2013). In particular, unobserved firm characteristics that cause firms to diversify may also cause the firm to have more debt, and thus higher leverage, relative to firms that choose not to diversify. Alternatively, there might be reverse causality: firms with better access to debt markets may be more likely to diversify. Previous research on diversification (and its effect on different outcome variables, mainly firm value) addresses related endogeneity concerns with panel data designs with firm fixed effects, matching estimators, instrumental variables or Heckman two-step corrections (see e.g. Campa and Kedia, 2002; Villalonga, 2004). However, identifying the "treatment effect" of diversification on capital structure is difficult with such designs due to the challenge of finding good instruments or appropriate counterfactuals. We address this issue with our shock-based empirical design. It exploits plausibly exogenous variation in the main variable of interest, the organizational status of the firm, for some firms and forms a control group of firms without such a change as counterfactuals.

Third, our analysis also complements a related literature that examines the cost of capital of diversified firms (e.g., Aivazian, Qiu, and Rahaman, 2015; Franco, Urcan, and Vasvari, 2015; Hann, Ogneva and Ozbas, 2013).[6] These studies find results consistent with the coinsurance effect of diversification. For instance, Aivazian, Qiu, and Rahaman (2015) show that diversified firms pay lower loan rates than comparable focused firms; Franco, Urcan, and Vasvari (2015) focus on bond offering yields in (primary) public debt markets and find a similar negative relationship between corporate diversification and the cost of debt. Finally, Hann, Ogneva and Ozbas (2013) show that diversified firms with less correlated segment cash flows have a lower cost of capital than comparable portfolios of standalone firms. However, the focus of their paper is on how coinsurance affects firms' systematic risk and their cost of equity.

[6] Cost of debt ("price") and debt amount supplied ("quantity") are both endogenous and simultaneously/jointly determined by supply and demand. Cross-sectional studies of capital structure typically estimate reduced form equations with leverage as a function of demand and supply factors (see Faulkender and Petersen, 2005) or assume infinitely elastic capital supply.

Finally, our paper also relates to the literature on risk management and capital structure. Theoretical models suggest that risk management activities, such as hedging, enable firms to have higher debt levels due to lower cash flow variability resulting from a decrease in expected financial distress costs (Smith and Stulz, 1985). However, for financial risk management (hedging), the empirical validity of the argument has been questioned. There is scarce evidence for a positive relationship between derivative use and leverage, as predicted by theory (Dolde, 1995; Géczy, Minton, and Schrand, 1995). One potential explanation for these non-results is that hedging with financial instruments is not a credible commitment. Firms have no incentive to hedge ex-post after raising capital, which lenders may anticipate ex-ante.[7] In contrast, corporate diversification is highly irreversible and, therefore, serves as a credible commitment of the organization to manage risk. Thus, our paper also suggests that (irreversible) operational risk management, here: corporate diversification, may be a meaningful risk management instrument if firms aim to achieve higher debt capacity.

The rest of the paper is organized as follows. In section 2, we describe the data sample and the main definitions of important variables. Section 4 presents the econometric model and the baseline results. Section 5 presents our identification strategy and the difference-in-differences results. Section 6 presents the robustness checks. Section 7 concludes.

[7] Creditors face an "asset substitution" problem ex-post if incentives of managers and shareholders are aligned: shareholders have convex claims and benefit from increased risk, while debtholders, with their concave claims, are hurt.

3. Data, Variables, and Empirical Methods

3.1. Sample and Data

We construct our sample with data from Compustat North America Annual for the period from 1981 to 2015. From these files, we retrieve firm-level information such as leverage, book assets, operating profits, market-to-book ratios or dividend payments. We then merge these data with Compustat's Segment file, from which we obtain segment accounting information and the industry, in which the firms' segments operate (represented by four-digit SIC codes). Because the Compustat Segment File may contain multiple, repeated segment data entries for a given reporting period if firms reorganize reportable segments and then restate prior segment-years for comparative purposes, we only consider the earliest source year for a given reporting period. Otherwise, reorganization of reported segments may contaminate our results. Following the literature, we exclude financial firms (SIC 6000-6999), utilities (SIC 4900-4999), and government agencies (SIC 9000-9999) because their capital structure is subject to specific regulation and their accounting information can also differ from those of firms in other sectors of the economy. For the same reasons, we remove industrial firms if their segments operate in any of these industries. We further eliminate firm- and segment-year observations with negative or missing book values of sales or assets and segment-year observations with missing or incomplete data on segment industries.

Multi-segment firms frequently do not fully allocate total firm assets or sales to their reported business segments. To limit the effect of noise introduced by potential inconsistencies between segment figures and firm totals, we follow common conventions from the literature (e.g., see Berger and Ofek, 1995; Billet and Mauer, 2003). We require that the sum of segment sales (assets) must be within 1% (25%) of consolidated firm totals. For firms that meet these criteria, we allocate the unallocated portion of sales (assets) to the reported segments on a sales-weighted (asset-weighted) basis. We attribute their accounting items proportionally to the remaining segments. Finally, to reduce the effect of outliers, we truncate all variables at the 1^{st} and 99^{th} percentiles and require leverage ratios to lie in the closed unit interval. This selection procedure leaves us with a sample of 93,867 firm-year observations from 11,566 firms, for an average of 2,682 observations per year.

3.2. Empirical Strategy and Measures

Measure of Leverage. To investigate the relationship between corporate diversification and capital structure empirically, we run regressions of *industry-adjusted leverage* as the dependent variable on diversification, our main variable of interest, and a set of firm characteristics. We follow the prior literature (Berger and Ofek, 1995; Kuppuswamy and Villalonga, 2015) and define industry-adjusted leverage as the difference between a firm's actual leverage and its imputed leverage: For a diversified firm, the imputed leverage is the asset-weighted median leverage of standalone firms operating in the same industry and represents the leverage of an industry-matched, asset-weighted portfolio of a comparable standalone firm. For a standalone firm, the imputed leverage is the leverage of the median firm in its industry. Generally, the industry-adjustment removes common industry factors which are known to imply significant variation in leverage ratios across industries (e.g., MacKay and Phillips, 2005; Lemmon, Roberts and Zender, 2008; Frank and Goyal, 2009). In the context of our study, the industry-adjustment has the additional advantage of eliminating systematic leverage differences between diversified and standalone firms if firms choose to diversify into high-leverage industries.[8] The industry matching is based on the narrowest SIC grouping (beginning with four-digit SIC codes) that includes at least ten standalone firms per industry and year. We provide detailed variable definitions in the Appendix.

In our leverage regressions, we focus on total (short-term plus long-term) book leverage as main outcome variable. Total book leverage (TBL) is defined as the ratio of total debt to total book assets. This measure produces the most conservative estimates relative to alternative (book- and market-based) measures of leverage.[9] In some of our analysis, we also report results using alternative possible leverage ratios: total gross market leverage, long-term book and market leverage, or net (of cash) book and market leverage. In Table A.1 in the Online Appendix, we replicate all regressions using these measures introduced by prior literature.

Measure of Diversification. Our main variable of interest, diversification, is an indicator variable which measures the organizational status of a firm based on the industry classification of its divisions. The binary measure equals one if a firm operates in two or more different four-digit SIC code industries, and zero otherwise.

Control Variables. In our multivariate regressions and the difference-in-differences analysis, we control for common determinants of capital structure, which we choose and define following the prior literature (Rajan and Zingales, 1995; Lemmon et al., 2008; Frank and Goyal, 2009): size (natural logarithm of total book assets), profitability (operating income after depreciation scaled by total sales), tangibility (net property, plant and equipment scaled by total assets), investment

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[8] A second approach to remove unobserved industry heterogeneity instead of using industry adjustments is to regress leverage on firm characteristics and to add a firm's imputed leverage as an additional control. In the Online Appendix and some of the specifications below, we show that the results in such alternative specification are virtually unchanged. A potential third approach, industry-year fixed effects following Gormley and Matsa (2014), is infeasible to implement in studies of corporate diversification.

[9] There is no unified consensus or a universally "best" leverage measure in the literature (see also Frank and Goyal, 2009; Welch, 2011). Most capital structure studies scale debt by book values of assets instead of market values (see Parsons and Titman, 2007) because managers appear to be primarily concerned with book leverage (Graham and Harvey, 2001).

opportunities (proxied by the market-to-book ratio), and a firm's dividend payer status. In some specifications, we also add cash flow volatility/firm risk as an additional covariate, which we measure as the standard deviation of the ratio of operating income before depreciation to assets based on a past rolling windows of 10 years (with a required minimum of five valid observations) (see the Appendix for detailed variable definitions).[10]

4. Empirical Analysis

4.1. Descriptive Statistics and Differences-in-Means

We begin our analysis by presenting descriptive statistics for the sample and univariate results on the relation between diversification and leverage. Table 1 reports tests of differences in means (t-tests) and medians (Fisher's exact tests) between diversified and standalone firms. The full sample contains a total of 93,867 firm-years, including 17,922 (19%) observations from diversified firms. The table shows that, on average, diversified firms are significantly higher levered than standalone firms across all standard measures of leverage. The magnitudes are also economically important. For instance, the total book leverage ratio of the average (median) diversified firm is 6.3 (9.5) percentage-points higher compared to those of the average (median) standalone firm. In relative terms, these numbers correspond to a 31% (61%) higher leverage of diversified firms than those of standalone firms. These leverage differences also persist, when we industry-adjust our measures of leverage. The average (median) industry-adjusted total book leverage ratio (IAL) of diversified firms is 3.6 (6.4) percentage points higher than the corresponding value of the average standalone firm. This difference further gains in size for the remaining industry-adjusted standard measures of leverage.

The table also reveals that diversified and standalone firms differ across other firm-specific characteristics. Diversified firms operate 2.8 business segments in 2.5 different four-digit SIC code industries on average. They are significantly larger, hold more tangible assets, are more profitable, are more likely to pay dividends and have lower market-to-book ratios relative to standalone firms. Cash flow volatility is significantly lower for diversified firms. As these firm characteristics were identified by prior literature as determinants of capital structure (see e.g., Frank and Goyal, 2009), we will control for them in our empirical regression specification.

Before conducting the formal regression analysis, it is also interesting to take a look at the time series behavior of industry-adjusted leverage. We plot the evolution of the different measures of industry-adjusted leverage for focused and diversified firms over time in Figure A1 in the Online

[10] One drawback of including firm-level volatility is that it decreases the sample size substantially. Many companies do not have sufficient available valid observations.

Appendix. The black solid lines refer to the average leverage of diversified firms; the grey dashed lines refer to the average annual leverage of standalone firms. Visual inspection of the panels reveals that throughout the sample period, diversified firms are persistently higher levered across all leverage measures.

4.2. Baseline Analysis

We move on with a formal regression analysis of the relation between corporate diversification and capital structure. We estimate the following equation:

$$IAL_{i,t} = \alpha + \beta \times D_{i,t} + X'_{i,t} \times \gamma + \eta_t + \epsilon_{i,t} \quad (1)$$

$IAL_{i,t}$ is the industry-adjusted leverage ratio of firm i in period t; $D_{i,t}$ represents our diversification measure, which equals one if firm i operates in two or more different four-digit SIC code industries and zero otherwise; X refers to a set of observable firm-specific standard determinants of capital structure, including size, profitability, tangibility, the market-to-book ratio and dividend payer status; η_t is a set of year fixed effects, which absorbs time-varying shocks all firms face and $\epsilon_{i,t}$ is the error term. We cluster standard errors at the firm level to adjust for heteroscedasticity and possible dependence in the residuals over time (Petersen, 2009). The parameter β is the primary coefficient of interest and represents the difference in leverage for diversified vs. standalone firms.

Table 2 (columns 2-3 and 6-7) reports the estimates of equation (1). The results indicate a strong positive relation between our variable of interest $D_{i,t}$ and industry-adjusted leverage. The association is significantly different from zero at the 1% level of significance. The estimated coefficient $\hat{\beta}$ is of sizable economic magnitude. Corporate diversification is associated with an absolute increase in industry-adjusted book leverage of 4.1 percentage points. This result translates into additional debt of USD 70.1mn (converted in 2015 dollars) for the median-sized diversified firm.[11] The sign and statistical significance of the remaining covariates in our baseline specification are consistent with the extant literature on capital structure determinants (see e.g., Frank and Goyal, 2009; Graham, Leary and Roberts, 2015): We observe that larger and more tangible firms have higher industry-adjusted leverage (IAL). Dividend payers and more profitable firms as well as firms with higher market-to-book ratios are negatively associated with leverage. For robustness, we estimate a specification similar to the one in column 2, but we include firm-level cash flow volatility (column

[11] Using alternative measures of book and market leverage, the association between our variable of interest $D_{i,t}$ and $IAL_{i,t}$ even gains in size (see Table A.4 in the Online Appendix). As expected and consistent with Duchin (2010) who finds that standalone firms hold relatively more cash for precautionary reasons, we obtain the largest estimates using specifications with net cash leverage measures as the dependent variable.

3). The availability of cash flow volatility reduces the sample size by about 43%, so we do not include it in most of our reported results. The estimated coefficients on $D_{i,t}$ is virtually unchanged and remains statistically different from zero at the 1% level. Finally, we present results from an alternative estimation strategy. We regress total book leverage on the covariates described above but include imputed leverage as an additional control in the OLS specification. The regression yields a similar coefficient of 3.7% on the diversification dummy and confirms the positive relation between diversification and leverage.

In capital structure regressions, a frequent concern is that unobservable, time-invariant differences across firms can induce a fixed effect on firms' leverage outcomes. For instance, Lemmon, Roberts and Zender (2008) document that a large part of the variation in capital structure is due to firm-specific time-invariant factors, which suggests the inclusion of firm fixed effects and identification from a firm's time-series variation. The problem with the fixed effects estimator is that it not only removes all the cross-sectional variation in both the explanatory and dependent variables, but also requires time-series variation in the firm's organizational status. While the majority of firms (84%) never change their organizational status during the sample period, 16% of firms in our sample do (6%/4% diversify/refocus once, 6% change their status multiple times). Our baseline results continue to hold (see Table 2, columns 4 and 5). The baseline association between diversification and leverage remains economically large and statistically different from zero, with an estimated coefficient that ranges from 2.5% to 3.3%.

5. Natural Experiment and Identification Strategy: SFAS No. 131

5.1. Exogenous Shock on Diversification and Institutional Background

The ideal setting to test for the (causal) effect of corporate diversification on leverage would consist of a randomly assigned intervention that induces exogenous variation in corporate diversification in a controlled experiment. We exploit an exogenous policy shock that closely resembles such an ideal experiment. In June 1997, the U.S. Financial Accounting Standard Board (FASB) issued the Statement of Financial Accounting Standards No. 131 (SFAS No. 131) to establish new standards for disclosures about reported business segments. Effective for fiscal years beginning after December 15, 1997, SFAS No. 131 forced firms to provide information about their reportable business segments consistent with the internal organization of the firm. It superseded SFAS No. 14, which allowed managers flexibility in defining their reportable segments. In particular, the old standard allowed firms to aggregate dissimilar lines of businesses into broad industry segments or even to report only a single line of business although firms in fact ran businesses in more than one industry.[12]

We exploit this unique setting in a difference-in-differences framework to empirically evaluate the effect of corporate diversification on financial leverage. SFAS No. 131 forced some firms to reveal previously hidden information about their level of firm diversification to outsiders, allowing us to exploit plausibly exogenous variation on these firms' (publicly observed) diversification status. Other firms already complied to SFAS 131 prior to its enactment, and we use a subset of these firms to control for common temporal trends. The *treatment group* contains firms that were self-proclaimed *standalone* firms under SFAS No. 14, but revealed (previously hidden) industry operations, i.e. diversification, upon adoption of the new standard. Hereafter, we label these firms as “change firms”. We identify these firms based on a hand-collected database that contains restated SFAS 131 segment accounting data for the final SFAS 14 fiscal year using an algorithm proposed by Berger and Hann (2003). This algorithm allows us to isolate the effect of revealed diversification from other changes in the adoption year (such as pooling acquisitions or discontinued operations). Such real changes may contaminate our results, for instance, because observed leverage increases could be driven by firms’ need to fund their diversifying long-term investments (Denis and McKeon, 2012).[13] As a result, our treatment group is a subset of all firms with $D_{i,t}$ changing from zero to one upon introduction of

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[12] Frequently referred are examples are IBM or Xerox (see Ettredge et al., 2000; Berger and Hann, 2003). For instance, IBM restated from one industry segment (“Information Handling-Systems”) to seven operating segments (“Global Services”, “Enterprise Investments”, “Technology”, “Server”, “Personal Systems”, “Global Financing and Software”) in five different industries (at the SIC 4 level) under the new standard.

[13] For a detailed description of our database of hand-collectied, restated segment data and the sample screening procedure of the Berger and Hann (2003) algorithm, we refer to the Online Appendix.

SFAS 131. We proxy the behavior of treated firms absent the shock with a group of standalone firms. This *control group* (labeled "no-change firms") serves as the counterfactual and contains standalone firms that complied with SFAS No. 131 already prior to its introduction. The segment reporting of these "real" standalone firms was unaffected by the new rule and, as we show below, behaved otherwise similarly before the shock compared to firms in the treatment group. This procedure identifies 388 "change firms" and a control group of 1,052 "no-change" firms.

5.2. Identifying Assumption: Parallel Trends

A necessary condition for identification is the parallel-trends assumption. In our case, it requires that the evolution of leverage of change and no-change firms absent the shock would have followed common trends both before and after the shock. The potential leverage had the shock not happened is unobservable, so we cannot formally test whether this *parallel-trends assumption* holds after the introduction of SFAS 131. We therefore test whether the trends in leverage are parallel before the shock.

To assess pre-shock trends, we estimate the following specification:

$$IAL_{i,t} = \alpha + \sum_{t=1993}^{2001} \beta_t \times \textit{change-firm}_{i,t} + \gamma_i + \eta_t + \epsilon_{i,t} \tag{2}$$

where $\textit{change-firm}_{i,t}$ is an indicator variable that equals one for treated firms (change-firms) in period t and zero otherwise, γ_i are firm dummies and η_t is a set of year fixed effects. The coefficients of interest, β_t, are interactions between the change dummy and year fixed effects. Figure 3 plots the estimated coefficients and the 95% confidence intervals. We use the year 1992 as the reference year, for which the coefficient is zero by construction. As Figure 3 reveals, the estimated coefficients for the years prior to the shock are statistically indistinguishable from zero and economically small (between -0.8% and 0.8%). Therefore, we fail to reject that time trends prior to the introduction of SFAS 131 are similar across treated and control firms. There is no evidence that non-parallel trends could bias our estimates.

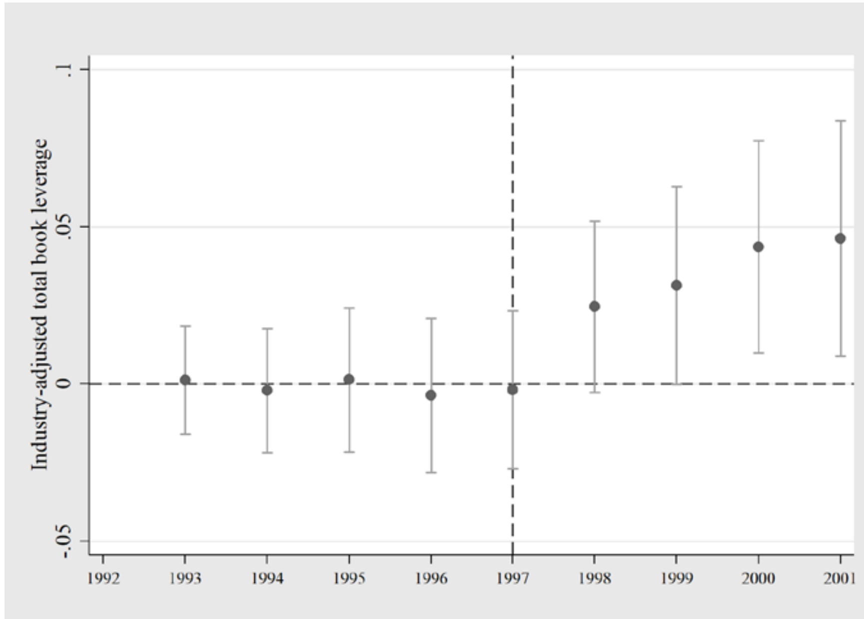

Figure 3. Parallel Pre-Treatment Trends: This figure plots the estimated coefficients and 95% confidence intervals for a set of leads and lags contained as in the regression: $IAL_{i,t} = \boldsymbol{\alpha} + \sum_{t=1993}^{2001} \boldsymbol{\beta_t} \times \textit{change-firm}_{\boldsymbol{i,t}} + \boldsymbol{\gamma_i} + \boldsymbol{\eta_t} + \boldsymbol{\epsilon_{i,t}}$, where $\boldsymbol{\beta_t}$ represents the coefficient estimates of interactions between the treatment indicator and year fixed effects (with 1992 as the omitted year).

5.3. Difference-in-Differences Strategy

To formally test the effect of (disclosed) diversification on financial leverage, we estimate the following difference-in-differences (DiD) specification:

$$IAL_{i,t} = \alpha + \delta_{DiD} \times \textit{change-firm}_i \times \textit{post-SFAS}_{i,t} + \delta_{change} \times \textit{change-firm}_i + \delta_{post\text{-}SFAS} \times \textit{post-SFAS}_{i,t} + \eta_t + \epsilon_{i,t}, \quad (3)$$

where $\textit{change-firm}_i$ is an indicator that equals one if a firm belongs to the treatment group and zero otherwise; $\textit{post-SFAS}_{i,t}$ is an indicator for the post-treatment period[14] of firm i; η_t is a set of year fixed effects and $\epsilon_{i,t}$ is the unobservable error term. We restrict the full sample to the four years before and after firms' adoption of SFAS 131. The coefficient of interest is δ_{DiD}, which measures the

[14] Because the adoption of the new standard became mandatory for fiscal periods ending after December 15, 1998, December to May year-end firms (83% of firms in our sample) adopted SFAS 131 in 1998, whereas June to November year-end firms (17% of firms) adopted the standard in 1999. Post-$SFAS_{i,t}$ reflects that SFAS 131 affects firms at two different points in time.

average leverage change in the treatment group compared to the change in the control group before and after the shock. A statistically significant and positive coefficient would provide support for the co-insurance hypothesis of diversification.

Table 3 presents the estimates from the difference-in-differences specification described above. We report the results from regressions on the full sample in columns 1-4 and from a balanced sample (as defined by presence of firms in each year during the DiD sample period) in columns 5-8. We estimate different regressions with and without covariates as well as with and without firm fixed effects for each of the two samples. All regressions are with standard errors clustered at the firm level. Table 3 shows that leverage increases substantially after the shock for change-firms. Across all specifications, the coefficient of interest $\hat{\delta}_{DiD}$ is uniformly positive, always economically large and statistical significant – in the full sample and the balanced sample. The magnitude of the coefficient is similar to that in our baseline analysis (Section 4): In column (1), the specification without covariates, the coefficient of interest $\hat{\delta}_{DiD}$ equals 4% and is statistically significant at the 1% level. The size of the estimated coefficient is also similar across alternative specifications, e.g., when we add the covariates from the OLS analysis (column 2: 4%) or firm fixed effects (column 3: 3%). For robustness, columns 5-7 repeat the analysis and present the estimated coefficients for the balanced sample. These regressions address the concern that changes in sample composition in each group of firms could affect our results. Significance and magnitude of the estimates are similar to the ones in the full sample. In the Online Appendix (Table A.2), we re-estimate all specifications for alternative leverage measures. All results are qualitatively similar to those in Table 3, with even slightly larger magnitudes than the ones presented here.

In panel B of Table 3, we present results from the alternative estimation strategy of replacing the dependent variable with non-industry-adjusted total book leverage. With this analysis, we assess whether the results are affected by industry-adjusting our leverage measure. (We discuss the potential implications of the industry adjustment and provide more definite tests in Section 5.5.2.). In some of the specifications, we add imputed leverage as an additional control. Panel B of Table 3 shows that the coefficients of the interaction term, *change-firm* × *post-SFAS*, are consistently statistically significant at the 1% level and virtually identical to the ones in the corresponding specifications in Panel A. The regression yields similar coefficients of about 4%.

Overall, the results in Table 3 are consistent with the coinsurance hypothesis of diversification, suggesting that (observed) diversification status allows firms to have a higher leverage relative to comparable focused firms.

5.4. The Coinsurance Channel

In this chapter, we aim to provide further evidence for a coinsurance channel through which revealed diversification affects leverage. If there is a coinsurance effect, we should not only find a relative leverage increase for the change-firms compared to no-change firms after the shock, but also that firms with more coinsurance (higher diversification) react more sensitive to treatment. Following the procedure proposed by Duchin (2010), we construct a direct measure of cash flow coinsurance using the volatilities and correlations of industry-level cash flows based on single-segment firms. Specifically, we compute the sales-weighted industry cash flow portfolio standard deviation associated with the industries in which firm i engages with N segments in year t:

$$\sigma_{i,t}^{ind} = \sqrt{\sum_{m=1}^{N}\sum_{n=1}^{N}\omega_{m,t}\sigma_{m,t}\omega_{n,t}\sigma_{n,t}\rho_{m,n}},$$

where $\sigma_{i,t}^{ind}$ is firm i's portfolio standard deviation across all its N segments in period t; $\omega_{m,t}$ is the weight of segment m's sales relative to the consolidated sales of the firm; $\sigma_{m,t}$ is industry cash flow volatility of segment m; $\rho_{m,n}$ is the pairwise correlation between the industry cash flows of segment m and segment n. Industry cash flow volatilities $\sigma_{m,t}$ are based on the narrowest SIC grouping that includes at least 5 observations of standalone firms over a rolling time window of 10 years.

We also calculate the segments' no-diversification portfolio standard deviation ($\overline{\sigma}_{i,t}^{ind}$) by setting the pair-wise correlation between all segments to one. This provides us with a benchmark and allows to assess the extent to which cash flow coinsurance comes into play:

$$\tau_{i,t} \; = \; \sigma_{i,t}^{ind} - \overline{\sigma}_{i,t}^{ind},$$

where $\tau_{i,t}$ measures the difference between the portfolio volatility with and without correlation. Note that $\overline{\sigma}\,_{i,t}^{ind}$ mechanically is always less than or equal to zero, and higher (less positive) values imply higher correlation and smaller levels of diversification.

We split our treatment sample into firms with high and low cash flow coinsurance and then re-estimate our DiD-model for both types of firms. We classify a firm as having strong (low) coinsurance synergies if the firm's average value of $\tau_{i,t}$ in the post-treatment era exceeds (falls below) the sample median of treated firms. Table 9 presents the regression results of our DiD-model separately for the subsamples of treated firms with high and low cash flow coinsurance. Note that no-change firms have zero diversification by construction, which implies we cannot exploit within-group variation, e.g., in a Triple-Differences framework. Hence, all regressions use the same control group of standalone firms from Section 5.3.

Column 1 of Table 9 shows the results of univariate regressions on industry-adjusted leverage for treated firms with strong cash flow coinsurance. The coefficient of the DiD-estimator is 5.9% and thus increased by 1.9 percentage-points (44%) relative to the coefficient of the entire treatment group. This result is statistically significant at the 1% level and remains practically unchanged if we add controls to the DiD-model (see column 2). In contrast, the same coefficient decreases substantially to 2.2% for the subsample of treated firms with low cash flow coinsurance (see columns 3 and 4). The overall picture portrayed by the first four columns of Table 4 continues to hold if we use total book leverage as the dependent variable and augment the specifications with a firm's imputed total book leverage as an additional control (see columns 5-8). The evidence presented in Table 9 thus supports the notion that coinsurance gains of treated firms with a higher degree of diversification can also explain the increase in leverage after the adoption of SFAS No.131 within the group of treated firms.

5.5. Alternative Explanations and Threats to Identification

A threat to the internal validity of our identification strategy is that the mandatory adoption of SFAS No. 131 might affect capital structure through channels other than *revealed diversification*. We conduct several robustness tests to rule out alternative channels and corroborate our results.

5.5.1. Information Disaggregation Channel

First, it is possible that our shock operates through increased information disaggregation, i.e. less opaqueness at the segment level (the transparency channel). Prior literature has shown that SFAS No.131 increased the extent of segment reporting disaggregation (Berger and Hann, 2003; Herrmann and Thomas, 2000; Street, Nichols, and Gray 2000). Then, more disaggregated information at the segment level instead of revealed diversification may explain the increase in leverage induced by the shock.

We construct two tests that enable us to distinguish the effect of increased segment reporting transparency on firms' capital structure after the shock from the effect of revealed diversification. To proxy for the level of information disaggregation at the firm level, we use a variant of the "fineness" measure, *DISAGG*, introduced by Piotroski (2002) and Berger and Hann (2003). This measure is defined as the ratio of the number of reported segments to the number of reported 4-digit SIC code industries.

The first test builds a placebo sample of firms that serves as pseudo-treatment group. This group consists of *no-change* firms that reveal an increased number of operating segments under the new standard, but operate in the same 4-digit SIC industry throughout the sample period (i.e., *DISAGG*=1 under SFAS No. 14, but *DISAGG*>1 under SFAS No. 131). These firms are *single-*

segment, single-industry firms under SFAS No. 14 but become *multi*-segment, single-industry firms under the new standard. One example is Oshkosh Truck Corp. that operated in SIC code 3711 throughout the sample period and disclosed a single segment called "specialized motor vehicles" before the shock, but three segments ("commercial trucks", "fire and emergency trucks" and "defense tactical trucks") under the new standard. We identify 112 such non-diversified placebo firms.

Then, we estimate a variant of equation (3), in which we replace the treatment assignment indicator, $change_i$, with an indicator variable, $placebo_i$, that equals one if a firm belongs to the "placebo" group and zero if the firm is part of the control group (firms that are single-segment, single-industry throughout the sample period). If information disaggregation were an alternative channel, we would expect to find a relative increase in leverage for the placebo firms after the shock compared to the control group ($\delta_{\mathrm{DiD}} > 0$). As we show in Table 5, the DiD estimate is insignificant, close to zero and negative, indicating no change in leverage for placebo firms relative to control firms. This results suggests that it seems unlikely that disaggregation drives our results.

The second test proposes a triple-differences (difference-in-difference-in-differences) strategy that tests if the relative leverage effect of the shock is larger for the group of *change-firms* with an increase in disaggregated reporting under SFAS 131 (i.e., $DISAGG$>1 under SFAS No. 131, 40% of change-firms) compared to the group of treated firms with no such increase (60%). While the placebo test in the previous paragraph indicates that disaggregation did not affect leverage of persistently (pre- and post-SFAS 131) non-diversified firms, this test provides an assessment of whether our baseline difference-in-differences results (Section 5.3) are affected by the alternative channel. Because a triple-differences test requires variation in disaggregation within both groups, we assign the previously defined placebo firms to the control group and estimate the specification as described in equation (4):

$$\begin{aligned} IAL_{i,t} = {} & \alpha + \delta_{\mathrm{DiDiD}} \times disagg_i \times change\text{-}firm_i \times post\text{-}SFAS_{i,t} \\ & + \delta_1 \times disagg_i \times post\text{-}SFAS_{i,t} + \delta_2 \times change\text{-}firm_i \times post\text{-}SFAS_{i,t} \\ & + \delta_3 \times disagg_i \times change\text{-}firm_i + \delta_4 \times disagg_i + \delta_{change} \times change\text{-}firm_i \\ & + \delta_{post\text{-}SFAS} \times post\text{-}SFAS_i + \eta_t + \epsilon_{i,t} , \end{aligned} \tag{4}$$

where $disagg_i$ is an indicator variable that equals one for firms with greater disaggregation under SFAS 131; $change\text{-}firm_i$ is an indicator that equals one if a firm belongs to the treatment group; and $post\text{-}SFAS_{i,t}$ is an indicator for the post-treatment period of firm i. This specification allows us to difference out two separate control effects during the pre- and post-treatment periods by accounting for three levels of differencing: Change-firms versus no-change firms, no disaggregation vs.

disaggregation, and pre- versus post-SFAS 131. The placebo firms serve as the post-SFAS counterfactual for change-firms with an increase in disaggregation. The group of no-change firms have no increase in disaggregation by construction and serve as the counterfactual for change-firms without increase in disaggregation. The interaction of $disagg_i$, $change\text{-}firm_i$ and $post\text{-}SFAS_{i,t}$, δ_{DiDiD}, is the triple-differences estimate and the main coefficient of interest. It captures how different the leverage change is for change-firms with increased disaggregation relative to change-firms without such increase. If there is an effect of the disaggregation channel incremental to revealed diversification, we should expect a positive estimate, $\delta_{\text{DiDiD}} > 0$. The inclusion of the second-level interactions controls for changes after the shock common to all firms with greater disaggregation (δ_1), changes after the shock common to all treated firms (δ_2), and time-invariant characteristics of the change-firms with greater disaggregation (δ_3).

Table 6 reports estimates for the coefficients in equation (4) across different specifications. The estimated coefficient of interest δ_{DiDiD} is negative, close to zero, and never statistically significant. This near-zero effect persists uniformly across all specifications. Across all specifications, Table 6 also shows positive, economically small, and statistically insignificant effects of the shock on the leverage of *all firms* with greater disaggregation (δ_1), which confirms the results of our placebo test. In summary, we find no evidence for an effect of information disaggregation beyond revealed diversification or, more generally, evidence in favor of an information disaggregation hypothesis of leverage.

5.5.2. Industry Composition Channel

Another potential threat to our identification strategy could arise if treated firms conceal their pre-SFAS-131 segments' industry affiliation and systematically report their high-leverage industry segments during the pre-treatment era (while segments of low-leverage industries remain hidden under SFAS 14).[15] Then, SFAS No. 131 may reveal mandated changes in reported industry affiliation instead of diversification strategies, and specifications using industry-adjusted leverage as the dependent variable would mechanically overestimate the effect of revealed diversification. Moreover, even if there were no incentives to camouflage low-debt-capacity industries, firms' incentives to hide segments — for instance, to withhold information that could competitively disadvantage the firm —

[15] We note that SFAS 14 and SFAS 131 require firms to report the products and services from which each reportable segment derives its revenues, but do not require firms to report SIC codes on a segment level. It is S&P Compustat that assigns 4-digit segment SIC codes based on the descriptive information of segment activities (see Davis and Duhaime, 1992; Guenther and Rosman, 1994; Maksimovic and Phillips, 2007 for details on this iterative process). For convenience, we refer to "firms that report industries" throughout the paper (instead of to "firms that report descriptive information about business activities, which Compustat uses to assign SICs").

may impart bias to the industry adjustment[16]. Technically, this "industry composition channel" may mechanically introduce non-parallel trends in the *post-SFAS 131* periods and confound our results.

To formally address this concern, we examine if the shock induced by SFAS No.131 differentially affected the industry-adjustment of leverage for change-firms versus control firms. To do so, we rerun equation (3), but replace the dependent variable, *IAL*, with the firm's imputed leverage (see Section 3.2). This alternative difference-in-differences specification tests how SFAS No. 131 affected the imputed leverage of change-firms compared to the one of no-change firms. Recall that the imputed leverage of standalone firms is the leverage of the median firm in its industry, whereas the imputed leverage of diversified firms is the industry-matched, asset-weighted median leverage of the industries in which the firm operates. Our results, reported in Table 7, rule out that changes in industry composition may drive our results. The coefficient of interest, the interaction of the Change-Firm and Post-SFAS 131 dummy, is close to zero and insignificant across all specification.

In the Online Appendix, we also show results from an alternative test. We construct a variable that measures the imputed leverage (for post-SFAS 131 firm-years) that would have been observed if the firm had provided the post-SFAS 131 segment disclosures already in the lag adoption year (the last 10-K under SFAS 14).[17] Then, we regress this measure (*BIL*) on a set of dummy variables that denote individual post-treatment years. The estimated coefficients of the time dummies capture the time-series difference that result from post-treatment compositional changes relative to the lag adoption year. The results corroborate our previous findings. The coefficients of the time variables are economically small, hover around zero and are statistically insignificant at conventional levels.

5.5.3. Agency Cost of Debt Channel

One possible reason for why some firms withhold segment information under the prior standard SFAS 14 is that they conceal the presence of within-firm agency problems (see e.g., Berger and Hann, 2007). For instance, managers may have used their discretion opportunistically to disguise inefficient cross-subsidization by aggregating distinct lines of businesses into broad industry segments.[18]

[16] Botosan and Stanford (2005) find evidence that firms hide profitable segments in less competitive industries than their primary operations to appear as if the were underperforming their competition. In contrast, Berger and Hann (2007) provide inconclusive evidence regarding competitive motives of withholding segment information.

[17] The measure is constructed by replacing the time-varying industry median leverage of standalone firms with the industry's median leverage in the lag adoption year (the last 10-K under SFAS 14). Then, we compute the imputed leverage for each firm-year as described in Section 3.2.

[18] A large literature studies the (in)efficiency of capital allocation in internal capital markets (e.g., Lamont, 1997; Shin and Stulz, 1998; Rajan, Servaes, and Zingales, 2000; Maksimovic and Phillips, 2002; Ozbas and Scharfstein, 2010; Matvos and Seru, 2014).

Therefore, a natural question that we consider next is whether the revelation of agency problems (associated with the distortion of capital allocation) affects our results.

The most plausible story is that agency problems are negatively related to leverage because they restrict debt capacity introducing frictions in the supply of debt to the firm (e.g., Stiglitz and Weiss, 1981; Tirole, 2006). Therefore, our shock-based research design could underestimate the effect of diversification on capital structure if some of the firms in our sample pursue agency motives. For example, if some firms not only disclose that they are diversified, but also reveal agency problems, the positive effect on leverage may be mitigated by an alternative channel.

To examine this "agency cost channel", we first divide our treated group of change-firms into two samples: one sample that includes firms that revealed pronounced (but previously hidden) cross-segment subsidization in capital allocation suggesting agency problems at the segment level, and one sample that includes firms with no such revelation. We follow the literature and employ a common measure (*TRANSFER*) introduced by Billet and Mauer (2003) and Berger and Hann (2007) to proxy for agency motives associated with inefficient cross-segment transfers. *TRANSFER* (described in the appendix) is an indicator variable that equals one if a change-firm likely subsidizes underperforming segments. For the control group of no-change firms, we set the TRANSFER variable to zero.

To avoid possible bias if firms anticipate adverse financing effects resulting from the disclosure of agency problems, we exploit a unique feature of SFAS No. 131. SFAS No. 131 mandated firms to release restated segment information for the final SFAS No. 14 year (the lag adoption year), which implies that firms were forced to retroactively disclose investment behavior. Using this restated segment information, we are able to address the concern that firms strategically respond to the introduction of the new regulatory requirements by adjusting capital allocation prior to the release of the first SFAS 131 financial statement. Because the restated data is not available in commercial databases, we hand-collect them from the firms' first SFAS 131 10-K.

We then re-estimate our main difference-in-differences specification for the two subsamples and find evidence that leverage increased around the shock only in the subsample of firms without agency problems (Table 8, columns 1-4). For the group of firms that revealed cross-segment transfers, we detect a near-zero and statistically insignificant effect of the shock (columns 5-8). This result indicates that the net effect of revealed diversification for firms with agency problems is close to zero.

In our final analysis, we use the coinsurance measure as introduced in Section 5.4 for a more nuanced analysis of diversification on the (net) effect of SFAS 131 conditional on revealed agency problems. We use a triple-differences framework similar to the one in Section 5.5.1. The variant of equation (4) that we estimate replaces $disagg_i$ (which measures disaggregation under SFAS 131) with $transfer_i$ (which measures disclosed agency problems). Because the triple-difference specification requires variation in the control group with respect to *transfer*, we assign the group of placebo firms to the control firms. Recall that placebo firms are *no-change* firms that reveal an increased number of operating segments under the new standard, but all of them operate in the same 4-digit SIC industry. The unique feature that we exploit here is that a subset of this placebo firms also disclose inefficient transfers and therefore serve as a post-SFAS counterfactual for change-firms with inefficient transfers.

Table 9 presents the results. In columns (1) and (2), we first run the specification with and without covariates on the full sample. The estimates confirm that the (simultaneous) disclosure of agency problems dampens the baseline results (and does not drive them). The coefficient on the double interaction, *change-firm* × *post-SFAS*, is positive, economically large (5.2-5.3%) and increases in magnitude relative to the estimates in the baseline DiD (4.1%, see Table 3, columns 1 and 2). The reason can be seen from the triple interaction, *Transfer* × *Changefirm* × *Post-SFAS*, which is negative and significant. The coefficient is also of similar size relative to the double-difference estimate, which implies that firms with agency problems are not able to utilize coinsurance synergies. We observe the same pattern, when we split the sample in firms with high and low coinsurance (columns 3-6). Firms with no (revealed) agency problems benefit from the revelation of diversification strategies, whereas for firms with (revealed) agency problems the net effect of diversification and agency is close to zero.

5.5.4. Pre-Treatment Compliance and Non-Compliance

We also address the concern that firms systematically self-select into treatment ("change firms") and control group ("no change firms"). We match treatment and control firms based on different propensity scores prior to the introduction of SFAS 131 and perform a matched, conditional DiD analysis. We rely on theories of disclosure that guide our specification of the propensity score models. Our results continue to hold; statistical and economical significance remain unchanged.[19]

5.5.5. Functional Form Independence

We conduct further robustness checks to demonstrate functional form independence of our results. The magnitude or even the sign of the DiD estimator may be sensitive to its functional form assumption, when average outcomes for control and treatment group are very different at baseline. We introduce a log-level difference-in-differences specification to study the shock in relative terms (instead of absolute terms). We use the natural log of total book leverage as the dependent variable on the left-hand side of equation (3) and include firms' imputed leverage ratio as an additional

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[19] This section is work in progress.

control.[20] Table 10 reports estimates for the coefficients of the log-level difference-in-differences specification. Columns (1) and (2) of Table 7 suggest that the treatment firms increase their industry-adjusted leverage ratio compared to control firms after the adoption of SFAS No. 131 by more than 40%. The average effect of the treatment is practically unchanged if we add observed firm characteristics or firm fixed effects. Thus, our results continue to hold if we consider relative changes in debt levels instead of absolute changes in debt levels.[21]

6. Conclusion

In this paper, we show that diversified firms have higher leverage relative to standalone firms. Our results suggest economically large financing advantages of diversified firms, which allows them to borrow more than comparable focused firms. We identify causal effects in a novel shock-based difference-in-differences research design using the introduction of new segment reporting standards (SFAS No. 131) as a quasi-natural experiment. SFAS 131 forced some firms to reveal previously hidden information about their level of firm diversification to outsiders, allowing us to exploit plausibly exogenous variation on a firm's diversification status. Our findings identify the reduction of cash flow volatility as the main channel of the coinsurance effect. These results add to our understanding of how firm boundaries affect financial policy.

[20] We refrain from applying the log-transformation to the main measure, industry-adjusted leverage (IAL), because all firms that are underlevered relative to their industries (i.e. IAL < 0) would be canceled out.

[21] This section is work in progress.

Appendix

Table A1. Variable Definitions

Variable	Definition
Diversified	Indicator variable that equals one if a firm reports multiple segments in at least two different 4-digit SIC code industries (sics1); and zero otherwise
Firm Size	The natural logarithm of book value of assets (at)
Profitability	Operating income after depreciation (oiadp) scaled by total firm sales (sale)
Tangibility	Property, Plant and Equipment (ppent) scaled by book value of assets (at)
Market-to-Book	Total debt (dlc + dltt) + market value of common equity (prcc_f × csho) − preferred stock (pstkl) scaled by book value of assets (at)
Dividend Payer	Indicator variable that equals one if a firm pays dividends (dvc>0), and zero otherwise
Cash flow	Operating Income before depreciation (oibdp) scaled by book value of assets (at)
Firm Risk	Rolling standard deviation of firm cash flow over a window of 10 years with a minimum requirement of 5 years of non-missing data
Total Book Leverage	Total debt (dlc + dltt) scaled by book value of assets (at)
Net Book Leverage	Total debt (dlc + dltt) − cash and short-term investments (che) scaled by book value of assets (at)
Long-term Book Leverage	Long-term debt (dltt) scaled by total firm assets (at)
Total Market Leverage	Total debt (dlc + dltt) scaled by market value of assets (dlc + dltt + prcc_f × csho + pstkl)
Net Market Leverage	Total debt minus cash and short-term investments (dlc + dltt −che) scaled by net market value of assets (dlc + dltt − che + prcc_f × csho + pstkl)
Long-term Market Leverage	Long-term debt (dltt) scaled by market value of assets (dlc +dltt + prcc_f × csho + pstkl)

Imputed Leverage	Asset-weighted median leverage of standalone firms operating in the same industry and year. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 standalone firms per industry and year.
Transfer	Transfer is an indicator variable that equals one for a firm when any of its segments is defined as (1) receiving cross-segment transfers and (2) underperforming in the firm's lag adoption year; and zero otherwise. Cross-segment transfers occur when a segment's excess capital expenditures exceed the excess capital expenditures of the firm. Segment excess capital expenditures are segment capital expenditures minus the sum of segment profits and depreciation, i.e. max{capxs – (ops + dps), 0}. Firm excess capital expenditures are firm capital expenditures minus the sum of firm earnings and depreciation, i.e. max{capx – (ebit + dp), 0}. A segment is classified as "underperforming segment" if the segment's ROS (ops / sales) is less than the sales-weighted average ROS of the remaining segments.
Industry cash flow volatility	The volatility of the average standalone firm's cash flow in its industry over the past 10 years. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 5 standalone firms per industry.
Firm-specific industry cash flow volatility	Sales-weighted industry cash flow volatility across all segments of the firm in year t obtained after accounting for the cross-segment industry cash flow correlations.
Cash flow coinsurance	Cash flow coinsurance is the difference between the firm-specific industry cash flow volatility conditional on perfectly correlated segment industries and the firm-specific cash flow volatility obtained after accounting for the cross-divisional cash flow correlations

Table 1. Descriptive Statistics

This table provides descriptive statistics using annual Compustat data from 1981 through 2015 for diversified and standalone firms with total book assets of $5M or more. The sample contains firms whose aggregated segment sales (assets) are within 1% (25%) of the consolidated firm totals. Diversified firms are all firms that report multiple businesses in at least two different 4-digit SIC Code industries. Financial firms (SIC 6000-6999), utilities (SIC 4900-4999), and government agencies (SIC 9000-9999) are excluded, as well as all firms whose segments operate in any of these industries. The leverage measures are winsorized with cutoffs at the 1% and 99%-level. Industry-adjusted leverage is the difference between a firm's actual book leverage, defined as the ratio of total debt to total assets, and its imputed leverage. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Total		(1) Diversified		(2) Focused		Difference (1)-(2)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Firm Characteristics								
Diversified	0.190	0.000	1.000	1.000	0.000	0.000	1.000***	1.000***
Firm Size	4.851	4.661	5.935	5.890	4.595	4.423	1.339***	1.467***
Profitability	−0.211	0.055	0.060	0.069	−0.275	0.050	1.000***	0.019***
Tangibility	0.278	0.218	0.313	0.279	0.270	0.200	0.042***	0.079***
Market-to-Book	1.750	1.179	1.189	0.980	1.883	1.252	−0.693***	−0.271***
Dividend payer	0.303	0.000	0.559	1.000	0.242	0.000	0.317***	1.000***
Cashflow Volatility (Firm Risk)	0.074	0.052	0.048	0.037	0.083	0.058	−0.035***	−0.021***
Number of segments	1.417	1.000	2.864	3.000	1.076	1.000	1.788***	2.000***
Leverage Measures								
Total book leverage	0.212	0.181	0.263	0.250	0.200	0.155	0.062***	0.094***
Net book leverage	0.166	0.093	0.224	0.210	0.153	0.040	0.071***	0.169***
Long-term book leverage	0.160	0.110	0.211	0.193	0.148	0.081	0.063***	0.111***
Total market leverage	0.212	0.143	0.284	0.248	0.196	0.113	0.088***	0.134***
Net market leverage	0.173	0.068	0.244	0.203	0.157	0.025	0.087***	0.178***
Long-term market leverage	0.157	0.085	0.225	0.190	0.141	0.058	0.083***	0.132***
Imputed Leverage								
Total book leverage	0.162	0.155	0.184	0.188	0.157	0.142	0.027***	0.045***
Net book leverage	0.107	0.068	0.124	0.119	0.103	0.040	0.021***	0.078***
Long-term book leverage	0.105	0.080	0.120	0.114	0.102	0.067	0.018***	0.047***
Total market leverage	0.148	0.124	0.175	0.169	0.141	0.107	0.034***	0.061***
Net market leverage	0.102	0.053	0.122	0.103	0.097	0.028	0.025***	0.074***
Long-term market leverage	0.095	0.062	0.113	0.100	0.090	0.048	0.022***	0.052***
Industry-Adjusted Leverage								
Total book leverage	0.050	0.011	0.079	0.065	0.043	0.001	0.035***	0.064***
Net book leverage	0.059	0.000	0.099	0.080	0.050	0.000	0.049***	0.080***
Long-term book leverage	0.055	0.007	0.091	0.072	0.046	0.000	0.044***	0.072***
Total market leverage	0.064	0.010	0.108	0.082	0.054	0.001	0.054***	0.081***
Net market leverage	0.071	0.000	0.121	0.084	0.059	0.000	0.061***	0.084***
Long-term market leverage	0.062	0.005	0.112	0.081	0.051	0.000	0.061***	0.081***
Obs	93,867	93,867	17,922	17,922	75,945	75,945	93,867	93,867

*** p<0.01, ** p<0.05, * p<0.1

Table 2. Baseline Regression

This table presents pooled cross-sectional regression results from estimating equation (1) using annual Compustat data from 1981 through 2015. The sample includes diversified and standalone firms with total book assets of $5M or more. The dependent variable is industry-adjusted total book leverage in columns 1-3, 7-9 and total book leverage in columns 4-6. Industry-adjusted leverage is the difference between a firm's actual book leverage, defined as the ratio of total debt to total assets, and its imputed leverage. Imputed leverage is the asset-weighted median leverage of stand-alone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. Diversified is a dummy that equals one if a firm operates segments in two or more different 4-digit SIC code industries, and zero otherwise. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	Industry-adjusted total book leverage			Total book leverage			Industry-adjusted total book leverage		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Diversified	0.036***	0.040***	0.037***	0.045***	0.042***	0.039***	0.033***	0.025***	0.021***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Imputed leverage				0.641***	0.485***	0.424***			
				(0.012)	(0.014)	(0.020)			
Firm size		0.009***	0.010***		0.012***	0.012***		0.022***	0.027***
		(0.000)	(0.001)		(0.000)	(0.001)		(0.001)	(0.002)
Profitability		−0.000*	−0.002***		−0.000	−0.002***		−0.000	−0.001**
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Tangibility		0.036***	0.006		0.146***	0.125***		0.180***	0.115***
		(0.007)	(0.010)		(0.008)	(0.010)		(0.012)	(0.017)
Market-to-book		−0.004***	−0.004***		−0.007***	−0.008***		−0.002***	−0.003*
		(0.000)	(0.001)		(0.000)	(0.002)		(0.000)	(0.001)
Dividend payer		−0.070***	−0.071***		−0.068***	−0.067***		−0.042***	−0.039***
		(0.003)	(0.004)		(0.003)	(0.003)		(0.003)	(0.003)
Firm risk			0.036			−0.021			0.151***
			(0.023)			(0.023)			(0.035)
Constant	0.012***	0.004	0.015	0.087***	0.068***	0.088***	−0.007*	−0.122***	−0.134***
	(0.003)	(0.005)	(0.011)	(0.004)	(0.005)	(0.011)	(0.003)	(0.008)	(0.016)
Year FE	X	X	X	X	X	X	X	X	X
Firm FE							X	X	X
Nobs	93,867	93,867	53,230	93,867	93,867	53,230	93,867	93,867	53,230
Adj. R^2	0.01	0.04	0.05	0.17	0.22	0.19	0.03	0.06	0.05

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Difference-in-Differences Regression

This table presents regression results using a difference-in-differences (DiD) design to estimate equation (3). The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). The dependent variable is industry-adjusted total book leverage in panel A and total book leverage, defined as the ratio of total debt to total assets in panel B. Industry-adjusted leverage is the difference between a firm's actual book leverage, and its imputed leverage. Imputed leverage is the asset-weighted median leverage of standalone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. Changefirm is an indicator variable that equals one if a firm's organizational status changes from "standalone" to "diversified" after the adoption of SFAS No. 131, and zero otherwise. Post-SFAS is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

Panel A. Regression on industry-adjusted total book leverage

	Full Sample			Balanced Sample		
	(1)	(2)	(3)	(5)	(6)	(7)
Changefirm × post-SFAS	0.041***	0.041***	0.030***	0.047***	0.045***	0.049***
	(0.010)	(0.010)	(0.009)	(0.014)	(0.013)	(0.013)
Changefirm	0.033***	0.037***		0.023	0.032*	
	(0.012)	(0.012)		(0.018)	(0.018)	
post-SFAS	−0.008	−0.013	0.005	0.001	−0.007	0.006
	(0.013)	(0.012)	(0.007)	(0.016)	(0.016)	(0.008)
Firm Size		0.013***	0.043***		0.017***	0.054***
		(0.002)	(0.005)		(0.004)	(0.008)
Profitability		−0.070***	−0.049***		−0.086***	−0.066**
		(0.021)	(0.017)		(0.031)	(0.026)
Tangibility		0.011	0.109***		−0.011	0.089*
		(0.019)	(0.034)		(0.025)	(0.048)
Market-to-Book		−0.003	−0.000		−0.001	−0.000
		(0.002)	(0.000)		(0.001)	(0.000)
Dividend Payer		−0.060***	−0.027***		−0.058***	−0.025*
		(0.009)	(0.009)		(0.012)	(0.013)
Firm Risk						
Constant	0.010	−0.029*	−0.216***	−0.008	−0.063***	−0.278***
	(0.006)	(0.015)	(0.029)	(0.008)	(0.020)	(0.044)
Year FE	X	X	X	X	X	X
Firm FE			X			X
Observations	8,445	8,445	8,445	4,240	4,240	4,240
Adj. R^2	0.02	0.05	0.07	0.02	0.06	0.10

Panel B. Regression on total book l everage

	Full Sample			Balanced Sample		
	(1)	(2)	(3)	(5)	(6)	(7)
Changefirm × post-SFAS	0.040***	0.040***	0.028***	0.047***	0.048***	0.049***
	(0.010)	(0.009)	(0.008)	(0.013)	(0.012)	(0.012)
Changefirm	0.045***	0.042***		0.037**	0.039**	
	(0.012)	(0.011)		(0.018)	(0.017)	
post-SFAS	0.011	−0.006	0.006	0.025	−0.001	0.005
	(0.013)	(0.012)	(0.006)	(0.016)	(0.015)	(0.008)
Imputed leverage		0.475***	0.261***		0.382***	0.261***
		(0.040)	(0.029)		(0.054)	(0.038)
Firm Size		0.015***	0.045***		0.019***	0.056***
		(0.002)	(0.005)		(0.003)	(0.008)
Profitability		−0.063***	−0.066***		−0.098***	−0.088***
		(0.022)	(0.019)		(0.030)	(0.028)
Tangibility		0.134***	0.125***		0.135***	0.109**
		(0.021)	(0.034)		(0.028)	(0.048)
Market-to-Book		−0.005	−0.001		−0.003	−0.000
		(0.004)	(0.001)		(0.003)	(0.000)
Dividend Payer		−0.055***	−0.024***		−0.047***	−0.028**
		(0.008)	(0.008)		(0.011)	(0.012)
Firm Risk						−0.163***
						(0.045)
Constant	0.189***	0.017	−0.102***	0.171***	−0.007	−0.163***
	(0.006)	(0.015)	(0.029)	(0.008)	(0.019)	(0.045)
Year FE	X	X	X	X	X	X
Firm FE			X			X
Observations	8,445	8,445	8,445	4,240	4,240	4,240
Adj. R^2	0.02	0.24	0.10	0.02	0.22	0.12

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Cash Flow Coinsurance Channel: Subsample Analysis

This table presents regression results using a difference-in-differences (DiD) design to estimate equation (3) for different subsamples of treated firms: firms with strong cash flow coinsurance and firms with weak cash flow coinsurance (based on the sample median). The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). The dependent variable is industry-adjusted total book leverage in columns 1-4, and total book leverage in columns 5-6. Industry-adjusted leverage is the difference between a firm's actual book leverage, and its imputed leverage. Imputed leverage is the asset-weighted median leverage of standalone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "standalone" to "diversified" after the adoption of SFAS No. 131, and zero otherwise. *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	Industry-adjusted total book leverage				Total book leverage			
	High Coinsurance		Low Coinsurance		High Coinsurance		Low Coinsurance	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Changefirm × post-SFAS	0.059***	0.057***	0.022	0.022*	0.056***	0.054***	0.025*	0.026**
	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.012)
Changefirm	0.012	0.018	0.055***	0.058***	0.017	0.024	0.060***	0.064***
	(0.015)	(0.016)	(0.016)	(0.016)	(0.014)	(0.014)	(0.015)	(0.015)
post-SFAS	−0.001	−0.006	0.001	−0.002	0.002	−0.003	0.009	0.003
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.012)
Imputed Leverage					0.614***	0.480***	0.622***	0.488***
					(0.033)	(0.041)	(0.033)	(0.042)
Firm Size		0.012***		0.012***		0.014***		0.014***
		(0.003)		(0.003)		(0.002)		(0.002)
Profitability		−0.083***		−0.064***		−0.079***		−0.061***
		(0.023)		(0.021)		(0.023)		(0.022)
Tangibility		0.016		0.017		0.140***		0.141***
		(0.019)		(0.020)		(0.022)		(0.022)
Market-to-Book		−0.002		−0.002		−0.005		−0.005
		(0.002)		(0.002)		(0.004)		(0.004)
Dividend Payer		−0.059***		−0.067***		−0.054***		−0.061***
		(0.010)		(0.010)		(0.009)		(0.009)
Constant	0.010*	−0.025	0.010*	−0.023	0.189***	0.020	0.191***	0.020
	(0.006)	(0.015)	(0.006)	(0.015)	(0.006)	(0.015)	(0.006)	(0.015)
Year FE	X	X	X	X	X	X	X	X
Observations	7,695	7,695	7,632	7,632	7,695	7,695	7,632	7,632
R-squared	0.01	0.05	0.02	0.05	0.19	0.24	0.18	0.25

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Information-Disaggregation Channel: Placebo-Test

This table presents panel regression results using a difference-in-differences (DiD) design to estimate equation (3) for a sample of non-diversified multi-segment firms that operate in a single industry pre- and post-SFAS 131. The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). The dependent variables are industry-adjusted total book leverage and industry-adjusted total market leverage. Industry-adjusted leverage is the difference between a firm's actual book leverage, defined as the ratio of total debt to total assets, and its imputed leverage. Imputed leverage is the asset-weighted median leverage of stand-alone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Placebo* is an indicator variable that equals one if a firm revealed increased information disaggregation upon adoption of SFAS No. 131, and zero otherwise. *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	(1)	(2)	(3)	(4)
Placebo × post-SFAS	0.010	0.011	0.007	0.009
	(0.015)	(0.015)	(0.013)	(0.013)
Placebo	0.029*	0.034**		
	(0.015)	(0.015)		
post-SFAS	0.010	0.006	0.025***	0.024***
	(0.013)	(0.013)	(0.007)	(0.007)
Size		0.011***		0.036***
		(0.003)		(0.005)
Profitability		−0.059**		−0.026
		(0.027)		(0.022)
Tangibility		0.024		0.133***
		(0.019)		(0.036)
Market-to-Book		−0.003		−0.000
		(0.002)		(0.000)
Dividend Payer		−0.065***		−0.017*
		(0.010)		(0.009)
Constant	0.011*	−0.022	0.007*	−0.193***
	(0.006)	(0.015)	(0.004)	(0.029)
Year FE	X	X	X	X
Firm FE			X	X
Nobs	7,540	7,540	7,540	7,540
Adj. R^2	0.01	0.04	0.03	0.06

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Information-Disaggregation Channel: Triple Difference-in-Differences

This table presents panel regression results using a triple differences (3-DiD) design to estimate equation (4). The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). The dependent variable is industry-adjusted total book leverage. Industry-adjusted leverage is the difference between a firm's actual book leverage, defined as the ratio of total debt to total assets, and its imputed leverage. Imputed leverage is the asset-weighted median leverage of stand-alone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Disagg* is an indicator variable that equals one if a firm's level of segment-reporting disaggregation increased after the adoption of SFAS No. 131, and zero otherwise. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "stand-alone" to "diversified" upon adoption of SFAS No. 131, and zero otherwise. *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	(1)	(2)	(3)	(4)
Disagg × Changefirm × post-SFAS	−0.013	−0.010	−0.013	−0.018
	(0.027)	(0.027)	(0.024)	(0.024)
Changefirm × post-SFAS	0.040***	0.040***	0.031***	0.033***
	(0.012)	(0.012)	(0.011)	(0.010)
Disagg × post-SFAS	0.010	0.011	0.009	0.013
	(0.016)	(0.016)	(0.014)	(0.014)
Changefirm × Disagg.	−0.010	−0.020		
	(0.029)	(0.029)		
Changefirm	0.029*	0.035**		
	(0.015)	(0.015)		
Disagg	0.034**	0.037**		
	(0.015)	(0.015)		
post-SFAS	−0.004	−0.007	0.009	0.009
	(0.012)	(0.012)	(0.007)	(0.007)
Firm Size		0.012***		0.043***
		(0.002)		(0.005)
Profitability		−0.058**		−0.033
		(0.026)		(0.023)
Tangibility		−0.001		0.124***
		(0.020)		(0.034)
Market-to-Book		−0.003		−0.000
		(0.002)		(0.000)
Dividend Payer		−0.055***		−0.022**
		(0.009)		(0.009)
Constant	0.004	−0.028*	0.008**	−0.223***
	(0.006)	(0.014)	(0.004)	(0.029)
Year FE	X	X	X	X
Firm FE			X	X
Nobs	8,391	8,391	8,391	8,391
Adj. R^2	0.02	0.05	0.04	0.07

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Industry Composition Channel

This table presents panel regression results using a difference-in-differences (DiD) design to estimate equation (3) with imputed leverage as the dependent variable. The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). Imputed leverage is the asset-weighted median leverage of stand-alone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "stand-alone" to "diversified" upon adoption of SFAS No. 131, and zero otherwise. *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	(1)	(2)	(3)	(4)
Changefirm × post-SFAS	−0.000	−0.000	−0.002	−0.002
	(0.005)	(0.005)	(0.004)	(0.004)
Changefirm	0.012	0.010		
	(0.007)	(0.007)		
post-SFAS	0.019**	0.013*	0.002	0.002
	(0.008)	(0.007)	(0.003)	(0.003)
Firm Size		0.004**		0.003
		(0.002)		(0.002)
Profitability		0.011		−0.023***
		(0.016)		(0.005)
Tangibility		0.234***		0.022
		(0.013)		(0.015)
Market-to-Book		−0.004		−0.000
		(0.003)		(0.000)
Dividend Payer		0.009		0.003
		(0.005)		(0.004)
Constant	0.179***	0.088***	0.173***	0.154***
	(0.004)	(0.010)	(0.001)	(0.012)
Year FE	X	X	X	X
Firm FE			X	X
Nobs	8,445	8,445	8,445	8,445
Adj. R^2	0.01	0.23	0.05	0.05

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8. Agency Motive Channel: Subsample Analysis

This table presents panel regression results using a difference-in-differences (DiD) design to estimate equation (3) for different subsamples of treated firms: firms without (with) inefficient cross-segment transfers of underperforming segments in columns 1-4 (5-8). Control firms are standalones operating in a single four-digit SIC code industry before and after the enactment of SFAS 131. The dependent variable is industry-adjusted total book leverage, which is the difference between a firm's total book leverage and its imputed leverage. Imputed leverage is the asset-weighted median leverage of standalone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "standalone" to "diversified" upon adoption of SFAS 131 (treated firms), and zero otherwise (control firms). *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS 131 in or before year t, and zero otherwise. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	Efficient treatment firms				Inefficient treatment firms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Changefirm × post-SFAS	0.053***	0.052***	0.038***	0.038***	0.000	0.001	−0.000	0.003
	(0.011)	(0.011)	(0.011)	(0.010)	(0.017)	(0.017)	(0.015)	(0.014)
Changefirm	0.026**	0.031**			0.055**	0.058**		
	(0.013)	(0.013)			(0.024)	(0.023)		
post-SFAS	−0.008	−0.012	0.007	0.007	0.009	0.004	0.025***	0.024***
	(0.013)	(0.013)	(0.007)	(0.007)	(0.013)	(0.013)	(0.007)	(0.007)
Firm Size		0.011***		0.042***		0.012***		0.036***
		(0.003)		(0.005)		(0.003)		(0.005)
Profitability		−0.073***		−0.047**		−0.075***		−0.046**
		(0.022)		(0.018)		(0.022)		(0.017)
Tangibility		0.011		0.116***		0.023		0.120***
		(0.019)		(0.035)		(0.020)		(0.037)
Market-to-Book		−0.003		−0.000		−0.002		−0.000
		(0.002)		(0.000)		(0.002)		(0.000)
Dividend Payer		−0.060***		−0.026***		−0.066***		−0.023**
		(0.009)		(0.009)		(0.010)		(0.009)
Constant	0.009	−0.023	0.008**	−0.217***	0.012*	−0.025	0.007*	−0.191***
	(0.006)	(0.015)	(0.004)	(0.029)	(0.006)	(0.015)	(0.004)	(0.030)
Year FE	X	X	X	X	X	X	X	X
Firm FE			X	X			X	X
Nobs	8,074	8,074	8,074	8,074	7,253	7,253	7,253	7,253
Adj. R^2	0.02	0.05	0.04	0.08	0.01	0.04	0.03	0.06

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Agency Motive Channel: Triple Difference-in-Differences

This table presents regression results using a triple difference-in-differences (DiD) design for different subsamples of treated firms: the full treatment sample in columns 1-2; treated firms with strong cash flow coinsurance in columns 3-4 and treated firms with weak cash flow coinsurance in columns 5-6. The dependent variable is industry-adjusted total book leverage, which is the difference between a firm's total book leverage and its imputed leverage. Imputed leverage is the asset-weighted median leverage of standalone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Transfer* is an indicator variable that equals one if an underperforming segment received cross-segment transfers in the firm's lag adoption year. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "standalone" to "diversified" upon adoption of SFAS 131 (treated firms), and zero otherwise (control firms). *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS 131 in or before year t, and zero otherwise. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	All treated firms		Treated firms with strong coinsurance		Treated firms with weak coinsurance	
	(1)	(2)	(3)	(4)	(5)	(6)
Transfer × Changefirm × post-SFAS	−0.063**	−0.062**	−0.067*	−0.067*	−0.053*	−0.052*
	(0.027)	(0.026)	(0.037)	(0.036)	(0.031)	(0.030)
Changefirm × post-SFAS	0.053***	0.052***	0.070***	0.069***	0.033**	0.033**
	(0.011)	(0.011)	(0.015)	(0.015)	(0.016)	(0.016)
Changefirm × Transfer	0.016	0.014	0.004	−0.005	0.021	0.025
	(0.036)	(0.035)	(0.043)	(0.042)	(0.045)	(0.044)
Transfer × post-SFAS	0.010	0.012	0.010	0.011	0.010	0.011
	(0.019)	(0.017)	(0.019)	(0.017)	(0.019)	(0.017)
Changefirm	0.023*	0.027**	0.005	0.013	0.043**	0.044**
	(0.013)	(0.013)	(0.017)	(0.018)	(0.017)	(0.017)
Transfer	0.012	0.012	0.012	0.012	0.012	0.012
	(0.025)	(0.024)	(0.025)	(0.024)	(0.025)	(0.025)
post-SFAS	−0.005	−0.009	0.000	−0.003	0.003	0.000
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Firm Size		0.013***		0.012***		0.012***
		(0.002)		(0.002)		(0.002)
Profitability		−0.055**		−0.066**		−0.050**
		(0.024)		(0.026)		(0.024)
Tangibility		0.010		0.015		0.016
		(0.019)		(0.019)		(0.019)
Market-to-Book		−0.003		−0.003		−0.003
		(0.002)		(0.002)		(0.002)
Dividend Payer		−0.057***		−0.056***		−0.063***
		(0.009)		(0.009)		(0.009)
Constant	0.013**	−0.026*	0.013**	−0.023	0.013**	−0.022
	(0.006)	(0.014)	(0.006)	(0.014)	(0.006)	(0.014)
Year FE	X	X	X	X	X	X
Nobs	9,155	9,155	8,405	8,405	8,342	8,342
Adj. R^2	0.02	0.05	0.02	0.04	0.02	0.05

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10. Functional Form Independence

This table presents panel regression results using a log-level difference-in-differences (DiD) design to estimate equation (3). The staggered sample period ranges from 1994 to 2002 (4 years before and 4 years after the implementation of SFAS No. 131). The model uses the natural log of total book leverage as the dependent variable. Independent variables include a firm's imputed leverage, which is the asset-weighted median leverage of stand-alone firms operating in the same industry. The industry matching is based on the narrowest SIC grouping (beginning with 4-digit SIC codes) that includes at least 10 stand-alone firms per industry and year. *Changefirm* is an indicator variable that equals one if a firm's organizational status changes from "stand-alone" to "diversified" upon adoption of SFAS No. 131 (exogenous shock), and zero otherwise. *Post-SFAS* is an indicator variable that equals one if a firm had implemented the SFAS No. 131 in or before year t, and zero otherwise. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include year fixed effects. Standard errors (in brackets) are clustered at the firm level. See the Appendix for all variable definitions.

	(1)	(2)	(3)	(4)
Changefirm × post-SFAS	0.597***	0.568***	0.386**	0.428***
	(0.158)	(0.153)	(0.150)	(0.146)
Changefirm	1.022***	0.932***		
	(0.194)	(0.187)		
post-SFAS	0.263	−0.007	0.100	0.096
	(0.254)	(0.228)	(0.132)	(0.131)
Imputed Leverage		5.879***		2.763***
		(0.754)		(0.530)
Firm Size		0.244***		0.535***
		(0.053)		(0.104)
Profitability		−1.559***		−0.748**
		(0.504)		(0.292)
Tangibility		3.005***		4.279***
		(0.336)		(0.637)
Market-to-Book		−0.148		−0.026
		(0.100)		(0.024)
Dividend Payer		−0.557***		−0.346**
		(0.175)		(0.139)
Constant	1.178***	−1.485***	1.116***	−3.004***
	(0.127)	(0.321)	(0.078)	(0.577)
Year FE	X	X	X	X
Firm FE			X	
Nobs	8,445	8,445	8,445	6,980
Adj. R2	0.12	0.18	0.01	0.04

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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