

# Heterogeneity in the Financial-Reporting Effects of ASC 606 Adoptions: Evidence from an Industry-Focused Approach

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## ABSTRACT

This paper examines the financial-reporting effects of ASC 606 (*Revenue from Contracts with Customers*) adoptions. Given the expected heterogeneous effects of ASC 606 for companies in different industries, we employ an industry-focused approach to evaluate the effects of ASC 606. Specifically, we focus on firms in the software industry, which is expected to be more significantly affected by ASC 606, and use firms in the electronic computer industry as a control group. We find the adoption of ASC 606 is associated with improvement in financial-statement comparability, informativeness, and mapping of revenue accruals to cash collections, for firms in the software industry compared with firms in the electronic computer industry. We also document significant increases in liquidity for software firms relative to electronic computer firms, reinforcing our inferences of ASC 606's effects on improving financial reporting. Collectively, these findings based on the industry-focused approach suggest the importance of controlling for underlying economic comparability and pre-existing accounting differences, supporting that the evaluation of the effects of new accounting standards can benefit from a series of narrow-sample studies.

**Keywords:** Revenue Recognition; ASC 606; Financial Reporting Quality; Software Industry

**JEL codes:** G10, G18, L8, M41, M48

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## 1. Introduction

This paper provides empirical evidence on the extent to which Accounting Standards Codification (ASC) 606, *Revenue from Contracts with Customers*, achieves the goal of providing information useful to investors' decisions. The stated objectives of ASC 606 are to improve consistency and comparability of financial statements, provide helpful information to users of financial statements, and enhance revenue disclosures (FASB, 2014). Accordingly, we examine whether the adoption of ASC 606 improves financial-statement comparability, informativeness, and mapping of revenue accruals to cash collections. We also corroborate the inferences of ASC 606 effects on financial reporting by examining equity market liquidity and revenue-recognition-process disclosures.

ASC 606 has changed the landscape for revenue recognition from a rules-based to a principles-based accounting standard. Prior to ASC 606, revenue recognition was based on the completion of the earnings process. The focus on the earnings process and the emergence of complex contractual arrangements led to a wide range of authoritative industry- and transaction-specific guidelines, which led to economically similar transactions being accounted for differently and reduced financial-statement comparability among firms. The more restrictive nature of the specified guidelines under the prior revenue-recognition standard might also impair the informativeness of reported earnings or earnings components, because managers did not have the flexibility to signal value-relevant information about future performance to the capital market (Subramanyan, 1996; Altamuro, Beatty, and Weber, 2005; Zhang, 2005).

To address these problems, the FASB issued a new revenue-recognition standard that provides a unified approach for all US firms. The core principle of ASC 606 is to recognize revenue when goods or services are transferred to customers for the amount the company expects to be

entitled to receive. ASC 606 describes principles an entity must apply in measuring and recognizing revenue, rather than providing detailed rules for specific transactions. A principles-based approach in recognizing revenue is likely to provide managers with increased discretion and judgment in financial reporting. The principles-based accounting standards and the discretion afforded to managers may increase financial-statement comparability and improve the informativeness of financial-statement numbers (Yip and Young, 2012; Wang, 2014). However, managers might use increased discretion and judgment under the new revenue-recognition standard to manage earnings, which may not lead to the stated objectives of ASC 606 (Bens, 2006; Barth, Landsman, and Lang, 2008; Christensen, 2012). Moreover, the effectiveness of principles-based accounting standards can be influenced by various factors, such as management's reporting incentives and the institutional environment (e.g., Ball, Kothari, and Robin, 2000; Ball, Robin, and Wu, 2003; Burgstahler, Hail, and Leuz, 2006; Barth et al., 2008; Christensen, Hail, and Leuz, 2013; Daske, Hail, Leuz, and Verdi, 2013). Thus, whether ASC 606 improves financial-statement comparability, informativeness, and the usefulness of reported revenue is an empirical question.

Given the importance of ASC 606, several concurrent studies examine the impacts of ASC 606 on financial reporting and related outcomes but find mixed results.<sup>1</sup> Pinning down the exact reasons for the mixed findings is challenging, but one common feature across these studies is that they examine the overall population of US public firms. Although the broad-sample studies are appealing because the findings are more generalizable, such studies are likely to face identification challenges, suggesting several potential explanations for the inconsistent findings on the ASC 606 effects in the existing studies (Glaeser and Guay, 2017; Chritensen, 2020).

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<sup>1</sup> Section 2 provides a more detailed discussion about these studies.

First, the effects of ASC 606 are likely to be heterogeneous for firms in different industries, because of the fundamental differences in each industry's operating environment and sales contract design. For example, the impact might not be significant for firms that sell products and recognize revenue at the point of sale. By contrast, for firms that sell multiple goods and services across multiple reporting periods under the terms of a single contract, the impact of ASC 606 would be substantial. Thus, assessing the impact of ASC 606 requires controlling for differences in the underlying economics of the affected firms, which is empirically challenging for broad-sample studies.

Second, firms were subject to different pre-existing accounting rules on revenue recognition, and the standard guidance was mostly transaction-specific or industry-specific. Thus, assessing the impact of ASC 606 requires a thorough understanding of the institutional setting, which is often challenging for the broad-sample approach.

Finally, ASC 606 applies to almost all US firms, which makes identifying a control group of firms challenging. The existing studies employ different strategies, such as comparing firms with different adoption timing or comparing materially affected firms with not materially affected firms based on firms' voluntary disclosures (e.g., Chung and Chuwonganant, 2021; Ferreira, 2020; Lee and Lee, 2020). These differences in sample compositions and treatment/control group definitions may lead to inconsistent results.

Given the identification challenges inherent in studies based on the overall population of US public firms, we employ an industry-focused approach to examine the effects of ASC 606. Specifically, we focus on firms in the software industry to present narrow-sample evidence, which provides several identification advantages (Christensen, 2020).

First, focusing on firms in specific industries allows us to better understand the underlying economics and the institutional setting, especially regarding the pre-existing accounting rules on revenue recognition. Software firms tend to sell multiple deliverables across multiple reporting periods under the terms of a single contract; thus, ASC 606 materially affects the revenue recognition of most firms in the software industry. In contrast, the electronic computer industry, which we use as the control group, faces similar transactions and contracts. However, firms in this industry are less affected by ASC 606 because they were already subject to Accounting Standards Update (ASU) 2009-13/14, which imposed revenue-recognition standards similar to some aspects of ASC 606 on firms selling *tangible products* with multiple deliverables.<sup>2</sup> Thus, software and computer industry firms face similar transactions but are affected differently by ASC 606, which provides a plausibly specified quasi-experimental setting.

Second, the industry-focused approach allows us to conduct in-depth analyses using manually collected data. Specifically, we collect the amount of changes in earnings and revenues using the pro-forma disclosure in the adoption year for firms in the software and electronic industries. The manually collected data allows us to examine the nature and magnitude of adjustments in earnings and revenues and how investors react to these adjustments. In addition, we collect firm disclosures on the revenue-recognition process from 10-Ks to examine the impact of ASC 606 on disclosures using textual-analysis techniques.

Another appealing feature of our industry-focused approach is that we can shed light on the financial-reporting impact of ASC 606 on the software industry, one of the fastest-growing

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<sup>2</sup> Myers et al. (2022) examine the financial-reporting implications of ASU 2009-13 and ASU 2009-14. ASU 2009-13/14 have some similar features on revenue recognition as those in ASC 606. However, there are several provisions unique to ASC 606 that were not required under ASU 2009-13/14, but have significant implications on revenue and expense recognition (see section 2 for details). Therefore, the findings of the financial-reporting effects of ASU 2009-13/14 cannot be directly applied to ASC 606.

segments of the economy.<sup>3</sup> The software industry has transformed the global economy by affecting innovations, productivity, and the workforce. Recent studies document the growing significance of software and information technology as drivers of innovation and new product development across various industries (e.g., Branstetter, Glennon, and Jensen, 2019). However, the accounting standards of revenue recognition are complex for software firms because they tend to bundle multiple products and services in the same sales contract across several reporting periods. Thus, understanding the extent to which the new revenue-recognition standards can help software firms faithfully represent economic performance is of significant interest.

We identify firms in the software industry using SIC codes (7370-7372) for 2016–2019 and identify firms in the electronic computer industry using Fama-French 48-industry classifications (equal to 35, Computers).<sup>4</sup> To provide empirical support for the assumption that software firms are more affected by ASC 606 than electronic computer firms, we examine differences in critical audit matter (CAM) disclosures on ASC 606 revenue recognition across firms in the two industries. We find that software firms provide more CAM disclosures on ASC 606 revenue recognition than electronic computer firms during the post-ASC 606 period. We also examine the cumulative effect of ASC 606 adoptions on retained earnings for the adoption year, and find that the effect on retained earnings is significantly higher for software firms than for electronic computer firms. These findings support our research design using software firms as the treatment group and electronic computer firms as the control group.

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<sup>3</sup> See, for example, <https://www.grandviewresearch.com/industry-analysis/business-software-services-market>.

<sup>4</sup> We acknowledge that the classification of software and electronic computer industries based on SIC codes might be subjective. For example, a better approach could be based on the proportion of software contract revenues in total revenues, but such data are proprietary and difficult to obtain. However, we note our approach to identifying software firms is consistent with what is used in prior research investigating the impact of revenue-recognition standards on software firms (Zhang, 2005; Srivastava, 2014). Also, the approach is empirically valid as long as the proportion of sales from software products is on average higher for firms classified in the software industry than those in the electronic computer industry.

We start by investigating the effects of ASC 606 on financial-statement comparability. Although a uniform principles-based accounting standard is expected to increase financial-statement comparability, we might not observe the predicted result, because of countervailing forces. First, prior studies show that accounting standards, institutional environment, and managerial reporting incentives together shape accounting numbers (e.g., Ball et al., 2000; Burgstahler et al., 2006). Second, principles-based accounting standards lack detailed implementation guidance, which could amplify management discretion and judgment, thus reducing financial-statement comparability (Schipper, 2003).

Our primary measure of financial-statement comparability is the output-based measure proposed by De Franco, Kothari, and Verdi (2011). The underlying idea of this comparability measure is that the accounting system can map economic events to financial statements. For a given set of economic transactions, two firms with comparable accounting systems should generate similar financial statements. We find a significant increase in financial-statement comparability following the adoption of ASC 606 for software firms but not for electronic computer firms. This result suggests that the more principles-based approach under ASC 606 is associated with improvement in financial-statement comparability for firms with similar economic transactions.

Next, we assess the impact of ASC 606 on the informativeness of accounting numbers by examining the association between annual stock returns and earnings. The results show that the association between stock returns and earnings (and revenues) is higher in the post-period than in the pre-period for software firms but not for electronic computer firms. We then use the pro-forma information to decompose reported earnings into earnings that do not include the ASC 606 effects and earnings resulting from ASC 606 adoptions. We find that both components are significantly associated with annual returns for software firms but not for electronic computer firms. Overall,

these findings suggest that the application of ASC 606 is associated with more informative accounting numbers for software firms.

Finally, we investigate how ASC 606 affects the mapping of revenue accruals to cash collections. The stated objective of ASC 606 is to align revenue recognition with the transfer of goods and services to customers, so we examine how well revenue accruals map into the past, present, and future cash collections (Myers, Schmardebeck, Seidel, and Stuart, 2022). We find a better mapping of revenue accruals into cash collections for software firms than for electronic computer firms after ASC 606.

Our evidence thus far suggests that the adoption of ASC 606 is associated with improvement in financial reporting. Prior research suggests a link between improved financial reporting and information-asymmetry reduction (Verrecchia, 2001). As such, an analysis of software firms' liquidity changes relative to computer firms after ASC 606 can help corroborate our inferences on the effects of ASC 606 on financial reporting. Overall, we find significant improvement in liquidity for software firms but more mixed evidence for electronic computer firms.

In supplementary analyses, we examine the impact of ASC 606 on revenue-recognition disclosure in firms' 10-K filings. We find that firms in both industries increase the quantity and quality of revenue-recognition disclosure, and the comparability of revenue disclosure improves in the two industries after ASC 606. Interestingly, we find no significant differences between software and electronic computer firms in revenue-disclosure quantity and quality, and disclosure comparability even improved more for electronic computer firms than for software firms, contrasting with the earlier results for financial-reporting attributes. When adopting a new accounting standard, firms significantly adjust the relevant disclosures in their 10-Ks to comply



with the new standard, which could be boilerplates. Therefore, the improvement in disclosures does not necessarily indicate an improvement in the decision usefulness of accounting information.

Our paper makes the following contributions. First, our paper contributes to the literature on the consequences of principles-based accounting standards. Whether principles-based accounting standards improve the quality of financial reporting has long been debated. Prior studies primarily focus on the adoption of IFRS but document mixed evidence<sup>5</sup>, suggesting that the effectiveness of principles-based accounting standards can be influenced by various factors other than the standards themselves (see Barth et al., 2008). ASC 606, arguably one of the most important principles-based accounting standards since the IFRS adoption, is subject to similar concerns that the impact might be heterogeneous depending on the underlying economics and the institutional environment. Consistent with this concern, existing ASC 606 studies using a broad-sample approach present mixed findings. By comparing the software and electronic computer industries, our study better controls for the underlying economic similarity of the transactions and pre-existing accounting differences, thus more effectively isolates the effects of ASC 606. Our findings based on the industry-focused approach suggest that the more principles-based approach under ASC 606 is associated with improved decision usefulness of accounting information and equity market liquidity.

Second, our industry-focused approach to studying the impact of ASC 606 contributes to the broad literature examining the impact of new accounting standards. While researchers have used this narrowly focused sample approach to study the effects of disclosure regulations (e.g.,

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<sup>5</sup> For example, DeFond, Hu, Hung, and Li (2011), Yip and Young (2012), and Wang (2014) find that the adoption of IFRS, which is considered more principles-based accounting standard, increased accounting comparability and information transfers. On the other hand, Liao, Sellhorn, and Skaife (2012) find that accounting comparability decreases years after the IFRS adoption. Similarly, Cascino and Gassen (2015) and Lin, Riccardi, Wang, Hopkins, and Kabureck (2019) find that the impact of IFRS on accounting comparability is marginal.

Christensen, Floyd, Liu, and Maffett, 2017), this approach is rarely used to evaluate the impact of new accounting standards.<sup>6</sup> The salient differences in the impact of ASC 606 on the software and electronic computer industries suggest the importance of controlling for underlying economic comparability and differences in pre-existing accounting treatments. Our paper suggests that the industry-focused approach provides a valuable tool for evaluating the effects of other new accounting standards.

Our study is subject to a caveat that the findings in the software industry are likely not generalizable to other industries, which is an inherent limitation of the narrow-sample evidence. However, with this caveat, we emphasize that both broad- and narrow-sample studies complement each other because identifying causal relationships for important accounting research questions is most likely to come from a mosaic of studies that collectively update our priors (Glaeser and Guay, 2017; Christensen, 2020).

## **2. Background, Related Literature, and Hypotheses**

### **2.1. ASC 606 Background**

The FASB started working on a new revenue-recognition standard in September 2002. The organization completed the project in May 2014 by issuing ASU No. 2014-09, *Revenue from Contracts with Customers*. This update amends the prior ASC by creating Topic 606, *Revenue from Contracts with Customers*, which is effective for US public firms with fiscal years beginning on or after December 15, 2017.

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<sup>6</sup> For example, Christensen (2020) points out that the samples used in studies of IFRS adoption or SOX often include thousands of firms across many industries and, in the former case, countries. As a result, he argues that we can learn a great deal from narrow-sample evidence even when broad-sample evidence on the same research question already exists.

ASC 606 represents a shift from rules-based to principles-based accounting standards applicable to almost all US firms. The core principle of ASC 606 is to recognize revenue when goods or services are transferred to customers for the amount that the company expects to be entitled to receive in exchange for those goods and services. ASC 606 establishes a unified framework for revenue recognition by requiring the following five-step process: identify the contract with a customer, identify the performance obligations in the contract, determine the expected transaction price, allocate the transaction price to performance obligations, and recognize revenue when a performance obligation is satisfied. The new standard also requires that firms disclose the nature, amount, timing, and uncertainty of revenue and cash flows in detail.

## **2.2. Revenue Recognition for the Software Industry and the Electronic Computer Industry**

Although ASC 606 applies to almost all US firms, the effects of ASC 606 are likely heterogeneous for firms in different industries because of the fundamental differences in their operating environment and sales-contract design. Among industries, the software industry is expected to be more significantly affected because of the complexity and diversity in software firms' underlying revenue-generating processes and business practices.<sup>7</sup>

Appendix B presents the revenue-recognition guidance and rules for software and electronic computer firms over the years. The revenue recognition of software firms has been under regulatory scrutiny since the early 1990s, and regulators issued several updated revenue-recognition rules primarily targeted at software firms. Prior to ASC 606, US GAAP generally required that revenue be recognized when it is “realizable” and “earned” (SFAS No. 5, FASB 1984, para. 83). However, no specific guidance on the timing for recognizing software license and

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<sup>7</sup> For example, industry practitioners suggest that the adoption effect of ASC 606 may be greater for software firms relative to other firms (e.g., <https://www2.deloitte.com/us/en/pages/audit/articles/revenue-recognition-saas-software-guidance.html>). In addition, FASB hosted a podcast specifically to address the impact of ASC 606 on financial reporting in the software industry (<https://www.youtube.com/watch?v=q1y8VqBRzqo>).

service revenues existed, which created opportunities for software firms to change the timing of revenue recognition. To address this issue, AICPA issued SOP (Statement of Position) 91-1 in 1991, which required that, if collectability is probable, software-license revenue be recognized upon delivery and service revenue be recognized proportionally over the contractual agreement.<sup>8</sup>

The revenue-recognition rules for the software industry have evolved continuously since the issuance of SOP 91-1. With rapid technology development, software firms had changed business practices by bundling multiple products and services in the same sales contract across several reporting periods by the mid-1990s. These components could include a software license, software-as-a-service, post-contract customer support, and other goods or services. However, SOP 91-1 did not provide specific guidance regarding the recognition timing and the amount of deferred revenues for delivered and undelivered elements. To address these issues, AICPA issued SOP 97-2, which required that software firms establish vendor-specific objective evidence (VSOE) to allocate aggregate contract consideration to each element and recognize the revenue upon delivery of each element. VSOE requires firms to establish the selling price of each element based solely on their history of transactions and is determined by demonstrating that separate sales regularly occur either at the same price or within a tight band.<sup>9</sup> In practice, however, establishing VSOE for software licenses and professional services is challenging. If a firm could not establish VSOE for one element, SOP 97-2 required the deferral of all the revenues of the contract until the firm had delivered all elements.

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<sup>8</sup> In December 1999, the SEC issued Staff Accounting Bulletin (SAB) No. 101, *Revenue Recognition*, to require the completion of the earnings process for revenue recognition (SEC, 1999). SAS 101 essentially made the revenue-recognition criteria developed for the software industry the guidance for all other industries.

<sup>9</sup> SOP 97-2 permits only two methods to establish VSOE: the first method involves the use of the company's data related to separate sales, and the second method uses the data, set by appropriate management, for separately sold items as determined within a short time of the ultimate pricing decision. Software firms used a methodology often referred to as the bell-shaped curve approach, stating that VSOE exists when at least 80% of separately sold productions are priced with a plus/minus 15% band (<https://www.journalofaccountancy.com/issues/2007/dec/softwarerevenuerecognitionontherise.html>).

One of the most significant changes of ASC 606 to software revenue recognition would be in identifying and recognizing the performance obligations. ASC 606 eliminates the requirement to establish VSOE for allocating contract revenue to contract elements for software firms. Instead, it requires firms to determine *the standalone selling price* and recognize the revenue upfront for deliverables if they satisfy the performance obligations. Whereas establishing VSOE is a strict rules-based process, the determination of the standalone selling price is principles-based and allows more managerial discretion and judgment. ASC 606 does not preclude any method for establishing the standalone selling price as long as the estimation accurately represents what price would be charged in a separate transaction. Consequently, ASC 606 is likely to significantly affect the timing and amount of revenue recognized for software firms.<sup>10</sup>

Firms in the electronic computer industry have similar transactions and contracts with multiple deliverables across multiple reporting periods. In general, the revenue recognition for these firms follows ASC 605-25 (codified version of SAB 101) or ASC 985-605 (codified version of SOP 97-2) prior to the adoption of ASU 2009-13/14 in 2010.<sup>11</sup> ASU 2009-13/14 was adopted in 2010, which removed the requirement to establish VSOE for firms when recognizing revenues for tangible products with multiple deliverable sales transactions. ASU 2009-13 applied to tangible products with only non-software components, and ASU 2009-14 applied to tangible products with

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<sup>10</sup> Panel A of Appendix C presents the excerpts of revenue-recognition disclosure before and after ASC 606 for a firm in the software industry. Before ASC 606, software firms, in general, disclosed that they could not establish VSOE for some deliverables such as professional services in a contract with multiple deliverables, so they were required to recognize as revenue the entire contract sales price over the contract period. By contrast, after ASC 606, software firms disclose that they allocate the transaction price to the multiple performance obligations based on their relative standalone selling prices. Overall, this example suggests that revenue recognition of software firms is significantly affected by the ASC 606 adoption.

<sup>11</sup> On July 1, 2009, the FASB codified SOP 97-2, its related amendments, and the related TPAs (Technical Practice Aids) in ASC 985-605, and SAB 101 in ASC 605-25. The FASB issued ASU 2009-13/14 in October 2009. For tangible products, ASU 2009-13 amended the guidance on multiple-element arrangements in ASC 605-25. To address the concern about more pervasive incidents of the use of software in tangible products, the FASB issued ASU 2009-14, which amends ASC 985-605 to exclude from its scope certain tangible products that contain software. See Appendix B for the evolution of revenue-recognition guidance for software and electronic computer firms.

both software and non-software components, with software elements only incidental to the related products.<sup>12</sup> Both updates applied to electronic computer firms that were primarily in the business of tangible products but not to software firms. The removal of the restriction about establishing VSOE in ASU 2009-13/14 is similar to that in ASC 606, and thus, electronic computer firms are likely less affected by ASC 606.<sup>13</sup>

Importantly, ASC 606 has broader provisions than ASU 2009-13/14. The main provision in ASU 2009-13/14 is the removal of the requirement to establish VSOE for some vendors with multiple-deliverable arrangements with their customers. In addition to removing the requirement of establishing VSOE, ASC 606 has provisions regarding incorporating variable considerations in determining the transaction price and capitalizing costs associated with obtaining and executing a contract.<sup>14</sup> These provisions are unique to ASC 606 and could affect the timing and amount of revenue and expense recognition.

### **2.3. Related Literature**

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<sup>12</sup> Specifically, ASU 2009-13/14 permits the use of the estimated selling price (ESP) as the allocation basis for contracts with multiple deliverables. ESP is a more principles-based standard than VSOE, and the hierarchy of evidence for selling prices is based on the following: VSOE, third-party evidence (TPE), and BESE (vendor's best estimate of selling price). See Appendix C for the revenue-recognition disclosure example of computer firms before ASC 606 regarding how they allocated contract revenues to each element based on a selling-price hierarchy as specified in ASU 2009-13/14.

<sup>13</sup> Panel B of Appendix C presents the excerpts of revenue-recognition disclosure before and after ASC 606 for a firm in the electronic computer industry. Before ASC 606, these firms allocated revenue based on estimated selling prices (ESPs), which are similar to the standalone selling prices under ASC 606. These examples suggest electronic computer firms can be a suitable control group for our empirical analyses.

<sup>14</sup> Software companies tend to enter into contracts with variable considerations, i.e., contracts with variable amounts representing discounts, rebates, credits, incentives, extended payment terms etc. Under ASC 605, revenues from certain types of variable consideration for software companies were deferred until periods in which the revenue could be reliably measured, such as when uncertainties involving collection were known or when cash was collected. Under ASC 606, however, variable consideration is accounted for based on the extent that it is probable that a significant reversal of revenue will not occur when the uncertainty is resolved. With regard to accounting for contract costs, ASC 340-40, which is part of ASC 606, requires the capitalization of the incremental costs of obtaining a contract as well as any direct costs of fulfilling a contract. Prior guidance on accounting for contract costs allows companies the discretion to capitalize direct and incremental contract costs under certain circumstances, although many companies expense such costs as incurred.

Our paper is related to the literature examining the financial-reporting implications of revenue-recognition rules. Several studies focus on software firms and investigate the trade-off between relevance and reliability. Zhang (2005) examines the effect of SOP 91-1 and finds that accelerated revenue recognition is associated with more timely reported revenue but at the cost of lower reliability.<sup>15</sup> Srivastava (2014) uses SOP 97-2, which requires the establishment of VSOE, as an empirical setting limiting software firms' discretion to recognize revenue. The results show that SOP 97-2 did not change overall earnings management but reduced the value relevance of earnings. More recently, Myers et al. (2022) examine the adoption of ASU 2009-13 and ASU 2009-14, which removed the requirement to establish VSOE for firms to recognize revenue in multiple deliverable arrangements. Their empirical evidence suggests that increased managerial discretion in revenue recognition increases the relevance of reported earnings without reducing faithful representation. Our study extends the literature by examining the recent and arguably one of the most impactful revenue-recognition standards. We also contribute to the literature by studying the impact of more principles-based revenue-recognition standards on financial-statement comparability after controlling for the underlying economic similarity and pre-existing accounting differences. Although our study is related to Myers et al. (2022), we argue that the findings of Myers et al. (2022) cannot be directly applied to our empirical setting for the following reasons. First, the scope of ASU 2009-13/14 is significantly narrower than that of ASC 606. Second, prior studies suggest that the effects of a principles-based accounting standard could depend on institutional factors and firm characteristics (e.g., Christensen et al., 2013; Daske et al., 2013).

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<sup>15</sup> Along those lines, Altamuro et al. (2005) investigate SAB 101, which addresses the concern that firms accelerate revenue recognition to manage earnings. Their results show the adoption of SAB 101 is associated with less earnings management but also less informative earnings.

Our paper is also related to concurrent studies investigating ASC 606. Chung and Chuwonganant (2021) show that ASC 606 is associated with lower information asymmetry as proxied by liquidity, pricing efficiency, and trading activities. Comparing firms with different adoption timing of ASC 606 based on firms' fiscal year-ends, Ferreira (2020) similarly finds that ASC 606 improves liquidity and attributes the liquidity effect to increases in both precision and comparability of earnings. On the other hand, Billings et al. (2020) show evidence of decreased stock liquidity as measured by bid-ask spreads after ASC 606. In addition, Lee and Lee (2020) document that companies materially affected by ASC 606 experienced a decrease in earnings predictability and an increase in working-capital accruals relative to those not materially affected. These mixed findings suggest companies are not equally affected by ASC 606, making the empirical results more sensitive to research design and sample choices. Several studies attempt to reconcile the mixed findings by considering the adoption complexity and the opportunities/incentives to manage revenues (Ahn, Hoitash, and Schmardebeck, 2021).<sup>16</sup> Our study provides a novel industry-focused approach by comparing two industries facing similar economic transactions, which provides a cleaner setting to identify the impact of ASC 606 on financial reporting.

#### **2.4. Hypotheses Development**

The stated objectives of ASC 606 are to improve the consistency and comparability of financial statements, provide useful information to users of financial statements, and enhance

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<sup>16</sup> In addition, Glaze, Skinner, and Stephan (2021) use the ASC 606 adoption as an empirical setting that increases information uncertainty and examine whether concurrent quarterly reports are useful for investors when uncertainty is high. Ali and Tseng (2022) propose an empirical approach to identify revenue recognition in a large sample and use the approach to quantify the effects of ASC 606. Their results show ASC 606 on average accelerates revenue recognition, but the acceleration effect is concentrated in firms with a long revenue-generating cycle.



revenue disclosures (FASB 2014). Accordingly, we develop hypotheses about the impact of ASC 606 on these aspects of financial-reporting attributes for software firms below.

We start with financial-statement comparability, which is generally recognized as an important and desirable characteristic of financial reporting. FASB (1980) defines information comparability as “the quality of information that enables users to identify similarities in and differences between two sets of economic phenomena.” Thus, financial-statement comparability implies that firms engaged in similar economic transactions account for these transactions similarly in their financial reporting.

Prior to ASC 606, the revenue-recognition standard focuses on the earnings process. Given that earnings processes differ for firms in different industries, using “earnings process” as a standard-setting concept implies each earnings process could have its own revenue-recognition rule (Schipper, 2003). In addition, as technology evolves, sales contracts have become increasingly complex, involving multiple goods and services across multiple reporting periods, particularly for software firms. Thus, the former revenue-recognition standard was supplemented with a broad range of authoritative industry- and transaction-specific guidelines, which raised concerns about inconsistent accounting for economically similar transactions. For example, two firms that sell similar software on similar terms might have different accounting due to differences in each company’s VSOE analysis. As a result, economically similar arrangements could be accounted for differently based on the specifics of the VSOE analysis.

By contrast, ASC 606 describes principles that an entity must apply in measuring and recognizing revenue rather than providing detailed rules for specific transactions. Some studies document that the adoption of IFRS, a principles-based accounting standard, is associated with

increased financial-statement comparability (Yip and Young, 2012; Wang, 2014). Thus, it is possible that ASC 606 adoptions would improve financial-statement comparability.

However, ASC 606 adoptions might reduce financial-statement comparability. First, rules-based accounting standards provide detailed implementation guidance. This specific guidance could reduce differences in the professional judgment under certain circumstances, thus increasing financial-statement comparability (Schipper, 2003).<sup>17</sup> Second, a principles-based approach in recognizing revenue increases management's exercise of discretion and judgment, which might lead to significant divergence in firms' financial reporting depending on management's reporting incentives and the institutional environment (Ball et al., 2000; Ball, Robin, and Wu, 2003; Burgstahler et al., 2006). Given that the effect of ASC 606 on financial-statement comparability is unclear, we state our hypothesis in the null form as follows:

***H1: ASC 606 does not improve financial statement comparability for software firms.***

Next, we examine the effect of ASC 606 on the informativeness of financial statements. Prior revenue-recognition standards emphasize the completion of the earnings process, which prohibits accelerated revenue recognition. The deviation from the completion of the earnings-process requirement for revenue recognition could increase the value relevance of earnings for software firms in two ways. First, earnings with accelerated revenue recognition are more useful in predicting future economic performance (Altamuro et al., 2005; Zhang, 2005). Second, firms are more likely to have the flexibility to signal true performance to the capital market (Subramanyam, 1996; Linck, Netter, and Shu, 2013).<sup>18</sup>

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<sup>17</sup> Schipper (2003) also notes that to the extent that guidance is inappropriately strict, the results could be “surface comparability.”

<sup>18</sup> Managers might make efforts to comply with the intent of a principles-based relative to a rules-based accounting standard because the outcomes of potential judgment are highly uncertain for a principles-based accounting standard (Shavell, 1987; Myers et al., 2022). This compliance could lead to high-quality financial reporting that is consistent with the intent of the standards.

On the other hand, ASC 606 requires that revenue recognition be based on the determination of stand-alone selling prices and fulfilling performance obligations, which provides firms with increased discretion and judgment. Some firms might opportunistically use their discretion, which could distort the economic performance and reduce the informativeness of financial statements (Dye and Verrecchia, 1995; Nelson, Elliott, and Tarpley, 2002).<sup>19</sup> Given these possibilities, we state our next hypothesis in the null form as follows:

*H2: ASC 606 does not improve financial-statement informativeness for software firms.*

Finally, we consider the impact of ASC 606 on the mapping of revenue accruals to cash collections. The principles-based ASC 606 could facilitate accelerated revenue recognition for software firms with deferred revenue on the book for which they had already collected cash, which may improve the mapping of revenue accruals to past, current, and future cash collections. However, as discussed earlier, a trade-off exists because ASC 606 provides firms with more reporting discretion in recognizing revenue. Thus, the impact of ASC 606 on revenue attributes remains an empirical question, and we state our last hypothesis in the null form as follows:

*H3: ASC 606 does not improve the mapping of revenue accruals to cash collections for software firms.*

### **3. Sample Construction and Validation Tests**

#### **3.1. Sample and Descriptive Statistics**

We start our sample selection by identifying software and electronic computer firms. We use the sample of firms with non-missing revenue and asset information from 2016 to 2019 (i.e.,

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<sup>19</sup> The increased disclosure requirements for revenue recognition under ASC 606 may discipline firms' earnings management (Hirst and Hopkins, 1998).

two years before and after the ASC 606 adoption).<sup>20</sup> Following prior research investigating software industry revenue recognition (Srivastava, 2014), we classify firms with Standard Industrial Classification Historical (SICH) codes between 7300 and 7372 as software firms. Next, we identify firms with Fama-French 48-industry codes equal to 35 (Computers) but without SICH equal to 7373 (Computer integrated systems design) as electronic computer firms.<sup>21</sup> We then manually correct the firms' industry classification based on the SEC EDGAR website.<sup>22</sup>

We collect both software and electronic computer firms' pro-forma data and the adoption-fiscal-year information from EDGAR filings, supplemented with the Audit Analytics' Accounting Pronouncements – Revenue Recognition (ASC 606) database. We obtain financial data from Compustat, analyst forecast data from I/B/E/S, market data from CRSP, and CAM data from Audit Analytics. Table 1 details the sample-selection process. Removing observations with missing data reduces the sample to 5,798 firm-quarter observations and 1,387 firm-year observations. To mitigate the effects of outliers, we winsorize all continuous financial variables at the 1st and 99th percentile each calendar year.

Table 2 presents descriptive statistics for the full sample, software firms (treatment group), and electronic computer firms (control group). Panel A reports that, for the full sample, the average quarterly return on assets (*ROA*) is -0.9% and around 44.3% of the sample observations report

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<sup>20</sup> We end our sample period at the end of 2019 to address concerns about potential confounding impacts of COVID-19, which was declared a global pandemic by World Health Organization on March 11, 2020.

<sup>21</sup> Note we exclude computer integrated systems design (7373) because these firms are establishments primarily engaged in developing or modifying computer software and packaging or bundling the software with purchased computer hardware to create and market an integrated system for specific application (Zhang, 2005). More specifically, we identify firms with the following SIC codes as electronic computer industry: Computer & Office equipment (3570-3579), Computers (3680-3689), Computers – mini (3681), Computers – mainframe (3682), Computers – terminals (3683), Computers – desk and tape drives (3684), Computers – optical scanners (3685), Computers – graphics (3686), Computers – office automation systems (3687), Computers – peripherals (3688), Computers – equipment (3689), and Magnetic and optical recording media (3695).

<sup>22</sup> To ensure we do not miss any firms in both industries, we manually check firms' SICH information from 2014 (i.e., two years before our sample period) because some firms' SICH information in COMPUSTAT is inaccurate. For example, we find instances when the company's industry classification from SEC EDGAR disclosure is different from the Compustat data.

losses.<sup>23</sup> Panel B compares firm characteristics of software and electronic computer firms in the quarterly sample. The results show that software firms are smaller, report more losses, and have more analyst following relative to electronic computer firms.<sup>24</sup> Panel C shows the average annual earnings divided by total assets (*Earn*) is -2.8%, and the average annual revenue divided by total assets (*Rev*) is 77.7%. Panel D compares software and electronic computer firms in the annual sample and shows software firms are smaller and have lower *Earn* and *Rev* relative to electronic computer firms. Lastly, Panel E reports descriptive statistics for the quarterly pairwise sample, which we use for the financial-statement comparability analysis. To construct this sample, we pair firm *i* with firm *j* in both industries based on the same fiscal year quarter. The average pairwise financial-statement comparability (*Comp*) is -4.898. The indicator variables of loss firms for each pair (*Loss<sub>i</sub>* and *Loss<sub>j</sub>*) have the same descriptive statistics because firm pairs are symmetric.

### 3.2. Validation Tests

Before examining the effects of ASC 606 on financial-reporting attributes, we conduct several validation tests. First, we assume that both software and electronic computer firms face similar transactions and contracts before ASC 606. Although validating this assumption is empirically challenging, we examine the economic performance of software and electronic computer firms over the sample period to identify any distinct patterns in these two industries. In Figure 1, we plot four proxies of firms' economic performances: total revenue, income before extraordinary items, net income, and operating cash flow. All of these variables show clear parallel trends up to 2018, which is when most of our sample firms adopted ASC 606. This finding suggests

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<sup>23</sup> Our sample contains relatively more loss firms than the Compustat sample, because tech firms tend to be young and less profitable. Also, these firms tend to have smaller assets, which explains the relatively large magnitude of revenues and expenses relative to total assets.

<sup>24</sup> To reduce concerns that these differences in firm characteristics may affect our inferences, we conduct the coarsened exact matching (CEM) and entropy matching analyses for those tests comparing two industries. We find consistent results in these matching analyses. These results are not tabulated for brevity but are available upon request.

that software and electronic computer firms have experienced similar trends of economic performance before ASC 606. In Figure 2, we also plot the estimated treatment effects of ASC 606 on financial-statement comparability, informativeness, and mapping of revenue accruals to cash collections for each sample year to check for parallel trends of these variables. These yearly effects are estimated by including interactions between *SW* (or *Earn* for the earnings informativeness test) and indicators for each year relative to the ASC 606 adoption year except year -1, which serves as the benchmark year. In all plots, we find that coefficients before the ASC 606 adoption year are close to zero, suggesting that software and electronic computer firms experienced similar trends of these variables before ASC 606.

Second, we assume that, on average, software firms are more affected by ASC 606 than electronic computer firms. To validate this assumption, we analyze ASC 606-related CAM to assess how software and electronic computer firms are affected differently by ASC 606. PCAOB requires auditors to disclose any critical matters arising from the audit of the financial statements. Given that the CAM disclosure standard became effective after June 30, 2019, we compare the number of ASC 606-related CAM for software and electronic computer firms only in the post-ASC 606 period. Panel A of Table 3 reports that a significantly higher proportion of software firms received ASC 606-related CAM than electronic computer firms (0.154 vs. 0.052,  $p < 0.01$ ), suggesting software firms encountered more critical audit matters on ASC 606 revenue recognition. Column (1) of Panel B presents the results of an OLS regression where the dependent variable is ASC 606-related CAM, *CAM\_Rev*. We include *SW*, an indicator variable that equals 1 if a firm is in the software industry, and control for several firm characteristics in the regression. The results show the coefficient on *SW* is significantly positive (0.107,  $p < 0.01$ ).

One concern about using ASC 606-related CAM is that we can only observe it in the post-period, which confounds the inferences. As an alternative approach, we examine the cumulative effects of ASC 606 adoptions on retained earnings across the two industries.<sup>25</sup> We find that the average cumulative effect of ASC 606 on retained earnings is 4.4% of total assets for software firms, significantly higher than that of computer firms, 1.6% of total assets ( $p < 0.01$ ). Similarly, in column (2) of Panel B, we find a positive and significant coefficient on *SW* (0.029,  $p < 0.01$ ) when estimating an OLS regression with *RE\_Cumulative* as the dependent variable in the adoption year.<sup>26</sup> Overall, these results support the implicit assumption that ASC 606 had a greater impact on the software industry than on the electronic computer industry.

## 4. Research Design and Empirical Results

### 4.1. Comparability

We start by examining the impact of ASC 606 on financial-statement comparability. Following De Franco et al. (2011) and Yip and Young (2012), we define comparability as the similarity of accounting functions to translate economic transactions into accounting data. We first estimate the following equation by the individual firm for pre- and post-ASC 606 periods:

$$Earnings_{i,t} = \alpha_i + \beta_i Ret_{i,t} + \epsilon_{i,t}, \quad (1)$$

where  $Earnings_{i,t}$  is net income divided by total assets of firm  $i$  in period  $t$ , and  $Ret_{i,t}$  is the stock return of firm  $i$  in period  $t$ . The coefficients of  $\alpha_i$  and  $\beta_i$  are the estimates for firm  $i$ 's accounting function. We use quarterly data to estimate each firm's accounting function and require the firm

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<sup>25</sup> We use the footnote disclosure of the ASC 606 effects on financial statements to conduct the analysis on the cumulative effects of ASC 606 adoptions on retained earnings, which we hand collected from firms' 10-K filings. Thus, the number of observations in this analysis is smaller than that in the CAM disclosure analysis. See Appendix D for examples of firms' footnote disclosure of the ASC 606 effects on financial statements.

<sup>26</sup> We find similar results using the absolute value of the cumulative effects of ASC 606 adoptions on retained earnings.

to have data of eight quarters for the pre- and post-periods. Next, we estimate the following two equations to compute the similarity in the accounting functions of firms  $i$  and  $j$ :

$$E(Earnings)_{i,i,t} = \hat{\alpha}_i + \hat{\beta}_i Ret_{i,t}, \quad (2)$$

$$E(Earnings)_{i,j,t} = \hat{\alpha}_j + \hat{\beta}_j Ret_{i,t}. \quad (3)$$

$E(Earnings)_{i,j,t}$  is the predicted earnings of firm  $i$  given firm  $i$ 's function and firm  $i$ 's return in period  $t$ .  $E(Earnings)_{i,j,t}$  is the predicted earnings of firm  $j$  given firm  $j$ 's function and firm  $i$ 's return in period  $t$ . Note we estimate accounting equations for the pre- and post-ASC 606 periods separately to capture changes in a firm's accounting function after the adoption of ASC 606. We define accounting comparability between firms  $i$  and  $j$  as the negative value of the absolute difference, multiplied by 100, between the predicted earnings using firm  $i$ 's and  $j$ 's functions:

$$Comp_{i,j,t} = -100 \times |E(Earnings)_{i,i,t} - E(Earnings)_{i,j,t}|. \quad (4)$$

With the comparability measure, we estimate the following equation to evaluate whether the adoption of ASC 606 increases financial-statement comparability:

$$Comp_{i,j,t} = \alpha + \beta_1 Post_{i,j} + \beta_2 Post_{i,j,t} \times SW_{i,j} + \gamma X_{i,j,t} + \lambda_{i,j} + \delta_t + \epsilon_{i,j,t}. \quad (5)$$

The dependent variable,  $Comp_{i,j,t}$ , is the financial-statement comparability between firms  $i$  and  $j$  in period  $t$ . The variables of interest are  $Post_{i,j}$  and  $Post_{i,j,t} \times SW_{i,j}$ .  $Post_{i,j}$  is an indicator equal to 1 if both firm pairs are in the post-ASC 606 period and 0 otherwise, and  $SW_{i,j}$  is an indicator equal to 1 if both firm pairs are software firms and 0 otherwise.  $X_{i,j,t}$  denotes the matrix of control variables, which includes  $Diff\ Size_{i,j}$ ,  $Diff\ ROA_{i,j}$ ,  $Diff\ Market-to-Book_{i,j}$ ,  $Diff\ Leverage_{i,j}$ ,  $Diff\ NumAnalyst_{i,j}$ ,  $Loss_i$ , and  $Loss_j$ . These variables are included to control for the differences in firm characteristics between firms  $i$  and  $j$ . Importantly, we include firm-pair fixed effects,  $\lambda_{i,j}$ , to control for any time-invariant firm-pair-specific characteristics and interactions, which allows us to compare the



financial-statement comparability within each firm pair before and after the ASC 606 adoption.<sup>27</sup> We also include calendar-year fixed effects,  $\delta_t$ , to control for time-varying economic conditions.<sup>28</sup> All variables are defined in Appendix A.

We start by examining the effects of ASC 606 on financial statement comparability in different industries. In Appendix Table 1, we estimate equation (5) without the  $Post_{i,j} \times SW_{i,j}$  term by Fama-French 48-industry classifications. Notably, the coefficient on  $Post_{i,j}$  varies significantly by industry, confirming our expectation about the heterogeneity in the ASC 606 effect on financial statement comparability. It is plausible that the variation of financial statement comparability in different industries is related to concurrent changes in the economic and regulatory environment. In particular, the adoption of several new accounting standards, including leases (Topic 842), financial instruments (Topic 326), and equity investment (Subtopic 825-10) around the same period, also have heterogeneous effects on firms in different industries. As a result, determining whether ASC 606 improves or reduces financial statement comparability based on a broad sample is empirically challenging, suggesting the importance of a more granular empirical approach and the identification of a proper control group.<sup>29</sup>

We note that the software industry belongs to **34-Business Services**, and its coefficient on  $Post_{i,j}$  is positive and statistically significant (0.335,  $p < 0.01$ ), suggesting that ASC 606 improves financial statement comparability. On the other hand, the electronic computer industry belongs to **35-Computers**, and its coefficient on  $Post_{i,j}$  is statistically insignificant (0.224,  $p > 0.10$ ). These

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<sup>27</sup> We do not include  $SW_{i,j}$  in this equation, because the variable is subsumed by firm-pair fixed effects.

<sup>28</sup> We do not include  $Post_{i,j,t}$  in the equation for within-industry analyses because we are interested in the coefficient on  $Post_{i,j,t}$  and the inclusion of time fixed effects may absorb the necessary variation to estimate the coefficient on  $Post_{i,j,t}$ . However, we note that  $Post_{i,j,t}$  is not fully subsumed by time fixed effects because firms adopted ASC 606 at different calendar year-quarters due to their different fiscal year-ends.

<sup>29</sup> We note that the number of observations in some industries is very small, which also makes it difficult to interpret the results.

descriptive results indicate that ASC 606 has differential impacts on financial statement comparability for firms in the two industries.

We now focus the empirical analyses on firms in the software and electronic computer industries. Table 4 reports the regression results. Columns (1) and (2) show the comparability estimation results within the software and electronic computer industries, respectively, and column (3) shows the difference-in-differences estimation results across the two industries. We find a positive and statistically significant coefficient on  $Post_{i,j}$  in column (1) (0.459,  $p < 0.01$ ), suggesting ASC 606 improves financial-statement comparability for software firms. By contrast, the coefficient on  $Post_{i,j}$  is positive but statistically insignificant in column (2) (0.112,  $p > 0.10$ ), suggesting that ASC 606 does not improve financial-statement comparability for electronic computer firms. In column (3), we find a positive and marginally significant coefficient on  $Post_{i,j,t} \times SW_{i,j}$  (0.383,  $p < 0.10$ ), suggesting that comparability increases more for software firms than computer firms after ASC 606.<sup>30</sup>

#### 4.2. Informativeness

Next, we investigate the impact of ASC 606 on the informativeness of accounting numbers. Specifically, we examine the association between annual stock returns and annual earnings for software and electronic computer firms. We also perform our tests after decomposing earnings into revenues and expenses. The prior revenue-recognition standard was criticized as not reflecting the economic substance of a transaction, because the standard was detailed and restrictive (Altamuro et al., 2005; Zhang, 2005). We use annual financial data for the value-relevance

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<sup>30</sup> We also use an alternative comparability measure based on an intra-industry information-transfer framework (Wang, 2014). The measure captures non-announcing firms' stock market reactions to the announcing firm's earnings report. The untabulated results show that non-announcing firms' cumulative abnormal returns ( $CAR$ ) around the largest three firms' earnings-announcement periods are stronger after the ASC 606 adoption in the software industry but not in the electronic computer industry. These results support similar inferences drawn from using the comparability measure of De Franco et al. (2011) and Yip and Young (2012).

analyses to align with the informativeness tests using the pro-forma data, which are only available at the annual level. We estimate the following regressions:

$$Returns_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Earn_{i,t} + \beta_3 Post_{i,t} \times Earn_{i,t} + \gamma X_{i,t} + \epsilon_{i,t}, \quad (6)$$

$$Returns_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Rev_{i,t} + \beta_3 Exp_{i,t} + \beta_4 Post_{i,t} \times Rev_{i,t} + \beta_5 Post_{i,t} \times Exp_{i,t} + \gamma X_{i,t} + \epsilon_{i,t}, \quad (7)$$

where  $Returns_{i,t}$  is the annual market-adjusted returns using the value-weighted market index.  $Post_{i,t}$  is an indicator that equals one if a firm is in the post-ASC 606 period.  $Earn_{i,t}$  is the firm's net income scaled by total assets,  $Rev_{i,t}$  is revenue scaled by total assets, and  $Exp_{i,t}$  is expense scaled by total assets. The variables of interest are the interaction terms  $Post_{i,t} \times Earn_{i,t}$  and  $Post_{i,t} \times Rev_{i,t}$ .  $X_{i,t}$  denotes the matrix of control variables, which includes  $Size_{i,t}$ ,  $ROA_{i,t}$ ,  $Market-to-Book_{i,t}$ ,  $Leverage_{i,t}$ ,  $Loss_{i,t}$ , and  $NumAnalyst_{i,t}$ . We also include calendar-year fixed effects,  $\delta_t$ , to control for time-varying economic conditions, and firm fixed effects,  $\lambda_i$ , to control for time-invariant firm characteristics.<sup>31</sup> All variables are defined in Appendix A.

Table 5 presents the results of estimating equations (6) and (7). Columns (1) and (3) show the regression results for the software firms, and columns (2) and (4) present the results for the electronic computer firms. We find a positive and weakly statistically significant coefficient on  $Post_{i,t} \times Earn_{i,t}$  for software firms in column (1) (0.628,  $p < 0.10$ ), suggesting that the informativeness of software firms' earnings improved after ASC 606. The coefficient on  $Post_{i,t} \times Earn_{i,t}$  for electronic computer firms is statistically insignificant (0.048,  $p > 0.10$ ), suggesting no significant change in value relevance of earnings for electronic computer firms after ASC 606. In column (3), when we decompose earnings into revenues and expenses for software

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<sup>31</sup> Again, we note that  $Post_{i,t}$  is not fully subsumed by time fixed effects because firms adopted ASC 606 at different calendar year-quarters due to their different fiscal year-ends.

firms, we find the coefficient on  $Post_{i,t} \times Rev_{i,t}$  is positive and weakly statistically significant (0.548,  $p < 0.10$ ), and the coefficient on  $Post_{i,t} \times Exp_{i,t}$  is negative and statistically significant (-0.573,  $p < 0.05$ ). On the other hand, column (4) shows insignificant coefficients on  $Post_{i,t} \times Rev_{i,t}$  and  $Post_{i,t} \times Exp_{i,t}$  for electronic computer firms (0.098,  $p > 0.10$ ; -0.095,  $p > 0.10$ ). In summary, the association between stock returns and earnings (and revenues when earnings are decomposed) becomes higher after ASC 606 for software firms but not for electronic computer firms, suggesting the informativeness of accounting numbers improves after ASC 606.<sup>32</sup>

We perform a second test of informativeness using the pro-forma data reported by software and computer firms from the 10-K filings of the adoption year. Following Altamuro et al. (2005), we divide earnings reported under ASC 606 into two components: (1) earnings that do not include the ASC 606 effects ( $Proforma\_Earn_{i,t}$ ) and (2) earnings as a result of ASC 606 adoptions ( $\Delta Earn_{i,t}$ ), which is the difference between the reported earnings under ASC 606 and  $Proforma\_Earn_{i,t}$ . We estimate the following regression:

$$Returns_{i,t} = \alpha + \beta_1 Proforma\_Earn_{i,t} + \beta_2 \Delta Earn_{i,t} + \gamma X_{i,t} + \delta_t + \epsilon_{i,t}, \quad (8)$$

where  $Returns_{i,t}$  is the annual market-adjusted returns. We include the same control variables in equation (6), as well as calendar-year fixed effects.<sup>33</sup>

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<sup>32</sup> We tested the statistical differences in the coefficients  $Post_{i,t} \times Earn_{i,t}$ ,  $Post_{i,t} \times Rev_{i,t}$  and  $Post_{i,t} \times Exp_{i,t}$  across the two industries, and the differences are not statistically significant. We note that the interpretation of our result is subject to this caveat.

<sup>33</sup> Appendix D provides examples of firms' pro-forma data. Firms that adopt ASC 606 using the modified retrospective approach are required to provide pro-forma data for the first fiscal year after the adoption, and firms that adopt ASC 606 using the full retrospective approach are required to provide pro-forma data for the two fiscal years before the adoption. The underlying assumption for our empirical test is that investors understood the financial reporting implications of ASC 606 even several years before the ASC 606 adoption, and reacted accordingly. We note that ASU 2014-09 was first promulgated in May 2014, and the main provisions of ASC 606 are similar to those originally in ASU 2014-09. Anecdotal evidence suggests that some software companies trained financial analysts to understand ASU 606. However, we acknowledge that our value relevance test based on pro-forma information is ultimately a test of joint hypotheses.

We also perform a similar test using the pro-forma revenue and expense data reported by software and computer firms from the 10-K filings of the adoption year. Specifically, we estimate the following regressions:

$$\begin{aligned} Returns_{i,t} = & \alpha + \beta_1 Proforma\_Rev_{i,t} + \beta_2 \Delta Rev_{i,t} + \beta_3 Proforma\_Exp_{i,t} + \\ & \beta_4 \Delta Exp_{i,t} + \gamma X_{i,t} + \delta_t + \epsilon_{i,t}, \end{aligned} \quad (9)$$

where  $Returns_{i,t}$  is the annual market-adjusted returns.  $Proforma\_Rev_{i,t}$  is the revenue amount that does not include the ASC 606 effects;  $\Delta Rev_{i,t}$  is the change in the revenue amount resulting from ASC 606 adoptions, which is the difference between the reported revenue under ASC 606 and  $Proforma\_Rev_{i,t}$ . Likewise,  $Proforma\_Exp_{i,t}$  is the expense amount that does not include the ASC 606 effects, and  $\Delta Exp_{i,t}$  is the change in the expense amount resulting from ASC 606 adoptions, which is the difference between the reported expense under ASC 606 and  $Proforma\_Exp_{i,t}$ . We include the same set of control variables in equation (6), as well as calendar-year fixed effects. All variables are defined in Appendix A.

Table 6 reports the results of estimating equations (8) and (9). Columns (1) and (2) show the regression results for the software firms, and columns (3) and (4) present the results for the electronic computer firms. In column (1), we find both  $Proforma\_Earn_{i,t}$  and  $\Delta Earn_{i,t}$  are positively associated with annual returns (1.123,  $p < 0.1$ ; 3.685,  $p < 0.01$ ). This result suggests that investors consider both earnings components to be informative for software companies. In column (2), we find the coefficient on  $\Delta Rev_{i,t}$  is positive and statistically significant (0.001,  $p < 0.10$ ), suggesting that the change in revenue recognized due to the ASC 606 adoption provides more value-relevant information for software companies. We also note that the coefficient on  $\Delta Exp_{i,t}$  is significantly negative (-3.960,  $p < 0.10$ ) in column (2). Turning to the results for the electronic computer firms, column (3) shows insignificant coefficients on  $Proforma\_Earn_{i,t}$  and  $\Delta Earn_{i,t}$

(5.194,  $p > 0.10$ ; 7.079,  $p > 0.10$ ). Similarly, we find that the coefficient on  $\Delta Rev_{i,t}$  in column (4) is not statistically significant (6.332,  $p > 0.10$ ). Overall, our findings indicate that software firms' earnings and revenue became more informative, while the informativeness of electronic computer firms' earnings and revenue have not changed upon the ASC 606 adoption.

### 4.3. Mapping between Revenue Accruals and Cash Collections

Finally, we investigate whether the alignment between revenue recognized under ASC 606 and actual cash flows from the transfer of goods and services improved after ASC 606. Following prior studies (e.g., Myers et al., 2022), we measure how well the deferred revenue accruals map into past, present, and future cash collections. We first estimate the following equation by each industry for pre- and post-ASC 606 periods:

$$\Delta DR_{i,t} = \alpha + \beta_1 Cash\ Col_{i,t-1} + \beta_2 Cash\ Col_{i,t} + \beta_3 Cash\ Col_{i,t+1} + \epsilon_{i,t}, \quad (10)$$

where  $\Delta DR_{i,t}$  is the change in current and long-term deferred revenues divided by the beginning total assets.  $Cash\ Col_{i,t}$  is cash collections of firm  $i$  in period  $t$ , measured as revenue minus the change in accounts receivable plus the change in current deferred revenue divided by the beginning total assets. Then, we use the absolute value of the residual from equation (10) to capture how well deferred revenue accruals map into cash collections. With the revenue–cash-flow mapping measure, we estimate the following equation:

$$\Delta DR\ Resid_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Post_{i,t} \times SW_i + \gamma X_{i,t} + \delta_t + \lambda_i + \epsilon_{i,t}, \quad (11)$$

where  $\Delta DR\ Resid_{i,t}$  is the absolute difference between the predicted value of  $\Delta DR_{i,t}$  and the actual value of  $\Delta DR_{i,t}$ .  $Post_{i,t}$  is an indicator that equals 1 if a firm is in the post-ASC 606 period.  $SW_i$  is an indicator that equals 1 if a firm is in the software industry. The variables of interest are  $Post_{i,t}$  and  $Post_{i,t} \times SW_i$ , where we expect negative coefficients if ASC 606 improves the alignment between revenue recognition and actual cash collections. We include the same set of control

variables in equation (6). We also include calendar-year-quarter fixed effects,  $\delta_t$ , and firm fixed effects,  $\lambda_i$ . All variables are defined in Appendix A.

Table 7 reports the results of estimating equation (11). Columns (1) and (2) show the estimation for software and electronic computer firms, respectively. Consistent with *H3*, we find a negative and significant coefficient on  $Post_{i,t}$  in column (1) (-0.002,  $p < 0.05$ ), suggesting the mapping between revenue accruals and cash collections improves for software firms after ASC 606. By contrast, the coefficient on  $Post_{i,t}$  in column (2) is positive and significant (0.004,  $p < 0.01$ ), suggesting the mapping between revenue accruals and cash collections worsens for electronic computer firms after ASC 606.<sup>34</sup> In column (3), we use a difference-in-differences approach and find that the coefficient on  $Post_{i,t} \times SW_i$  is significantly negative (-0.007,  $p < 0.05$ ), suggesting the effect of ASC 606 on the mapping between revenue accruals and cash collections is better for software firms than for electronic computer firms.

Before we move on to the supplemental analyses, we conduct coarsened exact matching (CEM) and entropy-matching analyses for those tests comparing the two industries to mitigate concerns that firm-characteristic differences in the two industries may affect our inferences (Kim and Kim, 2021). With CEM, we coarsen the data by dividing observations into three evenly spaced bins of all continuous control variables and two bins of all binary control variables so that software and electronic computer firms have similar weighted histograms of these variables. Then, the weights are applied in a weighted least squares regression. With entropy matching, we calculate weights for each observation such that the weighted means for all control variables are equal across software and electronic computer firms. Then, the weights are applied in a weighted least squares

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<sup>34</sup> Ex ante, we do not expect ASC 606 to worsen the mapping between revenue accruals and cash collection for electronic computer firms. One potential explanation would be the concurrent adoption of several new accounting standards, including leases (Topic 842), or other economic conditions might affect the electronic computer firms. However, pinning down the exact reason for this finding is empirically challenging.

regression. In untabulated tables, we find the regression coefficients and their statistical significance largely stay similar to the analyses without matching.

## 5. Supplemental Analyses

### 5.1. Equity Market Liquidity

We conduct supplemental analyses to corroborate the primary inferences about the financial-reporting effects of ASC 606 adoption. Our evidence so far suggests that the adoption of ASC 606 is associated with improvement in financial-statement comparability, informativeness, and mapping of revenue accruals to cash collections for firms in the software industry compared with firms in the electronic computer industry. Prior analytical research suggests a fundamental link between improved financial reporting and information-asymmetry reduction (see Verrecchia, 2001, for a review). Empirical evidence from the US and international markets supports this link. In the US, Bushee and Leuz (2005) document that firms listed on the OTC Bulletin Board experience an increase in liquidity after being mandated to follow SEC disclosure requirements. Internationally, Leuz and Verrecchia (2000) find that firms switching from German GAAP to an international set of accounting standards experience an increase in liquidity. As such, an analysis of software firms' liquidity changes relative to computer firms after ASC 606 can help corroborate our inferences on the beneficial effects of ASC 606 on financial reporting. Specifically, we examine the effects of ASC 606 on liquidity using the following regression:

$$Liquidity_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Post_{i,t} \times SW_i + \gamma X_{i,t} + \delta_t + \lambda_i + \epsilon_{i,t}. \quad (12)$$

We use two measures for equity market illiquidity:  $Log Amihud_{i,t}$  is the natural logarithm of the quarterly median of Amihud's (2002) daily illiquidity measure, computed as the stock return divided by the trading volume.  $Log Bid-Ask_{i,t}$  is the natural logarithm of the quarterly median of



daily quoted spreads, measured as daily closing bid and ask prices divided by the midpoint (Daske, Hail, Leuz, and Verdi, 2008; Christensen et al., 2013). The variables of interest are  $Post_{i,t}$  and  $Post_{i,t} \times SW_i$ , where we expect negative coefficients if the ASC 606 adoption improves liquidity. We include the same control variables in equation (6). We also include calendar-year-quarter fixed effects,  $\delta_t$ , and firm fixed effects,  $\lambda_i$ . All variables are defined in Appendix A.

Table 8 reports the results of estimating equation (12). Columns (1) through (3) show the estimations for  $\text{Log Amihud}_{i,t}$ . We find the coefficient on  $Post_{i,t}$  is negative and statistically significant for software firms in column (1) (-0.191,  $p < 0.01$ ) but is insignificant for electronic computer firms in column (2) (-0.019,  $p > 0.10$ ). In column (3), we use a difference-in-differences approach and find the coefficient on  $Post_{i,t} \times SW_i$  is significantly negative (-0.161,  $p < 0.05$ ), suggesting liquidity increases for software firms but not for electronic computer firms after ASC 606. Columns (4) through (6) show the estimations for  $\text{Log Bid-Ask}_{i,t}$ . We find the coefficient on  $Post_{i,t}$  is statistically negative for software firms in column (4) (-0.085,  $p < 0.05$ ) and weakly negative for electronic computer firms in column (5) (-0.063,  $p < 0.10$ ). The coefficient on  $Post_{i,t} \times SW_i$  is negative but not statistically significant in column (6) (-0.029,  $p > 0.10$ ). Overall, we find consistent evidence of improved liquidity for software firms but more mixed evidence for electronic computer firms. These results reinforce our inferences on ASC 606's effects on improving financial reporting.<sup>35</sup>

## 5.2. Revenue-Recognition Disclosure

ASC 606 also requires a more transparent disclosure of the nature, amount, timing, and uncertainty of revenue recognition. Therefore, exploring how the ASC 606 adoption changes firms'

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<sup>35</sup> In Panel D of Figure 2, we also plot the estimated treatment effects of ASC 606 on equity market liquidity for each sample year to check for parallel trends. Again, we see that coefficients before the ASC 606 adoption year are close to zero, suggesting both software and electronic computer firms have experienced similar trends of these variables before ASC 606.

revenue-recognition disclosure practices could be important. We examine three aspects of the revenue-recognition disclosure: quantity, quality, and comparability.<sup>36</sup>

To examine the impact of ASC 606 on firms' disclosures, we manually collect the revenue-recognition section in the 10-Ks, where most firms disclose their revenue-recognition policies multiple times. We focus on those disclosures in "Notes to Condensed Consolidated Financial Statements" of Part II, Item 8: Financial statement and supplementary data.<sup>37</sup> We examine the effects of ASC 606 on the quantity and quality of revenue-recognition disclosure using the following regression:

$$Disclosure_{i,t} = \alpha + \beta_1 Post_{i,t} + \beta_2 Post_{i,t} \times SW_i + \gamma X_{i,t} + \delta_t + \lambda_i + \epsilon_{i,t}. \quad (13)$$

We use two textual measures to capture firms' revenue-recognition disclosure ( $Disclosure_{i,t}$ ).  $Disc Length_{i,t}$  is the total number of words and figures in a firm's revenue-recognition policy footnote of 10-Ks, which proxies for the quantity of disclosures.  $Table Ind_{i,t}$  is an indicator that takes a value of 1 if a firm discloses figures in the table format, which proxies for the quality of disclosures. The variables of interest are  $Post_{i,t}$  and  $Post_{i,t} \times SW_i$ . We include the same control variables in equation (6). We also include calendar-year fixed effects,  $\delta_t$ , and firm fixed effects,  $\lambda_i$ . All variables are defined in Appendix A.

Panel A of Table 9 reports the results of estimating equation (13). Columns (1)–(3) show the results for  $Disc Length_{i,t}$ , and columns (4)–(6) present the results for  $Table Ind_{i,t}$ . In columns (1) and (2), we find the coefficient on  $Post_{i,t}$  is significantly positive for both software and electronic computer firms (414.574,  $p < 0.01$ ; 427.064,  $p < 0.01$ ), suggesting firms in the two

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<sup>36</sup> Hinson, Pundrich, and Zakota (2021) examine the decision usefulness of the revenue-disaggregation requirement of ASC 606. However, the main focus of their paper is on the disclosure requirements of ASC 606 rather than the actual changes in revenue-recognition rules.

<sup>37</sup> We could not rely on XBRL to extract firms' revenue recognition disclosures, because many of our sample firms adopted XBRL starting from 2018 or later, which only covers the post-ASC 606 period.

industries increase the length of disclosures related to the revenue-recognition policy after ASC 606. However, in column (3), the coefficient on  $Post_{i,t} \times SW_i$  is not significant (-51.500,  $p > 0.10$ ), suggesting no difference in disclosure quantity between software and electronic computer firms. Similarly, in columns (4) and (5), we find the coefficient on  $Post_{i,t}$  is significantly positive for both software and electronic computer firms (0.384,  $p < 0.01$ ; 0.322,  $p < 0.01$ ), suggesting that firms in the two industries include more revenue-recognition disclosures that accompany tables. However, again, in column (6), the coefficient on  $Post_{i,t} \times SW_i$  is not significant (0.029,  $p > 0.10$ ), suggesting no difference in disclosure quality across firms in the two industries. These results indicate we cannot equate the effects of ASC 606 on firms' disclosures with the effects of ASC 606 on the decision usefulness of accounting numbers. When firms adopt a new accounting standard, they significantly change the relevant disclosures in their 10-Ks to comply with the new standard, which could be boilerplates. Therefore, the improvement in disclosures does not necessarily reflect the changes in the decision usefulness of accounting numbers.

We further use a textual measure to examine the impact of ASC 606 on the comparability of revenue-recognition disclosure. We define disclosure comparability as the cosine similarity of revenue-recognition disclosures in firms' 10-Ks, using the vector space model (VSM) in Brown and Tucker (2011) and Brown and Knechel (2016). With the cosine similarity measure, we estimate the following equation:

$$Cos\ Sim_{i,j,t} = \alpha + \beta_1 Post_{i,j} + \beta_2 Post_{i,j,t} \times SW_{i,j} + \gamma X_{i,j,t} + \lambda_{i,j} + \epsilon_{i,j,t}. \quad (14)$$

The dependent variable,  $Cos\ Sim_{i,j,t}$ , is the cosine similarity based on the VSM between firms  $i$  and  $j$  in period  $t$ . The variables of interest are  $Post_{i,j}$  and  $Post_{i,j} \times SW_{i,j}$ .  $Post_{i,j}$  is an indicator equal to 1 if both firm pairs are in the post-ASC 606 periods and 0 otherwise, and  $SW_{i,j}$  is an indicator equal

to 1 if both firm pairs are software firms and 0 otherwise. We include the same control variables in equation (5), as well as firm-pair fixed effects,  $\lambda_{i,j}$ . All variables are defined in Appendix A.

Panel B of Table 9 reports the results of estimating equation (14). Columns (1) and (2) show the disclosure comparability results within the software and electronic computer industries, respectively, and column (3) shows the results comparing the two industries. In columns (1) and (2), we find a positive and statistically significant coefficient on  $Post_{i,j}$  (0.027,  $p < 0.01$ ; 0.036,  $p < 0.01$ ), suggesting that ASC 606 improves disclosure comparability for both software and electronic computer firms. Interestingly, in column (3), the coefficient on  $Post_{i,j,t} \times SW_{i,j}$  is significantly negative (-0.008,  $p < 0.05$ ), suggesting that the disclosure comparability improved more for electronic computer firms than software firms. We note these results are different from the financial-statement comparability tests based on accounting numbers, where only within-software industry results are significant. Overall, the findings indicate that the improvement in disclosure similarity does not necessarily translate into financial-statement-information comparability.

## 6. Conclusion

ASC 606 has changed the landscape for revenue recognition from a rules-based to a principles-based accounting standard. The objective of our study is to examine the financial-reporting effects of ASC 606 adoptions. Given the expected heterogeneous effects of ASC 606 for firms in different industries and the mixed evidence from concurrent studies, we employ a novel approach of focusing on a specific industry that is expected to be more significantly affected by ASC 606, namely, the software industry. This focus allows us to use firms in the electronic

computer industry as a control group, which face similar transactions and contracts as software firms, but their revenue recognition is relatively less affected by ASC 606.

We find that the adoption of ASC 606 is associated with an improvement in financial-statement comparability, informativeness, and mapping of revenue accruals to cash collections for software firms but not for electronic computer firms. We also find consistent evidence of improved liquidity for software firms upon ASC 606 adoption but mixed evidence for electronic computer firms, supporting our inferences of ASC 606's effects on improving financial reporting. Finally, we document that firms in both industries increase the quantity and quality of revenue-recognition disclosure, and the comparability of revenue disclosure improves after the ASC 606 adoption. These results suggest that the improvement in disclosures does not necessarily imply an improvement in the decision usefulness of accounting information.

Overall, our paper suggests heterogeneous adoption effects of ASC 606 on financial reporting for firms in different industries, illustrating the importance of controlling for underlying economic comparability and pre-existing accounting differences. We emphasize that both broad-sample and narrow-sample empirical studies complement each other, and the evaluation of the effects of new accounting standards is likely to benefit from a mosaic of broad- and narrow-sample-based studies.

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## Appendix A. Variable Definitions

Variable	Definition
<b><i>Dependent Variables</i></b>	
$\Delta DR$	Change in current and long-term revenues divided by beginning total assets.
$\Delta DR Resid$	The absolute difference between the predicted value of $\Delta DR$ and the actual value of $\Delta DR$ .
$CAM\_Rev$	Indicator variable that takes a value of 1 if a firm receives a ASC 606 revenue-related critical audit matter (CAM) from its auditor in its audit report, and 0 otherwise.
$Comp_{i,j}$	The negative value of the absolute difference between the predicted earnings using firm $i$ 's and firm $j$ 's functions, multiplied by 100.
$Cos Sim_{i,j}$	The cosine similarity based on the vector space model between firm $i$ and firm $j$ 's revenue-recognition disclosures in 10-Ks.
$Disc Length$	Total number of words and figures in a firm's revenue-recognition policy footnote of 10-Ks, which proxies for the quantity of disclosures.
$Log Amihud$	Natural logarithm of the quarterly median of the Amihud's (2002) daily measure of illiquidity, measured as the stock return divided by the trading volume.
$Log Bid-Ask$	Natural logarithm of the quarterly median of the daily quoted spreads, measured as the daily closing bid and ask prices divided by the midpoint.
$Materiality$	Indicator variable that takes a value of 1 if a firm discloses the ASC 606 impact on its financial statements to be material in the footnote, and 0 otherwise.
$Returns$	Annual cumulative market-adjusted returns from CRSP (using the value-weighted market return).
$Table Ind$	Indicator that takes a value of 1 if a firm discloses figures in the table format, which proxies for the quality of disclosures, and 0 otherwise.
<b><i>Independent Variables</i></b>	
$\Delta Exp$	Change in expenses as a result of ASC 606 adoptions.
$\Delta Earn$	Change in earnings as a result of ASC 606 adoptions (i.e., the difference between ASC 606 and ASC 605).
$\Delta Rev$	Change in revenue as a result of ASC 606 adoptions (i.e., the difference between ASC 606 and ASC 605).

<i>Cash Col</i>	Revenue minus the change in accounts receivable plus the change in current deferred revenue divided by beginning total assets.
<i>Earn</i>	Net income divided by total assets.
<i>Exp</i>	Expense divided by total assets.
<i>Post</i>	Indicator variable that takes a value of 1 if a firm is in the post-ASC 606 period, and 0 otherwise.
<i>Proforma_Earn</i>	ASC 605 earnings divided by total assets. Firms using the modified approach usually provide a cumulative adjustment to retained earnings at the starting point, and then provide pro forma disclosure on balance sheet and income statement for the first year of adoption. Therefore, for firms using the modified approach, ASC 605 earnings is the balance reported as net income for the first year after the adoption minus the change in earnings as a result of ASC 606 adoption (i.e., the difference between ASC 606 and ASC 605). Firms using full retrospective approach usually provide a cumulate adjustment to retained earnings at 2 years before the adoption year, and then provide pro forma disclosure on income statement for the 2 years before adoption or just the year before the adoption. Therefore, for firms using the full approach, the balance is reported as net income for two years prior to the adoption for firms using the full approach.
<i>Proforma_Exp</i>	ASC 605 expenses divided by total assets (i.e., <i>Proforma_Rev</i> minus <i>Proforma_Earn</i> ).
<i>Proforma_Rev</i>	ASC 605 revenue divided by total assets. Firms using the modified approach usually provide a cumulative adjustment to retained earnings at the starting point, and then provide pro forma disclosure on balance sheet and income statement for the first year of adoption. Therefore, for firms using the modified approach, ASC 605 revenue is the balance reported as revenue for the first year after adoption minus the adjustment on revenues (sales) for the first year of adoption. Firms using full retrospective approach usually provide a cumulate adjustment to retained earnings at 2 years before the adoption year, and then provide pro forma disclosure on income statement for the 2 years before adoption or just the year before the adoption. Therefore, for firms using the full approach, the balance reported as revenue for the two years prior to the adoption year.
<i>Rev</i>	Revenue divided by total assets.
<i>SW</i>	Indicator variable that takes a value of 1 if a firm is in the software industry, and 0 otherwise.

$SW_{i,j}$  Indicator variable that takes a value of 1 if both firms  $i$  and  $j$  are in the software industry, and 0 otherwise.

**Control Variables**

$Diff\ Leverage_{i,j}$  Difference between firm  $i$ 's *Leverage* and firm  $j$ 's *Leverage*.

$Diff\ Market-toBook_{i,j}$  Difference between firm  $i$ 's *Market-to-Book* ratio and firm  $j$ 's *Market-to-Book* ratio.

$Diff\ NumAnalyst_{i,j}$  Difference between firm  $i$ 's *NumAnalyst* and firm  $j$ 's *NumAnalyst*.

$Diff\ ROA_{i,j}$  Difference between firm  $i$ 's *ROA* and firm  $j$ 's *ROA*.

$Diff\ Size_{i,j}$  Difference between firm  $i$ 's *Size* and firm  $j$ 's *Size*.

*Leverage* Total debt divided by total assets.

*Loss* Indicator variable that takes a value of 1 if net income is negative, and 0 otherwise.

*Market-to-Book* The market value of equity divided by the book value of equity.

*NumAnalyst* Number of analysts following the firm.

*ROA* Income before extraordinary items divided by total assets.

*SI* Special items divided by total assets.

*Size* Natural logarithm of total assets.

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## Appendix B. Revenue-Recognition Standards for Multiple Deliverable Contracts

	Multiple Deliverable Contract in General (Computer Industry)	Multiple Deliverable Contract with Both Hardware and Incidental Software Elements (Computer Industry)	Multiple Deliverable Contract with Software More than Incidental (Software Industry)
Before 1991	FAS 5	FAS 5	FAS 5
1991-1997	FAS 5	SOP 91-1	SOP 91-1
1997-1999	FAS 5	SOP 97-2	SOP 97-2
1999-2010	Topic 605-25 (EITF 00-21) (Codified version of SAB 101)	Topic 985-605 (Codified version of SOP 97-2)	Topic 985-605 (Codified version of SOP 97-2)
2010-2018	ASU 2009-13 / EITF 08-1	ASU 2009-14 / EITF 09-3	Topic 985-605
2018-present	Topic 606	Topic 606	Topic 606

## Appendix C: Examples of Revenue-Recognition Disclosure Excerpts before and after ASC 606

### Panel A. Software Industry

#### ELECTRONIC ARTS INC

Revenue Recognition Disclosure before ASC 606	Revenue Recognition Disclosure after ASC 606
<p>The majority of our software games and related content have online connectivity whereby a consumer may be able to download unspecified content or updates on a when-and-if-available basis (“unspecified updates”) for use with the original game software. In addition, we may also offer a service of online activities (e.g., online playability) without a separate fee. U.S. GAAP requires us to account for the consumer’s right to receive unspecified updates or the service of online activities for no additional fee as a “bundled” sale, or multiple-element arrangement.</p> <p>...</p> <p>We have an established historical pattern of providing unspecified updates (e.g., player roster updates to Madden NFL 18) to online-enabled games and related content at no additional charge to the consumer. Because we do not have vendor-specific objective evidence of fair value (“VSOE”) for these unspecified updates, we are required by current U.S. GAAP to recognize as revenue the entire sales price of these online-enabled games and related content over the period we expect to offer the unspecified updates to the consumer (“estimated offering period”).</p> <p>...</p> <p>In some of our multiple-element arrangements, we sell non-software products with software and/or software-related offerings. These non-software products are generally music soundtracks, peripherals or ancillary collectors’ items, such as figurines and comic books. Revenue for these arrangements is allocated to each separate unit of accounting for each deliverable using the relative selling prices of each deliverable in the arrangement based on the selling price hierarchy described below. If the arrangement contains more than one software deliverable, the arrangement consideration is allocated to the software deliverables as a group and then allocated to each software deliverable.</p>	<p>Games with Services. Our sales of Games with Services are evaluated to determine whether the software license, future update rights and the online hosting are distinct and separable. Sales of Games with Services are generally determined to have three distinct performance obligations: software license, future update rights, and the online hosting.</p> <p>...</p> <p>Since we do not sell the performance obligations on a standalone basis, we consider market conditions and other observable inputs to estimate the standalone selling price for each performance obligation. We recognize revenue from these arrangements upon transfer of control for each performance obligation. For the portion of the transaction price allocated to the software license, revenue is recognized when control of the license has been transferred to the customer. For the portion of the transaction price allocated to the future update rights and the online hosting, revenue is recognized as the services are provided.</p>

Panel B: Electronic Computer Industry

APPLE INC

Revenue Recognition Disclosure before ASC 606	Revenue Recognition Disclosure after ASC 606
<p>For sales of iPhone, iPad, Mac and certain other products, the Company has indicated it may from time to time provide future unspecified software upgrades to the device’s essential software and/or non-software services free of charge. The Company has identified up to three deliverables regularly included in arrangements involving the sale of these devices. The first deliverable, which represents the substantial portion of the allocated sales price, is the hardware and software essential to the functionality of the hardware device delivered at the time of sale. The second deliverable is the embedded right included with qualifying devices to receive, on a when-and-if-available basis, future unspecified software upgrades relating to the product’s essential software. The third deliverable is the non-software services to be provided to qualifying devices. <b>The Company allocates revenue between these deliverables using the relative selling price method. Because the Company has neither VSOE nor TPE for these deliverables, the allocation of revenue is based on the Company’s ESPs.</b> Revenue allocated to the delivered hardware and the related essential software is recognized at the time of sale, provided the other conditions for revenue recognition have been met. Revenue allocated to the embedded unspecified software upgrade rights and the non-software services is deferred and recognized on a straight-line basis over the estimated period the software upgrades and non-software services are expected to be provided. Cost of sales related to delivered hardware and related essential software, including estimated warranty costs, are recognized at the time of sale. Costs incurred to provide non-software services are recognized as cost of sales as incurred, and engineering and sales and marketing costs are recognized as operating expenses as incurred.</p>	<p>The Company has identified up to three performance obligations regularly included in arrangements involving the sale of iPhone, Mac, iPad and certain other products. The first performance obligation, which represents the substantial portion of the allocated sales price, is the hardware and bundled software delivered at the time of sale. The second performance obligation is the right to receive certain product-related bundled services, which include iCloud, Siri and Maps. The third performance obligation is the right to receive, on a when-and-if-available basis, future unspecified software upgrades relating to the software bundled with each device. The Company allocates revenue and any related discounts to these performance obligations based on their relative SSPs. Because the Company lacks observable prices for the undelivered performance obligations, the allocation of revenue is based on the Company’s estimated SSPs. Revenue allocated to the delivered hardware and bundled software is recognized when control has transferred to the customer, which generally occurs when the product is shipped. Revenue allocated to the product-related bundled services and unspecified software upgrade rights is deferred and recognized on a straight-line basis over the estimated period they are expected to be provided. Cost of sales related to delivered hardware and bundled software, including estimated warranty costs, are recognized at the time of sale. Costs incurred to provide product-related bundled services and unspecified software upgrade rights are recognized as cost of sales as incurred.</p>

## Appendix D: Examples of Pro Forma Disclosures

### Panel A: Modified Retrospective Adoption: ADOBE

On December 1, 2018, the beginning of our fiscal year 2019, we adopted the requirements of the new revenue standard utilizing the modified retrospective method of transition. Prior period information has not been restated and continues to be reported under the accounting standard in effect for those periods. We applied the new revenue standard to contracts that were not completed as of the adoption date, consistent with the transition guidance. Further, adoption of the new revenue standard resulted in changes to our accounting policies for revenue recognition and sales commissions as detailed below.

We recognized the following cumulative effects of initially applying the new revenue standard as of December 1, 2018:

<i>(in thousands)</i>	As of November 30, 2018	Topic 606 Adoption Adjustments	As of December 1, 2018
<b>Assets</b>			
Trade receivables, net of allowances for doubtful accounts	\$ 1,315,578	\$ 43,028	\$ 1,358,606
Prepaid expenses and other current assets	312,499	186,220	498,719
Other assets	186,522	273,421	459,943
<b>Liabilities and Stockholders' Equity</b>			
Accrued expenses	1,163,185	30,358	1,193,543
Deferred revenue, current	2,915,974	(52,842)	2,863,132
Deferred income taxes	46,702	82,834	129,536
Retained earnings	\$ 11,815,597	\$ 442,319	\$ 12,257,916

Adoption of the new revenue standard impacted our Consolidated Statements of Income for the year ended November 29, 2019 as follows:

<i>(in thousands, except per share amounts)</i>	As reported	Adjustments	Balances without Topic 606 adoption impact
<b>Revenue</b>			
Subscription	\$ 9,994,463	\$ 1,440	\$ 9,995,903
Product	647,788	(101,981)	545,807
Services and support	529,046	(7,431)	521,615
Total revenue	11,171,297	(107,972)	11,063,325
<b>Operating expenses</b>			
Sales and marketing	3,244,347	11,987	3,256,334
General and administrative	880,637	(7,646)	872,991
Provision for income taxes	253,283	(6,517)	246,766
Net income	\$ 2,951,458	\$ (105,953)	\$ 2,845,505
Basic net income per share	\$ 6.07	\$ (0.22)	\$ 5.85
Diluted net income per share	\$ 6.00	\$ (0.21)	\$ 5.79

RE\_Cumulative = \$442,319 K

Proforma\_Earn (2019) = \$2,845,505 K  
Proforma\_Rev (2019) = \$11,063,325 K

Δ Earn (2019) = \$105,953 K  
Δ Rev (2019) = \$107,972 K

## Panel B: Full Retrospective Adoption: FORESCOUT TECH INC

### Impacts on Financial Statements

The Company adjusted its consolidated financial statements from amounts previously reported due to the adoption of Topic 606. Selected consolidated balance sheet line items, which reflect the adoption of Topic 606, are as follows (in thousands):

	December 31, 2017		
	As Previously Reported	Impact of Adoption	As Adjusted
<b>Assets</b>			
Accounts receivable	\$ 65,428	\$ (742)	\$ 64,686
Deferred commission - current	\$ —	\$ 10,957	\$ 10,957
Prepaid expenses and other current assets	\$ 8,655	\$ 558	\$ 9,213
Deferred commission - non-current	\$ —	\$ 21,795	\$ 21,795
Other assets	\$ 4,120	\$ 488	\$ 4,608
<b>Liabilities and stockholders' equity</b>			
Deferred revenue - current	\$ 98,027	\$ (18,396)	\$ 79,631
Deferred revenue - non-current	\$ 64,731	\$ (9,503)	\$ 55,228
Accumulated deficit	\$ (497,376)	\$ 60,955	\$ (436,421)

Selected consolidated statement of operations line items, which reflect the adoption of Topic 606, are as follows (in thousands, except per share data):

	Year ended December 31, 2017		
	As Previously Reported	Impact of Adoption	As Adjusted
<b>Revenue:</b>			
Product	\$ 121,413	\$ 3,935	\$ 125,348
Maintenance and professional services	\$ 99,458	\$ (402)	\$ 99,056
<b>Cost of revenue:</b>			
Product	\$ 24,098	\$ (257)	\$ 23,841
<b>Operating expenses:</b>			
Sales and marketing	\$ 151,093	\$ (6,695)	\$ 144,398
Loss from operations	\$ (87,732)	\$ 10,485	\$ (77,247)
Net loss	\$ (91,205)	\$ 10,485	\$ (80,720)
Net loss attributable to common stockholders	\$ (104,015)	\$ 10,485	\$ (93,530)
Net loss per share attributable to common stockholders, basic and diluted	\$ (9.12)	\$ 0.92	\$ (8.20)

	Year ended December 31, 2016		
	As Previously Reported	Impact of Adoption	As Adjusted
<b>Revenue:</b>			
Product	\$ 98,655	\$ (661)	\$ 97,994
Maintenance and professional services	\$ 68,186	\$ 1,366	\$ 69,552
<b>Cost of revenue:</b>			
Product	\$ 21,678	\$ 154	\$ 21,832
<b>Operating expenses:</b>			
Sales and marketing	\$ 127,815	\$ (8,744)	\$ 119,071
Loss from operations	\$ (71,444)	\$ 9,295	\$ (62,149)
Net loss	\$ (74,774)	\$ 9,295	\$ (65,479)
Net loss attributable to common stockholders	\$ (74,774)	\$ 9,295	\$ (65,479)
Net loss per share attributable to common stockholders, basic and diluted	\$ (13.33)	\$ 1.66	\$ (11.67)

RE\_Cumulative = \$60,955 K

Proforma\_Earn (2017) = -\$91,205 K  
Proforma\_Rev (2017) = \$220,871 K

Δ Earn (2017) = \$10,845 K  
Δ Rev (2017) = \$3,533 K

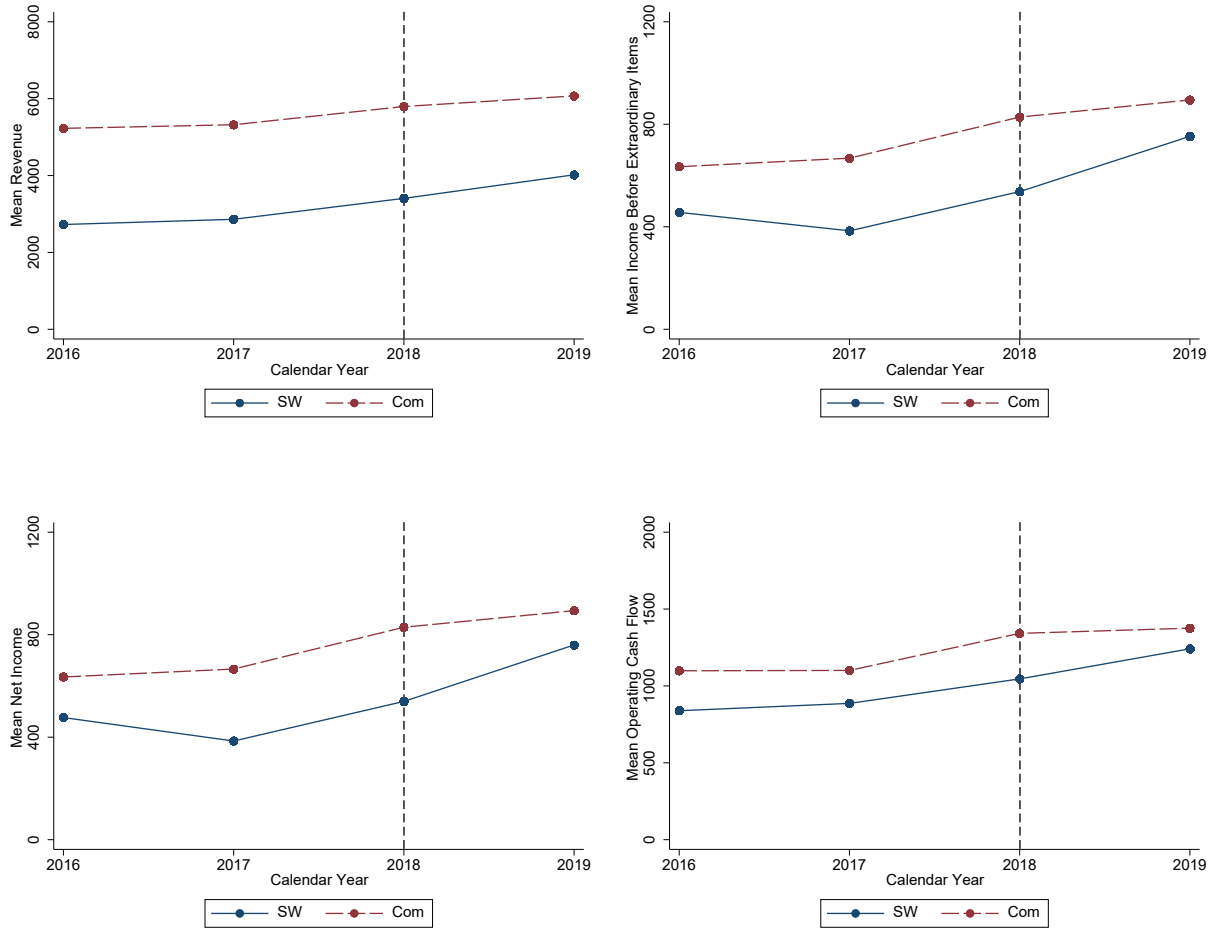
Proforma\_Earn (2016) = -\$74,774 K  
Proforma\_Rev (2016) = \$166,841 K

Δ Earn (2016) = \$9,295 K  
Δ Rev (2016) = \$705 K



### Figure 1. Trends of Economic Performance by Software and Electronic Computer Firms

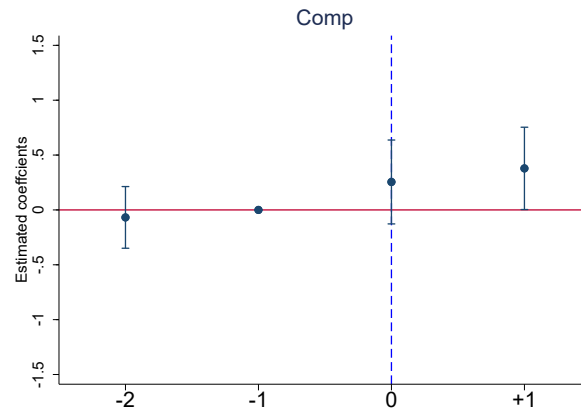
This figure depicts the average economic performance proxies by software and electronic computer firms over the sample period. The solid blue line (dashed red line) represents software (electronic computer) firms. We plot four variables: total revenue, income before extraordinary items, net income, and operating cash flow. These variables are in USD millions.



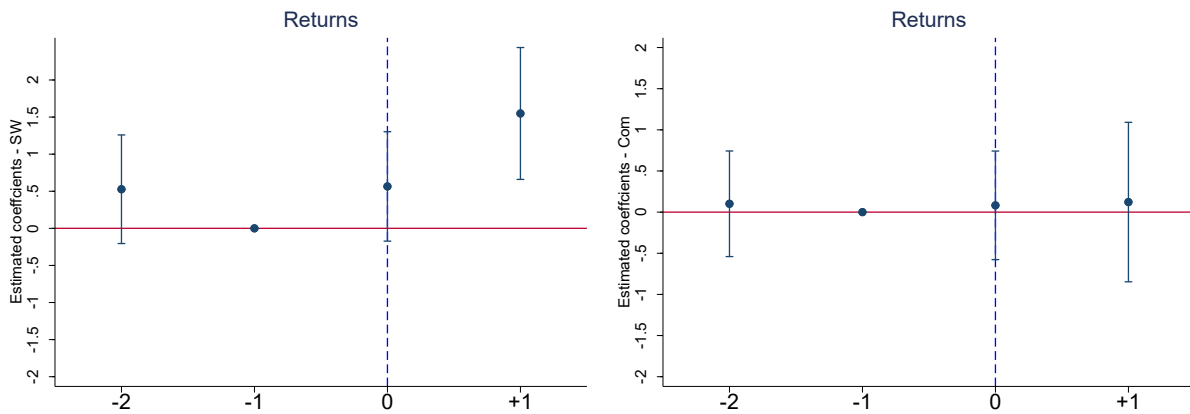
## Figure 2. Trends of Economic Performance by Software and Electronic Computer Firms

This figure plots the estimated effects of ASC 606 on financial-statement comparability, informativeness, mapping of revenue accruals to cash collections, and equity market liquidity. These yearly effects are estimated by including interactions between *SW* (or *Earn* for the earnings informativeness test) and indicators for each year from the ASC 606 adoption except year -1, which serves as the benchmark year. Panel A presents the estimated coefficients for financial statement comparability. Panel B presents the estimated coefficients for earnings informativeness. The left (right) panel is for the software (electronic computer) industry. Panel C presents the estimated coefficients for mapping of revenue accruals to cash collections. Finally, Panel D presents the estimated coefficients for equity market liquidity. The left (right) panel is for *Log Amihud* (*Log Bid-Ask*). All plots present 95 percent confidence intervals based on standard errors clustered at the firm level (or the firm-pair level for the comparability test).

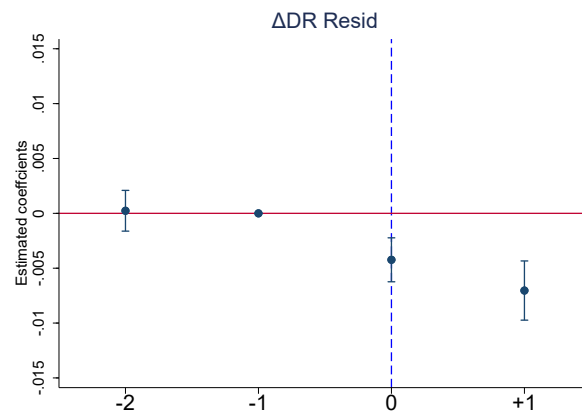
### Panel A: Financial Statement Comparability



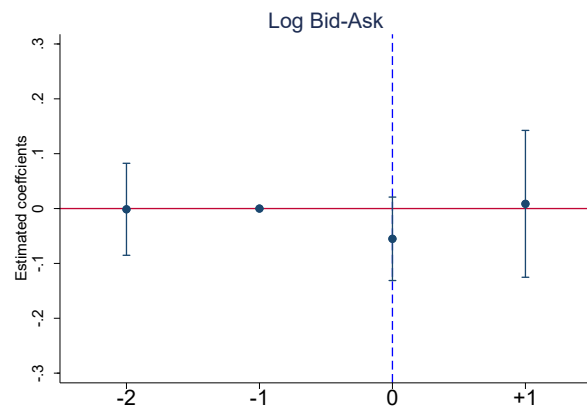
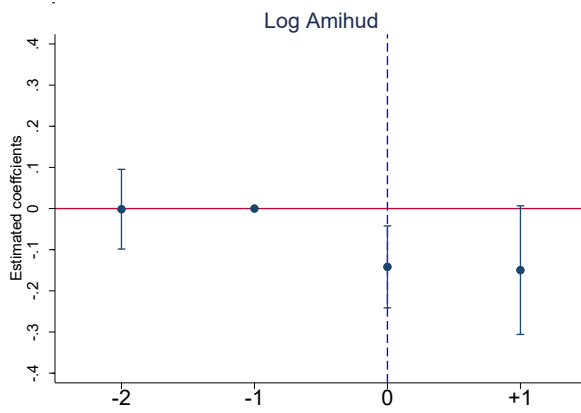
### Panel B: Earnings Informativeness



### Panel C: Mapping of Revenue Accruals to Cash Collections



### Panel D: Equity Market Liquidity



## Appendix Table 1. Effects of ASC 606 on Comparability by Fama-French 48 Industries

This table reports the regression results from equation (5) the  $Post_{i,j} \times SW_{i,j}$  term by Fama-French 48 industry. The dependent variable is  $Comp$ , the accounting comparability between firm pairs. The independent variable of interest is  $Post_{i,j}$ , an indicator equal to 1 if both firm pairs are in the post-ASC 606 periods. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm pair in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

Fama-French 48 Industry	Obs.	Coefficient on $Post_{i,j}$
1-Agriculture	289	-0.053
2-Food Products	18,531	-0.445**
3-Candy & Soda	256	0.681
4-Beer & Liquor	671	-0.139
5-Tobacco Products	64	-1.319***
6-Recreation	2,572	-0.574
7-Entertainment	14,078	0.211
8-Printing and Publishing	2,620	-0.691**
9-Consumer Goods	13,397	-0.226
10-Apparel	10,315	0.338*
11-Healthcare	21,498	0.599**
12-Medical Equipment	107,369	1.059**
13-Pharmaceutical Products	1,354,660	-0.758***
14-Chemicals	49,704	-0.309
15-Rubber and Plastic Products	2,628	-2.102***
16-Textiles	470	-0.321
17-Construction Materials	24,498	-0.440***
18-Construction	20,481	-0.633***
19-Steel Works Etc	7,541	0.158
20-Fabricated Products	289	-0.008
21-Machinery	93,259	-0.142
22-Electrical Equipment	16,285	-0.130
23-Automobiles and Trucks	29,388	-0.510**
24-Aircraft	2,436	-0.321***
25-Shipbuilding, Railroad Equipment	1,133	-1.289**
26-Defense	553	-0.771
27-Precious Metals	406	1.643
28-Non-Metallic and Industrial Metal Mining	3,432	0.905*
29-Coal	586	-1.740***
30-Petroleum and Natural Gas	180,955	0.136
31-Utilities	75,116	-0.043
32-Communication	50,216	-0.936***
33-Personal Services	8,644	-0.151
34-Business Services	1,506,013	0.335***
35-Computers	50,810	0.224
36-Electronic Equipment	262,655	-0.230
37-Measuring and Control Equipment	22,336	-0.756***
38-Business Supplies	6,779	-0.207
39-Shipping Containers	1,136	-0.314**
40-Transportation	76,944	0.617***
41-Wholesale	100,585	-0.078
42-Retail	219,396	-0.319***
43-Restaurants, Hotels, Motels	31,767	0.199
44-Banking	1,225,931	-0.024**
45-Insurance	72,696	-0.341***
46-Real Estate	2,007	0.125
47-Trading	433,190	-0.033
48-Almost Nothing	40,186	-0.431***

### Table 1. Sample Selection

This table details the sample-selection process discussed in section 3 and the number of observations in each step.

Description	Firm	Firm-Quarter	Firm-Year
Firms in the software and electronic computer industries, 2016–2019	454	6,703	1,595
Keep firms with constant classification	453	6,687	1,591
Keep firms with at least one observation for both pre- and post-periods	432	6,583	1,423
Keep firm-quarters without missing control variables (218 software firms and 196 electronic computer firms)	414	5,798	1,387

## Table 2. Descriptive Statistics

This table reports descriptive statistics for variables. Panel A provides descriptive statistics of quarterly variables for the full sample. Panel B provides the mean differences of quarterly variables for software vs. electronic computer firms. Panel C provides descriptive statistics of yearly variables for the full sample. Panel D provides the mean differences of yearly variables for software vs. electronic computer firms. Finally, Panel E provides descriptive statistics of firm-pair variables. All variables are defined in Appendix A.

### Panel A. Quarterly Sample – Full Sample

VARIABLES	N	Mean	Std. dev.	P25	Median	P75
<i>ADR Resid</i>	5,600	0.012	0.018	0.002	0.006	0.014
<i>Log Amihud</i>	5,739	-4.065	2.910	-6.206	-4.482	-2.073
<i>Log Bid-Ask</i>	5,740	-2.336	1.529	-3.501	-2.670	-1.306
<i>Size</i>	5,798	6.638	2.032	5.146	6.616	8.029
<i>ROA</i>	5,798	-0.009	0.058	-0.021	0.003	0.019
<i>Market-to-Book</i>	5,798	4.967	12.613	1.758	3.248	6.510
<i>Leverage</i>	5,798	0.202	0.203	0.008	0.164	0.328
<i>Loss</i>	5,798	0.443	0.497	0.000	0.000	1.000
<i>NumAnalyst</i>	5,798	12.554	11.120	4.000	9.000	17.000

### Panel B. Quarterly Sample – Software vs. Electronic Computer Firms

VARIABLES	SW		Com		Difference	
	N	Mean	N	Mean	SW - Com	t-stat
<i>ADR Resid</i>	2,983	0.016	2,617	0.008	0.007***	15.167
<i>Log Amihud</i>	3,028	-4.107	2,711	-4.019	-0.088	-1.145
<i>Log Bid-Ask</i>	3,029	-2.398	2,711	-2.266	-0.132***	-3.276
<i>Size</i>	3,080	6.526	2,718	6.765	-0.239***	-4.477
<i>ROA</i>	3,080	-0.010	2,718	-0.007	-0.003*	-1.699
<i>Market-to-Book</i>	3,080	6.375	2,718	3.372	3.003***	9.111
<i>Leverage</i>	3,080	0.199	2,718	0.206	-0.007	-1.278
<i>Loss</i>	3,080	0.482	2,718	0.398	0.084***	6.477
<i>NumAnalyst</i>	3,080	13.165	2,718	11.861	1.305***	4.465

Panel C. Annual Sample – Full Sample

VARIABLES	N	Mean	Std. dev.	P25	Median	P75
<i>Earn</i>	1,387	-0.028	0.204	-0.073	0.014	0.073
<i>Rev</i>	1,387	0.777	0.419	0.493	0.681	0.952
<i>Exp</i>	1,387	0.812	0.469	0.479	0.681	1.028
<i>Size</i>	1,387	6.726	1.991	5.279	6.715	8.073
<i>ROA</i>	1,387	-0.029	0.193	-0.076	0.012	0.071
<i>Market-to-Book</i>	1,387	5.088	12.071	1.791	3.284	6.609
<i>Leverage</i>	1,387	0.199	0.205	0.005	0.155	0.322
<i>Loss</i>	1,387	0.436	0.496	0.000	0.000	1.000
<i>NumAnalyst</i>	1,387	15.596	14.098	5.000	11.000	21.000

Panel D. Annual Sample – Software vs. Electronic Computer Firms

VARIABLES	SW		Com		Difference	
	N	Mean	N	Mean	SW - Com	t-stat
<i>Earn</i>	773	-0.038	614	-0.015	-0.023**	-2.131
<i>Rev</i>	773	0.738	614	0.825	-0.087***	-3.838
<i>Exp</i>	773	0.786	614	0.844	-0.059**	-2.315
<i>Size</i>	773	6.553	614	6.943	-0.390***	-3.643
<i>ROA</i>	773	-0.040	614	-0.016	-0.025**	-2.360
<i>Market-to-Book</i>	773	6.220	614	3.663	2.557	3.939
<i>Leverage</i>	773	0.197	614	0.202	-0.005	-0.485
<i>Loss</i>	773	0.473	614	0.389	0.084	3.151
<i>NumAnalyst</i>	773	16.172	614	14.870	1.302	1.710

Panel E. Pairwise Sample

VARIABLES	N	Mean	Std. dev.	P25	Median	P75
<i>Comp<sub>i,j</sub></i>	808,946	-4.898	5.807	-6.124	-3.157	-1.400
<i>Diff Size<sub>i,j</sub></i>	808,946	-0.010	2.830	-1.956	-0.010	1.937
<i>Diff ROA<sub>i,j</sub></i>	808,946	0.000	0.083	-0.032	-0.000	0.032
<i>Diff Market-to-Book<sub>i,j</sub></i>	808,946	-0.029	22.218	-3.616	-0.001	3.619
<i>Diff Leverage<sub>i,j</sub></i>	808,946	-0.000	0.290	-0.180	0.000	0.179
<i>Diff NumAnalyst<sub>i,j</sub></i>	808,946	-0.064	15.687	-9.000	0.000	8.000
<i>Loss<sub>i</sub></i>	808,946	0.447	0.497	0.000	0.000	1.000
<i>Loss<sub>j</sub></i>	808,946	0.447	0.497	0.000	0.000	1.000

**Table 3. Revenue-Related Critical Audit Matter (*CAM\_Rev*) and Cumulative Effects on Retained Earnings (*RE\_Cumulative*)**

This table examines whether ASC 606 materially affected software firms (*SW*) more than electronic computer firms (*Com*). Panel A reports the descriptive statistics of revenue-related critical audit matter (*CAM\_Rev*) disclosure in the post-sample period (2018–2019) and the cumulative effects of ASC 606 on retained earnings. Panel B reports the regression results of *CAM\_Rev* by firm-year and *RE\_Cumulative* by firm level. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A. *CAM\_Rev* and *RE\_Cumulative* Statistics

	SW			Com			Difference
	N	Mean	SD	N	Mean	SD	
<i>CAM_Rev</i>	363	0.154	0.362	286	0.052	0.223	0.102***
<i>RE_Cumulative</i>	149	0.044	0.086	94	0.016	0.035	0.028***

Panel B. *CAM\_Rev* and *RE\_Cumulative* Regressions

VARIABLES	(1)	(2)
	SW-Com <i>CAM_Rev</i>	SW-Com <i>RE_Cumulative</i>
<b><i>SW</i></b>	<b>0.107***</b>	<b>0.029***</b>
	<b>(0.024)</b>	<b>(0.010)</b>
<i>Size</i>	0.028***	-0.007
	(0.007)	(0.005)
<i>ROA</i>	-0.005	-0.037
	(0.067)	(0.066)
<i>Market-to-Book</i>	0.001	-0.000
	(0.001)	(0.001)
<i>Leverage</i>	0.034	0.053
	(0.057)	(0.052)
<i>Constant</i>	-0.153***	0.055*
	(0.051)	(0.032)
Observations	649	243
Firm FE	NO	NO
Year FE	NO	NO
Adj R2	0.0560	0.0719



**Table 4. Effects of ASC 606 on Financial-Statement Comparability**

This table reports the regression results from equation (5). The dependent variable is *Comp*, the accounting comparability between firm pairs. The independent variable of interest is  $Post_{i,j}$  and  $Post_{i,j} \times SW_{i,j}$ .  $Post_{i,j}$  is an indicator equal to 1 if both firm pairs are in the post-ASC 606 periods, and  $SW_{i,j}$  is an indicator equal to 1 if both firm pairs are software firms. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm pair in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

VARIABLES	(1) SW-SW <i>Comp</i>	(2) Com-Com <i>Comp</i>	(3) All Pairs <i>Comp</i>
<b><i>Post<sub>i,j</sub></i></b>	<b>0.459***</b> (0.176)	<b>0.112</b> (0.127)	<b>0.050</b> (0.122)
<b><i>Post<sub>i,j</sub> × SW<sub>i,j</sub></i></b>			<b>0.383*</b> (0.216)
<i>Diff Size<sub>i,j</sub></i>	0.027 (0.319)	0.104 (0.177)	0.049 (0.230)
<i>Diff ROA<sub>i,j</sub></i>	5.225 (3.723)	1.869 (1.571)	4.271 (2.722)
<i>Diff Market-to-Book<sub>i,j</sub></i>	-0.001 (0.002)	-0.005 (0.004)	-0.002 (0.002)
<i>Diff Leverage<sub>i,j</sub></i>	0.186 (0.892)	0.232 (0.414)	0.189 (0.653)
<i>Diff NumAnalyst<sub>i,j</sub></i>	-0.004 (0.009)	0.001 (0.008)	-0.003 (0.007)
<i>Loss<sub>i</sub></i>	-0.015 (0.176)	-0.206** (0.083)	-0.085 (0.119)
<i>Loss<sub>j</sub></i>	-0.402** (0.160)	-0.258*** (0.061)	-0.357*** (0.109)
Constant	-4.875*** (0.109)	-4.789*** (0.060)	-4.818*** (0.058)
Observations	460,294	347,326	807,620
Firm-Pair FE	YES	YES	YES
Year-Quarter FE	NO	NO	YES
Adj R2	0.683	0.883	0.785

**Table 5. Effects of ASC 606 on Financial-Reporting Informativeness**

This table reports the regression results from equations (6) and (7). *SW* indicates software firms, and *Com* indicates electronic computer firms. The dependent variable is *Returns*, annual cumulative market-adjusted returns using the value-weighted market index. The independent variables of interest are the interactive term of *Post*×*Earn*, *Post*×*Rev*, and *Post*×*Exp*. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)
	SW <i>Returns</i>	Com <i>Returns</i>	SW <i>Returns</i>	Com <i>Returns</i>
<i>Post</i>	0.010 (0.158)	-0.181** (0.082)	0.036 (0.150)	-0.174 (0.115)
<i>Earn</i>	-0.351 (0.774)	-1.424 (1.089)		
<b><i>Post</i>×<i>Earn</i></b>	<b>0.628*</b> <b>(0.346)</b>	<b>0.048</b> <b>(0.321)</b>		
<i>Rev</i>			0.154 (0.409)	-0.678 (0.703)
<i>Exp</i>			-0.166 (0.417)	0.387 (0.558)
<b><i>Post</i>×<i>Rev</i></b>			<b>0.548*</b> <b>(0.314)</b>	<b>0.098</b> <b>(0.323)</b>
<b><i>Post</i>×<i>Exp</i></b>			<b>-0.573**</b> <b>(0.265)</b>	<b>-0.095</b> <b>(0.306)</b>
<i>Size</i>	-0.106 (0.093)	-0.256 (0.171)	-0.129 (0.092)	-0.327* (0.185)
<i>Loss</i>	0.044 (0.085)	-0.073 (0.091)	0.039 (0.084)	-0.084 (0.088)
<i>ROA</i>	1.128 (0.827)	2.981** (1.211)	0.542 (0.456)	1.845** (0.714)
<i>Market-to-Book</i>	-0.002 (0.004)	0.004 (0.004)	-0.002 (0.004)	0.005 (0.004)
<i>Leverage</i>	0.079 (0.223)	0.401 (0.501)	0.135 (0.223)	0.304 (0.542)
<i>NumAnalyst</i>	0.005 (0.007)	-0.024** (0.011)	0.006 (0.006)	-0.025** (0.011)
Constant	0.707 (0.595)	2.248** (1.076)	0.844 (0.599)	3.005** (1.397)
Observations	773	614	773	614
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Adj R2	0.043	0.061	0.045	0.060

**Table 6. Annual Returns on Pro-Forma Earnings**

This table reports the regression results from equations (8) and (9). *SW* indicates software firms and *Com* indicates computer firms. The dependent variable is *Returns*, annual cumulative market-adjusted returns using the value-weighted market index. The independent variables of interest are  $\Delta Earn$  and  $\Delta Rev$ . We winsorize all variables at the 1st and 99th percentile in each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

VARIABLES	(1) SW <i>Returns</i>	(2) SW <i>Returns</i>	(3) Com <i>Returns</i>	(4) Com <i>Returns</i>
<i>Proforma_Earn</i>	1.123* (0.596)		5.194 (5.073)	
<b><math>\Delta Earn</math></b>	<b>3.685***</b> <b>(1.342)</b>		<b>7.079</b> <b>(4.433)</b>	
<i>Proforma_Rev</i>		0.697 (0.705)		5.403 (3.869)
<b><math>\Delta Rev</math></b>		<b>3.420***</b> <b>(1.199)</b>		<b>6.232</b> <b>(3.885)</b>
<i>Proforma_Exp</i>		-0.894 (0.750)		-5.237 (3.817)
$\Delta Exp$		-3.960* (2.322)		3.433 (13.098)
<i>Size</i>	-0.068* (0.037)	-0.093** (0.042)	-0.127 (0.077)	-0.118 (0.071)
<i>Loss</i>	0.099 (0.124)	0.071 (0.127)	-0.233 (0.164)	-0.187 (0.153)
<i>ROA</i>	-0.815 (0.687)	-0.577 (0.861)	-3.990 (4.951)	-3.936 (3.484)
<i>Market-to-Book</i>	0.001 (0.002)	0.000 (0.003)	0.021*** (0.007)	0.021*** (0.006)
<i>Leverage</i>	-0.040 (0.194)	0.025 (0.201)	0.739 (0.704)	0.669 (0.678)
<i>NumAnalyst</i>	0.007** (0.003)	0.008** (0.003)	0.003 (0.005)	0.005 (0.005)
<i>Constant</i>	0.383 (0.235)	0.700** (0.315)	0.841 (0.519)	0.592 (0.487)
Observations	154	154	96	96
Year FE	YES	YES	YES	YES
Adj R2	0.112	0.0894	0.155	0.155

**Table 7. Effects of ASC 606 on Mapping between Revenue and Cash Collections**

This table reports the regression results from equation (11). *SW* indicates software firms, and *Com* indicates electronic computer firms. The dependent variable is  $\Delta DR Resid$ , the change in current and long-term deferred revenues divided by the beginning total assets. The independent variables of interest are *Post* and  $Post \times SW$ . We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

VARIABLES	(1) SW $\Delta DR Resid$	(2) Com $\Delta DR Resid$	(3) All $\Delta DR Resid$
<i>Post</i>	<b>-0.002**</b> (0.001)	<b>0.004***</b> (0.001)	<b>0.004***</b> (0.001)
<i>Post</i> × <i>SW</i>			<b>-0.007***</b> (0.001)
<i>Size</i>	-0.003** (0.002)	0.002 (0.002)	-0.001 (0.001)
<i>ROA</i>	0.025** (0.011)	0.021 (0.013)	0.023*** (0.008)
<i>Market-to-Book</i>	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
<i>Leverage</i>	-0.006 (0.004)	-0.003 (0.004)	-0.004 (0.003)
<i>Loss</i>	-0.002 (0.001)	0.001 (0.001)	-0.001 (0.001)
<i>NumAnalyst</i>	0.000* (0.000)	0.000** (0.000)	0.000 (0.000)
Constant	0.035*** (0.009)	-0.008 (0.011)	0.018** (0.008)
Observations	2,982	2,616	5,598
Firm FE	YES	YES	YES
Year-Quarter FE	NO	NO	YES
Adj R2	0.368	0.375	0.402

**Table 8. Effects of ASC 606 on Equity Market Liquidity**

This table reports the regression results from equation (12). *SW* indicates software firms, and *Com* indicates electronic computer firms. In columns (1) through (3), the dependent variable is *Log Amihud*, the natural logarithm of the quarterly median of Amihud's (2002) daily measure of illiquidity, measured as the stock return divided by the trading volume. In columns (4) through (6), the dependent variable is *Log Bid-Ask*, the natural logarithm of the quarterly median of the daily quoted spreads, measured as the daily closing bid and ask prices divided by the midpoint. The independent variables of interest are *Post* and *Post*×*SW*. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

VARIABLES	(1) SW <i>Log Amihud</i>	(2) Com <i>Log Amihud</i>	(3) All <i>Log Amihud</i>	(4) SW <i>Log Bid-Ask</i>	(5) Com <i>Log Bid-Ask</i>	(6) All <i>Log Bid-Ask</i>
<i>Post</i>	<b>-0.191***</b> (0.063)	<b>-0.019</b> (0.047)	<b>0.048</b> (0.061)	<b>-0.085**</b> (0.041)	<b>-0.063*</b> (0.037)	<b>0.002</b> (0.052)
<i>Post</i> × <i>SW</i>			<b>-0.161**</b> (0.074)			<b>-0.029</b> (0.052)
<i>Size</i>	-1.038*** (0.126)	-1.244*** (0.146)	-1.033*** (0.101)	-0.448*** (0.104)	-0.520*** (0.094)	-0.477*** (0.078)
<i>ROA</i>	-0.281 (0.786)	-2.564*** (0.583)	-1.202** (0.570)	-0.576 (0.403)	-1.012** (0.393)	-0.787*** (0.303)
<i>Market-to-Book</i>	-0.004*** (0.002)	-0.012*** (0.004)	-0.005*** (0.002)	-0.003** (0.001)	-0.004* (0.002)	-0.003** (0.001)
<i>Leverage</i>	0.304 (0.374)	1.473*** (0.499)	0.709** (0.295)	0.067 (0.277)	0.918*** (0.281)	0.286 (0.212)
<i>Loss</i>	0.159*** (0.061)	0.186*** (0.050)	0.212*** (0.041)	0.105** (0.042)	0.119*** (0.038)	0.120*** (0.029)
<i>NumAnalyst</i>	-0.015*** (0.005)	0.003 (0.005)	-0.011*** (0.004)	-0.005 (0.003)	0.001 (0.004)	-0.003 (0.003)
Constant	2.803*** (0.744)	4.011*** (0.929)	2.713*** (0.629)	0.570 (0.619)	1.036* (0.615)	0.759 (0.488)
Observations	3,028	2,710	5,738	3,029	2,710	5,739
Firm FE	YES	YES	YES	YES	YES	YES
Year-Quarter FE	NO	NO	YES	NO	NO	YES
Adj R2	0.953	0.959	0.960	0.902	0.906	0.906

**Table 9. Effects of ASC 606 on Revenue-Recognition Disclosure**

This table reports the regression results from equations (13) and (14). *SW* indicates software firms, and *Com* indicates electronic computer firms. For Panel A, the dependent variables are *Disc Length*, the change in current and long-term deferred revenues divided by the beginning total assets, and *Table Ind*, an indicator that takes a value of 1 if a firm discloses the figures in the table format, which proxies for the quality of disclosures. The independent variables of interest are *Post* and *Post*×*SW*. For Panel B, the dependent variable is *Cos Sim*, the cosine similarity based on the vector space model between firm pairs. The independent variable of interest is *Post<sub>i,j</sub>* and *Post<sub>i,j</sub>*×*SW<sub>i,j</sub>*. We winsorize all variables at the 1st and 99th percentile each calendar year. All variables are defined in Appendix A. Standard errors are clustered by the firm in parentheses. \*, \*\*, and \*\*\* denote significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A. Effects of ASC 606 on Disclosure Length and Table Inclusion

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SW <i>Disc Length</i>	Com <i>Disc Length</i>	All <i>Disc Length</i>	SW <i>Table Ind</i>	Com <i>Table Ind</i>	All <i>Table Ind</i>
<i>Post</i>	<b>414.574***</b> (51.845)	<b>427.064***</b> (52.588)	<b>515.126***</b> (62.615)	<b>0.384***</b> (0.037)	<b>0.322***</b> (0.042)	<b>0.374***</b> (0.051)
<i>Post</i> × <i>SW</i>			<b>-51.500</b> (71.286)			<b>0.029</b> (0.054)
<i>Size</i>	-36.576 (60.357)	111.151 (112.733)	7.821 (55.862)	-0.035 (0.057)	0.021 (0.087)	-0.020 (0.048)
<i>ROA</i>	-216.071 (168.565)	-293.025 (325.697)	-270.856* (148.736)	-0.066 (0.114)	-0.092 (0.192)	-0.116 (0.097)
<i>Market-to-Book</i>	-1.691 (1.176)	-0.138 (1.739)	-1.661 (1.058)	-0.000 (0.001)	-0.002 (0.002)	-0.000 (0.001)
<i>Leverage</i>	-157.524 (195.676)	187.746 (314.983)	-37.713 (167.678)	-0.118 (0.156)	0.490** (0.207)	0.052 (0.131)
<i>Loss</i>	-85.927 (70.203)	-94.301 (66.832)	-97.222** (48.586)	0.055 (0.043)	-0.045 (0.045)	0.005 (0.032)
<i>NumAnalyst</i>	6.783 (6.745)	7.730 (8.980)	6.484 (5.490)	-0.004 (0.006)	0.009 (0.008)	-0.001 (0.005)
Constant	1,080.748*** (367.974)	-111.694 (670.530)	677.046* (346.843)	0.310 (0.331)	-0.246 (0.518)	0.148 (0.288)
Observations	751	484	1,235	751	484	1,235
Firm FE	YES	YES	YES	YES	YES	YES
Year-Quarter FE	NO	NO	YES	NO	NO	YES
Adj R2	0.634	0.669	0.657	0.443	0.476	0.454

Panel B. Effects of ASC 606 on Disclosure Comparability

VARIABLES	(1) SW-SW <i>Cos Sim</i>	(2) Com-Com <i>Cos Sim</i>	(3) Com-Sw <i>Cos Sim</i>
<i>Post<sub>i,j</sub></i>	<b>0.027***</b> <b>(0.002)</b>	<b>0.036***</b> <b>(0.003)</b>	<b>0.045***</b> <b>(0.003)</b>
<i>Post<sub>i,j</sub> × SW<sub>i,j</sub></i>			<b>-0.008**</b> <b>(0.004)</b>
<i>Diff Size<sub>i,j</sub></i>	-0.000 (0.002)	-0.000 (0.003)	-0.000 (0.002)
<i>Diff ROA<sub>i,j</sub></i>	0.004 (0.010)	0.001 (0.013)	0.005 (0.008)
<i>Diff Market-to-Book<sub>i,j</sub></i>	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
<i>Diff Leverage<sub>i,j</sub></i>	-0.000 (0.003)	0.000 (0.009)	0.001 (0.003)
<i>Diff NumAnalyst<sub>i,j</sub></i>	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
<i>Loss<sub>i</sub></i>	0.000 (0.002)	0.002 (0.003)	0.001 (0.002)
<i>Loss<sub>j</sub></i>	0.000 (0.001)	0.002** (0.001)	0.001 (0.001)
Constant	0.108*** (0.001)	0.092*** (0.002)	0.099*** (0.001)
Observations	103,564	42,784	146,348
Firm-Pair FE	YES	YES	YES
Year-Quarter FE	NO	NO	YES
Adj R2	0.683	0.599	0.667