

The Subscription Economy: Implications for Valuation and Earnings Management *

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Abstract

The subscription economy — wherein firms offer products and services for recurring fees — has witnessed substantial growth in the last two decades. When valuing firms that rely on recurring revenue (hereafter recurring firms), investors adopt valuation methods that prioritize future revenue over current performance, altering the earnings management incentives for these firms. I first document fundamental differences in recurring firms: they tend to be smaller and younger, and they have greater revenue persistence, investment efficiency, and profitability. They experience more pronounced stock market reactions to revenue and earnings, but only when future revenue indicators (deferred revenue) are high. To align with growth-focused investor valuation methods, recurring firms avoid premature revenue recognition to maintain a high level of deferred revenue. Instead, they cut discretionary expenses to meet earnings targets and defer revenue to enhance their valuation. These insights underscore how earnings management incentives evolve in response to the changing economy.

Keywords: Subscription Economy, Earnings Management, Valuation, Revenue Recognition.

JEL Classification: M41, M48, O33

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1 Introduction

In recent decades, the subscription economy has emerged and experienced rapid growth. According to UBS (2021), the digital subscription economy was valued at \$650 billion in 2020 and is projected to rise to \$1.5 trillion by 2025. Investors are increasingly favoring subscription business models due to their recurring revenues. This valuation surge is compelling companies beyond the technology industry to embrace recurring revenue business models.¹ As firms that rely on the recurring revenue model (hereafter recurring firms) derive a substantial portion of their value from future revenue streams, market participants are increasingly adopting valuation metrics that prioritize future revenue over current revenue. This emphasis on future recurring revenue streams in turn affects firms' earnings management incentives. Despite its growing significance in the economy, the impact of the recurring revenue model on valuation and earnings management patterns has yet to be thoroughly examined. In this paper, I investigate the differential characteristics, valuation methods, and earnings management of recurring firms.

In recent years, the recurring revenue model has substantially impacted the valuation metrics adopted by market participants. For recurring firms, investors now consider the future recurring portion of revenue as a better indicator of future performance than the recognized revenue in the current period. Metrics focusing on the recurring portion of revenue, such as Annual Recurring Revenue (ARR) and Monthly Recurring Revenue (MRR), are gaining prominence in assessing the value of these companies.²

The shifting valuation focus may create new incentives for earnings management activities. Previous literature on earnings management has largely focused on whether software and service companies engage in premature revenue recognition, given the SEC's concerns that the nature of their business gives them more discretion in the timing and price allocation of revenue recognition (Turner, 2001). For example, Altamuro et al. (2005) and Zhang (2005) investigate this issue and find evidence of premature revenue

¹Available at: <https://www.washingtonpost.com/business/2021/06/01/subscription-boom-pandemic/>. Accessed 03/09/2023.

²Available at: <https://www.ft.com/content/40eb1369-5b14-40b9-a3d5-478ca3420947>. Accessed 04/06/2023.

recognition by software firms. However, since emerging valuation metrics now emphasize future revenue over current revenue for recurring firms, premature revenue recognition may adversely affect their valuation. Recognizing revenue prematurely would lead to a decrease in future revenue indicators (e.g., deferred revenue), which are fundamental to the valuation of recurring firms. There is thus a tension as to how managerial incentives will manifest in earnings management activities.

In this study, I define the recurring revenue business model as one in which the vendor grants ongoing access to a product or service in return for a regular charge at specific intervals. To examine the implications of the recurring revenue model for valuation and earnings management, I first develop a text-based method to identify recurring firms. I use a bag-of-words approach to compute the frequency of the term “recurring” in 10-K files issued for fiscal years 2010 to 2019. In addition, I require the words “revenue(s)” and “sale(s)” to be present within a 20-word window of the term “recurring” to ensure that the measure is capturing discussion about the recurring nature of revenue streams. To account for the size effect of the 10-K file (Dyer et al., 2017), I divide the number of qualified appearances of the word “recurring” by the file’s total word count to obtain a measure of the firm’s reliance on recurring revenue (*%RecurringRev*). The time trend plot of *%RecurringRev* shows that sample firms increasingly adopt the recurring revenue model during the sample period.

Next, I use different methods to validate the measure. First, the descriptive statistics support the argument that the measure captures the recurring business model: the top three industries ranked by the average of the variable *%RecurringRev* are information, professional services, and administrative services. Notably, within the information industry, 56.42% of firm-years have discussed recurring revenues in their 10-K filings. This consistency aligns with the concept that IT firms frequently adopt subscription models, which generate recurring revenue. Moreover, I find that the measure is positively correlated with firms’ deferred revenue after controlling for other fundamentals, thereby validating that the measure captures firms’ reliance on recurring revenue. I further manually collect the ARR metrics voluntarily disclosed by firms during earnings calls. I

find that $\%RecurringRev$ is positively correlated with both the propensity to disclose the ARR metric and the proportion of firms' annual recurring revenues.³

I next examine the characteristics of recurring firms. Controlling for industry and year fixed effects, I find that recurring revenue firms exhibit more persistent revenues and greater investment efficiency. Furthermore, the reliance measure is negatively correlated with firm age and firm size but positively correlated with firm profitability and market-to-book ratio. The findings are consistent with the expectation that subscription businesses tend to be younger technology firms, and market participants consider these firms to have greater growth opportunities. Moreover, the fact that these firms often have a greater amount of off-balance sheet intangible assets is also consistent with the high market-to-book ratio.

To investigate the valuation implication of the recurring business model, I examine the valuation multiples and ERCs of recurring firms. I find that recurring firms obtain greater multiples for both revenues and EBITDA. Moreover, they exhibit greater ERCs on both revenue and earnings surprises than non-recurring firms, consistent with prior literature (Dechow et al., 2010). However, this stronger market reaction is moderated when recurring firms report lower deferred revenue than their industry peers, which suggests that the market is concerned that the positive news may stem from prematurely recognized revenues that will not lead to consistent cash flow in the future. The findings indicate that the recurring revenue model enhances market multiples, and this effect is due to the greater expectation of future recurring revenues.

Having established the valuation benefits of high deferred revenue for recurring firms, I next examine how the earnings management incentives of recurring firms differ from what has been documented in the previous literature. Specifically, I investigate how recurring firms may no longer have incentives to prematurely recognize revenue, which is considered one of the major concerns of earnings management (Altamuro et al., 2005; Turner, 2001; Zhang, 2005). Following Call et al. (2022), I use four different metrics to

³I did not employ the ARR metric as the primary measure of firms' reliance on the recurring revenue model due to the limited number of firms disclosing this metric. I discuss this in greater detail in [subsubsection 4.1.2](#).

measure a firm's incentives to meet or beat benchmarks, and I do not find evidence that recurring firms engage in more premature revenue recognition when they are close to missing earnings benchmarks. On the contrary, they defer even more revenues to boost valuation multiples, even if it means reducing the reported revenues for the current period. The results demonstrate that recurring firms resort to cutting discretionary expenses to meet earnings targets. These findings indicate that recurring firms are adopting new earnings management strategies that differ from those documented in the prior literature. Therefore, we should revise our understanding of firms' earnings management incentives to align with the evolving dynamics of their underlying businesses.

To rule out the possibility that the increase in recurring firms' abnormal deferred revenue is a byproduct of their attempt to inflate total revenue through real activities, I further investigate their profit margin and abnormal accounts receivables. The results suggest that recurring firms are not likely to have inflated their total revenue through channel stuffing, sales pull-in, or similar real activities. Therefore, the increase in abnormal deferred revenue is driven by reallocations in the *timing* or *price* of revenue, not by overstatements of *total* revenue.

Although the findings appear to contradict prior research that finds evidence of premature revenue recognition by software firms, it is likely correlated with the unique valuation applied specifically to the subscription business model. For firms that operate with this business model, investors and analysts deem future recurring revenue more important than current period revenue. While this may also apply to other firms, the importance of the future revenue indicator (i.e., deferred revenue) is especially important for recurring firms. Hence, recurring firms close to the benchmark with unsatisfactory current period performance would defer even more revenues to achieve a higher valuation. The abnormally deferred revenue would increase analysts' estimates of future recurring revenue and, as a result, serve as a remedy for the unsatisfying earnings for valuation purposes. Since doing so would drive the reported earnings away from earnings benchmarks, firms use other means, such as cutting discretionary expenses, to meet and beat earnings targets.

To better understand whether the existing market mechanism could discipline recurring firms' earnings management activities, I first examine how recurring firms' earnings management behavior interacts with their information environment as proxied by analyst coverage. It is unclear *a priori* whether greater analyst coverage would curtail recurring firms' earnings management behavior via monitoring (Yu, 2008) or exaggerate their incentives to meet analyst forecasts (e.g., Dhaliwal et al. (2004) and McVay (2006)). The findings reveal that recurring firms with higher analyst coverage are less likely to cut discretionary expenses but are encouraged to defer even more revenues into the future. This result is consistent with prior notions that a better information environment plays a monitoring role while incentivizing firms to inflate the recurring portion of their revenues. The findings suggest a need for regulatory efforts to address the incentives of recurring firms to inflate their recurring revenue portions, given the lack of standardized measurements and the difficulty of detecting such practices.

Lastly, to improve the identification of the earnings management tests, I use M&A as a setting to compare acquisitions of recurring vs. non-recurring businesses. The results show that, all else equal, acquisitions of recurring revenue targets create greater incentives to cut discretionary expenses, relative to acquisitions of non-recurring firms.

This paper makes a threefold contribution to the literature. First, it contributes to the literature on earnings management by providing empirical evidence on the impact of firms' business models on their earnings management incentives. Previous literature often concentrates on analyzing entire companies and draws conclusions based on average sample firm data (e.g., Caylor (2010) and Srivastava (2014a)). In this study, I demonstrate that firms' business models and the metrics investors use to evaluate them influence their incentives and patterns of earnings management, an observation that previous literature has not addressed. Furthermore, in addition to the motivations of avoiding scrutiny and smoothing earnings (Arya et al., 1998; Eldenburg et al., 2011; Key, 1997), my findings provide empirical evidence for a new motivation for understating earnings: to increase perceived recurring revenues to achieve an enhanced valuation. In summary, this study suggests that we must update our understanding of earnings

management and earnings quality to reflect the evolving dynamics of the underlying economy.

Second, prior research has documented changes in the properties of earnings over the past few decades, and researchers have debated whether these changes are due to accounting changes or changes in the real economy (Srivastava, 2014b). This study suggests that the growing subscription business model could have contributed to these changes. Consistent with the specific valuation metrics applied to the recurring revenue model, recurring firms opt for different earnings management behavior than that documented in previous literature. With the rapid development of technology and the subscription economy, this phenomenon is likely to become even more pronounced in the future. These findings present opportunities for future research to update measures of earnings quality, incorporating the evolving incentives for earnings management.

Lastly, the study provides findings useful to accounting standard setters who address issues of revenue recognition. The recent implementation of the new revenue recognition standard (ASC 606) mandates significantly more disclosure than the prior standard, but the disclosure and measurement of the recurring portion of revenues are not regulated. The urgency of imposing regulation on recurring revenue arises from the recent class-action lawsuit against Oracle Inc. In this lawsuit, the prosecution alleges that Oracle Inc. improperly deferred revenues that should have been recognized immediately to unlawfully inflate the recurring portion of revenue, thereby achieving a higher valuation.⁴ Given the evidence presented in this paper and this recent scandal, standard setters may consider standardizing the definition, measurement, and disclosure of recurring revenues.

2 The Subscription Economy and Previous Literature

2.1 The Valuation Implications of Recurring Revenue Models

Recurring revenue is the consistent income generated by a business as a result of customers' ongoing subscriptions and commitments. With the advancement of

⁴Available at: <https://casetext.com/case/city-of-sunrise-firefighters-pension-fund-v-oracle-corp-1>. Accessed 06/07/2023.

technology, the subscription economy is growing rapidly, and firms from different sectors are transitioning to the recurring revenue model.⁵ Anecdotal evidence suggests that companies embracing a recurring revenue model tend to command higher valuations compared to those offering only one-time purchase options.⁶

The elevated valuations associated with recurring revenue models can be attributed to several factors. First, the heightened predictability of revenue streams and the potential for sustained growth contribute to these enhanced valuations (Dursteler et al., 2022). Second, due to the more predictable revenue streams, businesses employing such models typically exhibit superior budgeting and risk management capabilities, fostering financial stability and attractiveness to investors. Additionally, recurring revenue models often build stronger and more enduring customer relationships, thereby appealing to investors seeking sustained profitability. Consequently, companies reliant on recurring revenue may exhibit greater valuation multiples than their industry peers who have not adopted such models.

Besides valuation multiples, recurring revenue models could also affect firms' earnings response coefficients (ERCs). Prior literature has identified multiple factors that could influence ERCs (e.g., Ali and Zarowin (1992), Collins and Kothari (1989), and Dechow et al. (2010)). Among others, two factors are associated with characteristics of recurring revenue businesses: market anticipation for the firm's future growth and the persistence of earnings (Collins & Kothari, 1989; Ghosh et al., 2005; Kormendi & Lipe, 1987). For firms with recurring business models,⁷ revenue streams are inherently more predictable and persistent, leading to more persistent earnings compared to firms that do not rely on recurring businesses. This persistence is valued by the market as an indicator of high earnings quality, and studies have shown that it is associated with higher ERC (Dechow et al., 2010). Furthermore, the predictability of revenue in recurring business firms enhances their ability to allocate resources, make investment decisions, and plan

⁵Available at: <https://www.digitalroute.com/blog/recurring-revenue-statistics/>.

⁶Available at: <https://cloudindex.bvp.com>.

⁷As discussed in section 1, recurring revenue business model refers to business model wherein the vendor offers access to a product or service in return for a regular fee collected at specific intervals, such as monthly, quarterly, or yearly. For more discussion, see section 1.

budgets over time, making their operations more attractive.

Another reason for the higher ERC observed in recurring business firms is their greater profit margin. Apart from the advantages discussed earlier, such as the ability to make informed operational decisions due to predictable revenue streams, firms that heavily rely on recurring businesses are likely to generate higher profit margins compared to other firms. This is primarily because many of these firms provide services with low variable costs. For instance, Software-as-a-Service (SaaS) companies typically have profit margins ranging from 60% to 80% as their cost of goods sold (COGS) consists mostly of network and delivery costs, which do not increase proportionately with sales.^{8,9} Recurring business models benefit from economies of scale, and their high and repeatable profit margins project a clear path for future growth. Consequently, the ERCs should reflect the market's expectation of the promising prospects associated with such businesses. Overall, firms with the recurring revenue model may receive greater ERCs.

While firms adopting a recurring revenue business model may receive additional market rewards for earnings surprises, the market's positive reaction could be tempered by indicators of a potential decrease in future revenue streams. Recognizing the unique characteristics of recurring revenue models, practitioners have adapted valuation metrics that emphasize the recurring component of revenue rather than its current amount.¹⁰ The primary metrics used for this purpose are “Annual Recurring Revenue (ARR)” and “Monthly Recurring Revenue (MRR),” which specifically value the recurring portion of revenue. Therefore, market participants may downward adjust their reactions to earnings and revenue surprises if the recurring portion of revenue decreased.

One proxy for assessing the recurring portion of revenue is deferred revenue (Prakash & Sinha, 2013; Zha-Giedt, 2018; Zhong et al., 2016).¹¹ In the subscription industry, firms

⁸Available at: <https://leadedge.com/why-we-like-saas-businesses/>. Accessed 06/07/2023.

⁹In untabulated analyses, I examine whether the gross margin differs for firms with and without recurring business. Results show that gross margin of firms with recurring based business is statistically significantly greater than firms without any recurring businesses.

¹⁰Available at: <https://www.ft.com/content/40eb1369-5b14-40b9-a3d5-478ca3420947>. Accessed 04/06/2023

¹¹An arguably better proxy for the recurring portion of revenue is the remaining performance obligation (RPO), which represents the total value of contracted products and/or services that are yet to be delivered to our customers. It's a forward-looking metric and provides visibility into future revenue. However, since RPO is required to be disclosed for and after fiscal year 2018, I cannot utilize it as the proxy for

often bill customers upfront, making the deferred revenue account a suitable estimate for future revenues.¹² Therefore, a disproportionate decrease in the ratio of deferred revenue to revenue serves as a warning sign for the potential decline in future recurring revenue streams. When earnings surprises coincide with a decrease in deferred revenue relative to revenue, investors may interpret the surprises with less enthusiasm. This interpretation arises from the concern that the positive news may stem from prematurely recognizing future revenues, thus indicating a potential reduction in generating consistent cash flow in the future. Drawing from these observations, it is plausible that the more pronounced market response to earnings surprises exhibited by firms with recurring revenue might undergo downward adjustment if firms report a diminished level of future revenue indicators.

2.2 The Changing Earnings Management Landscape

Stein (1989) develops a theoretical validation of managerial myopic tendencies, including earnings management when managers hold a vested interest in stock prices, irrespective of market efficiency. As market participants shift their valuation attention towards the recurring portion of revenues, enterprises in associated industries could conceivably adapt their earnings management strategies to align with investor inclinations. In particular, management may manipulate both revenue and expenses.

Prior literature has extensively explored firms' engagement in earnings management using different means (Badertscher, 2011; Dechow & Skinner, 2000; McVay, 2006). Regarding opportunistic revenue recognition, previous literature has focused on firms' incentives to prematurely recognize deferred revenue in order to inflate reported revenue. For instance, Altamuro et al. (2005) found that firms subject to more stringent standards on premature revenue recognition exhibited reduced earnings management behavior to meet or surpass earnings benchmarks. Additionally, Zhang (2005) provided evidence suggesting that premature revenue recognition by software firms leads to more relevant

the recurring portion of revenue for the main tests of this paper. In the Online Appendix, Table A1, I test the correlation between RPO and deferred revenue to justify the validity of deferred revenue being a proxy for the future recurring portion of revenue.

¹²Available at: <https://www.maxio.com/blog/saas-revenue-modeling>. Accessed 04/06/2023

yet less reliable and persistent revenue reporting. While some studies have produced mixed results, prior research generally concludes that managers commonly engage in premature revenue recognition to achieve various benchmarks, although excessively strict regulations can result in less informative revenue reporting (Srivastava, 2014a). Recognizing the significance of revenue, regulatory bodies such as the SEC have considered premature revenue recognition a substantial concern (Turner, 2001).

However, the applicability of inflating reported revenue through premature recognition of future revenues may have changed for firms relying on recurring revenue streams in recent years. As discussed in subsection 2.1, firms adopting a recurring revenue business model generate a significant portion of their value in the future as a considerable portion of their revenues are deferred. Consequently, investors place greater emphasis on future recurring revenue rather than current revenue figures. By prematurely recognizing deferred revenue to inflate current revenue, the potential benefits of achieving a more positive valuation by meeting earnings benchmarks may be diminished due to the worsened future prospects. This potential adverse valuation effect may drive firms to refrain from engaging in premature recognition.

While firms relying on a recurring revenue business model may face limitations in inflating their revenues through premature recognition, they still possess strong incentives to meet or exceed earnings benchmarks in order to avoid potential financial market penalties (Call et al., 2022; Graham et al., 2005). Due to the nature of recurring revenue businesses, these firms are less inclined to engage in practices such as channel stuffing, as their products or services are provided on a subscription basis. Although firms in the subscription business industry could employ other forms of earnings management, such as sales pull-in, doing so would not only impact the margin of the current period but also affect margin projections for future recurring revenues. As discussed above, engaging in sales pull-in may adversely affect firms' valuation as the deteriorated margin is expected to persist in future periods.

Given that inflating revenues may have negative consequences for firms heavily reliant on recurring businesses, they may instead opt to reduce discretionary expenses

to meet and beat earnings benchmarks (Dechow & Sloan, 1991; Gunny, 2010; Stein, 1989). Previous literature has shown that firms view accrual-based and real earnings management as potential substitutes to achieve target earnings (Chan et al., 2015; Cohen & Zarowin, 2010), and survey evidence indicates that practitioners do engage in real earnings management to achieve certain targets (Graham et al., 2005). Moreover, firms can employ various methods to manage discretionary expenses, including actual reductions in investments (Graham et al., 2005) or excessive capitalization of expenses (Canace et al., 2018). As recurring revenue firms are more constrained in revenue management, they may engage in expenses management to a greater extent than firms with traditional business models.

3 Data and Sample

3.1 Data

To assess firms' reliance on businesses generating recurring revenue streams, a textual analysis of 10-K filings available on EDGAR from 2011 to 2020 is conducted. Processed 10-K filings provided by Loughran and McDonald (2016) are utilized, which involve the removal of tagged contents and replacement of non-textual symbols.¹³ The occurrence of the term "recurring", in conjunction with "revenue(s)" or "sale(s)" within a 20-word window is calculated.

This combination is chosen for two reasons. First, recurring revenue is a prevalent metric employed by investors to evaluate recurring firms. Therefore, firms often discuss their recurring portion of revenue in their 10-Ks. Appendix B, Panels a) and b), show two examples where Adobe Inc. and Cisco System Inc. discuss how they adapt their business models to increase the portion of recurring revenue in their 10-K filings. Moreover, requiring "revenue(s)" and "sale(s)" to be present within a certain window around "recurring" prevents mismeasurement by counting irrelevant occurrences of "recurring." For example, in Appendix B, Panel a), Adobe Inc. uses the word "recurring" in note 4 within the context of fair value measurement. Requiring the presence of "revenue(s)" and "sale(s)" increases the accuracy of the measure.

¹³See <https://sraf.nd.edu> for detailed approaches. I further remove stop words, numbers, header tags, and other non-textual content to achieve more accurate word count.

The count of qualified occurrences of “recurring” is labeled as $RecurringRev_{i,t}$. Furthermore, $RecurringRev_{i,t}$ is divided by the total word count of the corresponding 10-K to create the measure $\%RecurringRev_{i,t}$ to account for the increasing length of 10-K filings (Dyer et al., 2017). In this paper, I use $\%RecurringRev_{i,t}$ as the main measure of firms’ reliance on recurring business. The underlying assumption is that firms extensively discuss recurring revenues in their 10-Ks when more engaged in recurring revenue businesses.

For the valuation implications tests, firms’ earnings surprises and 3-day cumulative abnormal return (CAR) are obtained from CRSP and I/B/E/S. Following Ertimur et al. (2003), earnings (revenue) surprises are defined as the difference between actual earnings (revenues) per share and earnings (revenue) per share forecasts, divided by the share price at the end of the previous period.

To identify firms that are most likely to have managed their earnings, I follow the survey results of Call et al. (2022) and employ four benchmarks labeled as $MeetBeat_{i,t}$ to capture firms that are close to missing earnings benchmarks: the first and the last earnings guidance for the period, analyst consensus, and the same earnings from the previous year. According to Canace et al. (2018), if the difference between a firm’s actual EPS and its management guidance or analyst EPS forecasts falls between 0 and 0.01, the firm-year is considered to have strong earnings management incentives. Additionally, firm-years with a year-to-year change in net income divided by average assets between 0 and 0.005 are classified as having incentives to manage earnings (Burgstahler & Dichev, 1997; Caylor, 2010).

To estimate abnormal current deferred revenue ($abDRC_{i,t}$), abnormal long-term deferred revenue ($abDRLT_{i,t}$), and abnormal discretionary expenses ($abDISEXP_{i,t}$), the methodologies of Zha-Giedt (2018) and Roychowdhury (2006) are followed using data from COMPUSTAT. Abnormal deferred revenues and expenses are estimated at the industry-year level, requiring a minimum of 10 valid observations per industry-year for meaningful estimation. In combination with the aforementioned earnings management incentives dummy $MeatBeat_{i,t}$, these two sets of variables are used to investigate

whether recurring firms exhibit different earnings management incentives and patterns.

Firm fundamentals, including firm size ($Size_{i,t}$), market-to-book ratio ($MTB_{i,t}$), sales growth ($SalesGrowth_{i,t}$), institutional ownership ($InstOwn_Perc_{i,t}$), profitability (measured by return on assets $ROA_{i,t}$), leverage ($LEV_{i,t}$), and a dummy variable indicating whether the firm-year is audited by a BIG4 auditor ($BIG4_{i,t}$) are included. Additionally, I compute revenue volatility ($Rev_Vol_{i,t}$) using the following approach. I first scale quarterly revenue using the revenue of the same quarter of the previous year. Then, for each firm-quarter, I compute the standard deviation of the scaled revenue for the next 12 quarters. Lastly, the quarterly standard deviation is aggregated to the year level by taking the average standard deviation of the four quarters. By scaling revenue using the revenue of the same quarter of the previous year, I avoid biases introduced by the absolute magnitude of revenue and other potential denominators such as total assets. Furthermore, I compute the variable $OverFirm_{i,t}$ following Biddle et al. (2009) to capture firms' inclination to overinvest. This variable is generated by first sorting each firm-year's cash and leverage (multiplied by -1 before sorting) into deciles separately, and then calculating the average ranking of each firm-year. The final ranking is rescaled to (0,1).

In additional analyses, an alternative measure $Alt_Measure_{i,t}$ is used to capture firm's reliance on recurring revenue. I first count the occurrences of keywords including "subscription(s)", "subscriber(s)", "membership(s)", "SaaS", "BAAS", "IAAS", "PAAS", "Software as a Service", "Backend as a Service", "Infrastructure as a Service", "Platform as a Service", "Annual Recurring Revenue (ARR)", "Monthly Recurring Revenue (MRR)", "churn", and "cloud", and divide the number by the total word count of the respective filings. The alternative measure is more industry specific but potentially with lower Type II errors as firms mentioning these words are very likely operating with a recurring revenue model. As an example, in Appendix B, Panel c), VMWARE Inc. discusses their subscription and SaaS revenue mix in their 10-K filings.

Throughout all analyses, industry is defined at the 2-digit SIC level, and all continuous variables are winsorized at the 1% and 99% levels to address outliers. Firms

in regulated industries and financial institutions are excluded from the analysis due to their distinct regulations and earnings incentives (Canace et al., 2018). To facilitate the interpretation of the findings, the measure of reliance on recurring businesses and earnings management variables are standardized by subtracting the mean and dividing by the respective standard deviation.

3.2 Sample and Descriptive Statistics

The merged sample comprises 20,024 firm-years spanning from fiscal year 2010 to 2019, involving 3,541 distinct firms. The sample period commences in 2010 for two reasons: to mitigate the influence of the financial crisis and to capture the emergence of the subscription economy in recent years.¹⁴ Figure 1 visualizes the time trend of the variables $RecurringRev_{i,t}$ and $\%RecurringRev_{i,t}$ (multiplied by 10,000), which gauge the extent to which firms discuss recurring revenue in their 10-K filings. As depicted in the figure, both variables exhibit an upward trajectory from 2010 to 2019. The flatter slope of $\%RecurringRev_{i,t}$ suggests that part of the increase in $RecurringRev_{i,t}$ may be attributed to the overall increase in the length of 10-K filings in general (Dyer et al., 2017). This emphasizes the necessity of accounting for the total word count of 10-K filings. The ascending trends of both $RecurringRev_{i,t}$ and $\%RecurringRev_{i,t}$ reflect the growing prevalence of the subscription economy and corroborate the validity of the measure. These upward trends also underscore the importance of understanding firms' evolving behavior and incentives in the new economy.

Table 1 presents the ranking of all sectors based on the average $\%RecurringRev_{i,t}$ over the sample period. To enhance readability, $\%RecurringRev_{i,t}$ and $\%RecurringRev_{i,t}$ are multiplied by 10,000 in this table. The table also provides the percentage of firm-years in each sector that have discussed recurring revenue in their 10-K filings ($\%RecurringFirmYear_j$), as well as the percentage of firm-years in each sector within the entire sample ($\%FirmYear_j$). The top three industries ranked by the average

¹⁴“Companies such as Amazon, Google, and Microsoft introduced their cloud-based software between 2006 and 2010 [...]” Available at: <https://casetext.com/case/city-of-sunrise-firefighters-pension-fund-v-oracle-corp-1>. Accessed 06/07/2023.

$\%RecurringRev_{i,t}$ are Information, Professional, Scientific, and Technical Services, and Administrative, Support, and Waste Services. These industries typically offer services over extended periods, allowing firms in these sectors to adopt business models that generate recurring revenue. In the Information Sector, 56.42% of firm-years have discussed recurring revenue in their annual filings, significantly higher than that of the second-ranked Professional Services sector (%46.05). Conversely, sectors with lower rankings in terms of $\%RecurringRev_{i,t}$, such as Mining, Repair Services, and Transportation, typically offer products and services that are less recurring in nature. Overall, these descriptive statistics align with anecdotal evidence regarding the trend of and industries with a higher reliance on subscription businesses, further validating the measure.

Table 2 presents descriptive statistics for the variables. On average, firms mention the term “recurring” 3.696 times in their annual filings ($Recurring_{i,t}$). However, as illustrated in the above, simply counting the occurrences of “recurring” does not precisely capture the reliance on recurring revenue, as firms also use the term for other purposes. Therefore, it is necessary to require the presence of the words “revenue(s)” or “sale(s)” within a 20-word window around “recurring”. By imposing this restriction, the average occurrence becomes 0.770 ($RecurringRev_{i,t}$). Over 50% of 10-K filings do not include a qualified occurrence of “recurring,” whereas the variable $RecurringRev_{i,t}$ takes a value of 1 at the 75th percentile. This indicates that the number of qualified occurrences is lower than the mere count of “recurring.” After dividing $RecurringRev_{i,t}$ by the total word count of the respective 10-K filing to account for the increasing length of 10-K filings (Dyer et al., 2017), the main measure for firms’ reliance on recurring businesses is obtained - $\%RecurringRev_{i,t}$.

As for the alternative measure, the mean of $Alt_Measure_{i,t}$ is greater than the main measure $\%RecurringRev_{i,t}$, primarily due to the inclusion of more keywords. However, since these keywords are concentrated in specific industries such as the information industry, the standard deviation of the alternative measure is also greater.

When employing different benchmarks to define $MeatBeat_{i,t}$, there are varying

percentages of firms that come close to missing their earnings targets. In the sample, 2.5% of firm-years are near missing their first earnings guidance issued during the period, while 14.6% of firm-years in the sample meet or slightly exceed analyst consensus. This difference underscores the importance of validating the results using different benchmarks.

4 Empirical Design and Results

4.1 Validation of Measures

4.1.1 Correlation with Deferred Revenue

The alignment between the recurring revenue business reliance measure $\%RecurringRev_{i,t}$ and the underlying business model it intends to capture is supported by both the time trend plot [Figure 1](#) and the industry descriptives [Table 1](#). In order to validate the measure more rigorously, I conduct two sets of empirical tests. In this section, I present the first set of validation test: the correlation between the reliance measure $\%RecurringRev_{i,t}$ and firms' deferred revenues.

Since businesses with recurring revenue often span multiple periods and firms therefore have to defer a significant proportion of their revenues to future periods, these firms are more likely to exhibit higher deferred revenue. To examine whether the measure $\%RecurringRev_{i,t}$ is positively correlated with firms' deferred revenue, I employ the following regression model:

$$Y_{i,t} = \beta_1 MEASURE_{i,t} + \beta_2 Controls_{i,t} + \sigma_i + \gamma_t + \epsilon_{i,t}, \quad (1)$$

Where $Y_{i,t}$ represents current, long-term, or total deferred revenue scaled by total assets. The variable $MEASURE_{i,t}$ represents four different measures that capture firms' reliance on a recurring revenue business model, namely $Recurring_{i,t}$, $RecurringRev_{i,t}$, $\%Recurring_{i,t}$, or $\%RecurringRev_{i,t}$. Among these four measures, I hypothesize that $\%RecurringRev_{i,t}$ best captures firms' reliance on recurring revenues since it excludes instances of "recurring" unrelated to revenues and considers the entire length of respective filings. All continuous variables are winsorized at the 1% and 99% levels, and

control variables include $Size_{i,t}$, $ROA_{i,t}$, $MTB_{i,t}$, $LEV_{i,t}$, $BIG4_{i,t}$, $InstOwn_{perc_{i,t}}$, and $SalesGrowth_{i,t}$. To facilitate interpretation, all $MEASURE_{i,t}$ and $Y_{i,t}$ variables are standardized.

The results are presented in Table 3, where Panel A displays the findings using the two scaled measures ($\%Recurring_{i,t}$ and $\%RecurringRev_{i,t}$) as independent variables, and Panel B shows the results using the two unscaled measures. As depicted in Panel A, $\%Recurring_{i,t}$ does not show any correlation with the deferred revenue measures, whereas $\%RecurringRev_{i,t}$ exhibits a strong association with all three deferred revenue measures, even after controlling for firm and year fixed-effects.¹⁵ In Panel B, simply counting the occurrence of “recurring” ($Recurring_{i,t}$) fails to capture firms’ reliance on recurring businesses. Conversely, the number of occurrences of the word “recurring” in proximity to revenue-related words is strongly linked to long-term and total deferred revenue, although the association with current deferred revenue is not statistically significant. These findings align with the anecdotal evidence presented in Appendix B, Panel a), which demonstrates that solely counting occurrences of “revenue” may include words that are irrelevant to firms’ business models. The tests conducted in this section confirm that the measure $\%RecurringRev_{i,t}$ exhibits the strongest association with deferred revenue, thereby validating its use.

4.1.2 Annual Recurring Revenue

In order to delve deeper into firms’ recurring revenue patterns and to provide further validation for my reliance measure, I hand-collect firms’ voluntary disclosure of annual recurring revenue (ARR) from their conference call transcripts. ARR, a prevalent metric in the subscription business valuation, offers a standardized annual representation of recurring revenue’s value. While ARR itself cannot be employed as the measure of firms’ reliance on the recurring revenue model within the study due to limited disclosure, the correlation between $\%RecurringRev_{i,t}$ and ARR serves to affirm the primary measure’s validity.

¹⁵The inference remain valid using industry and year fixed effects, year fixed effects only, and no fixed effect.

I restrict the sample to earnings call of Q4 among all my sample firms and identify instances where firms disclosed their ARR amounts. First, to capture firms' decision to disclose the ARR metric, I created a dummy variable ($ARR_Disclosure_{i,t}$) that takes a value of 1 if firm i has disclosed its ARR metric in year t . I hypothesize that recurring firms are more likely to disclose ARR, as the metric is of interest to investors of these firms and is less relevant for non-recurring firms. Next, I dived deeper into the intensive margin and calculated $ARR_Perc_{i,t}$ by dividing the ARR by the sales of the corresponding firm-year, thereby capturing the percentage of revenues deemed recurring. As shown in [Table 2](#), firms disclosing ARR, on average, attribute 52% of their annual revenue as recurring in future periods. The interquartile range spans from 12% at the 25th percentile to a significant increase of 80.4% at the 75th percentile, underscoring substantial disparities in reliance levels. This variance indicates the necessity of employing a continuous measure, rather than a binary one, to effectively encapsulate firms' reliance on recurring revenues.

In the analyses tabulated in [Table 3](#), Panel C, I find that the reliance measure $\%RecurringRev_{i,t}$ is significantly positively correlated with both firms' propensity of ARR disclosure and ARR percentage. The findings indicate that the $\%RecurringRev_{i,t}$ captures firms' continuous reliance on recurring revenues. Together, these tests validate the use of $\%RecurringRev_{i,t}$ as the continuous measure of firms' reliance on the recurring revenue model.

The analysis, as presented in [Table 3](#), reveals that the reliance measure $\%RecurringRev_{i,t}$ demonstrates a significant and positive correlation with both firms' ARR percentages and the tendency to disclose ARR. These findings collectively signify that $\%RecurringRev_{i,t}$ accurately captures firms' continuous reliance on recurring revenues. Thus, these tests substantiate the utilization of $\%RecurringRev_{i,t}$ as the continuous measure of firms' dependence on the recurring revenue model.

4.2 Characteristics of Recurring Revenue Firms

In previous sections, descriptive statistics reveal a notable surge in the adoption of the recurring revenue model in the past decade, with concentration in certain industries. Subsequently, I investigate the characteristics of recurring firms after controlling for

year and industry fixed effects. The outcomes of this analysis not only offer valuable insights into the characteristics of recurring revenue firms but also establish a fundamental groundwork for comprehending the valuation implications intrinsic to this business model.

The following characteristics are examined. I first investigate whether firms more reliant on recurring revenues exhibit more persistent revenues for two reasons: to further validate the measure and to provide one mechanism through which the greater market reaction to be studied in following sections could be justified. I follow previous literature's measure of volatility (e.g., Dichev and Tang (2009) and Li (2008)) and make adjustments to capture the size effect. More specifically, instead of using the standard deviation of absolute revenues, I scale quarterly revenue by that of the same quarter of the last fiscal year and compute its standard deviation using the next 12 quarter data. I then aggregate the quarterly standard deviation into yearly measure by taking the mean. By scaling the quarterly revenue using the comparable-quarter revenue, I rule out the size effect and avoid noises caused by other potential denominators, such as total assets.¹⁶

Also, I look into whether recurring revenue firms are less inclined to overinvest, as the persistent revenues should enable recurring firms to allocate resources more efficiently, leading to more promising growth prospect. I follow Biddle et al. (2009) and measure firms' inclination to overinvest using the average ranked variable of cash and leverage of firms. Along the line, I further add firm profitability as measured by return on asset (ROA) to examine whether recurring revenue firms are more profitable. Moreover, I investigate whether market participants consider recurring firms as growth or value firms by examining the market-to-book ratio (MTB). Lastly, firm age and size are included.

Results are shown in Table 4. Each characteristic is examined separately from column (1) to (6), and column (7) includes all variables into a single regression. All continuous variables are standardized to assist interpretation. I find that firms more reliant on recurring revenues exhibit less volatile future revenue, which is consistent with the nature of the business model and further validates the reliance measure. Moreover, they are less inclined to overinvest, potentially suggesting investment efficiency benefits of the recurring

¹⁶The inference remains unaffected if using standard deviations of revenue as the measure of revenue volatility.

revenue model. I also find that while recurring revenue firms have greater profitability and are often considered to be growth firms, they are not bigger in size and older in age. Instead, they are on average younger and smaller firms. The findings indicate that the greater revenue persistence and profitability are less likely a consequence of the size and maturity of the firm, but rather associated with the business model.

In this section, the findings provide insights into the attributes of recurring firms. Furthermore, these results offer validation for the reliability of the reliance measure. Additionally, they offer compelling reasons for the elevated valuation multiples and enhanced ERC observed among recurring revenue firms, as examined in the subsequent section.

4.3 Valuation Implications of Recurring Revenue Business

In this section, I examine the valuation implications of the recurring revenue model. As discussed in [subsection 2.1](#), recurring firms may yield higher multiples and elicit a stronger market reaction to earnings (revenue) surprises. This could be attributed to the persistence of their revenue stream and the likelihood of sustaining high profit margins in the future.

To begin, I employ a simple regression to investigate whether firms embracing the recurring revenue model garner larger multiples compared to their industry peers. Unless otherwise specified, all subsequent analyses control for firm size ($Size_{i,t}$), market-to-book ratio ($MTB_{i,t}$), sales growth ($SalesGrowth_{i,t}$), institutional ownership ($InstOwn_Perc_{i,t}$), auditor type ($BIG4_{i,t}$), profitability ($ROA_{i,t}$), and capital structure ($LEV_{i,t}$). Furthermore, this model takes into account industry and year fixed effects. The outcome variables are revenue multiples ($Rev_Multiple_{i,t}$) and EBITDA multiples ($EBITDA_Multiple_{i,t}$). The two variables are derived by dividing the enterprise value by the respective element (revenues or EBITDA).

Results are tabulated in [Table 5](#), Panel A. Compared to industry peers, firms more reliant on recurring revenue models receive both greater revenue multiples and EBITDA multiples. On average, one standard deviation increase in the recurring revenue reliance is associated with an increase in revenue multiple of 0.083 and an increase in EBITDA

multiple of 0.109. The findings are consistent with the observation that subscription business gain high valuation in the stock market.

Next, To explore whether the market response to earnings surprises is more pronounced for firms with recurring revenue, I examine how the earnings response coefficients (ERC) change as firms increasingly rely on the recurring business model. The regression model employed is as follows:

$$Y_{i,t} = \beta_1 UX_{i,t} + \beta_2 \%RecurringRev_{i,t} + \beta_3 UX_{i,t} \times \%RecurringRev_{i,t} + \beta_4 Controls_{i,t} \sigma_j + \gamma_t + \epsilon_{i,t}, \quad (2)$$

In equation (2), UX is defined as either earnings (SUE) or revenue (SUR) surprises. The coefficient of interest is β_3 , which captures how the ERC changes as firms' reliance on recurring revenues increases. Consistent with Ertimur et al. (2003), the measure of earnings (revenue) surprises is calculated as the difference between the actual and the analyst consensus earnings (revenue) per share, scaled by the lagged price per share. Abnormal return ($Y_{i,t}$) is measured by the 3-day cumulative abnormal return ($CAR_{i,t}$) around firm i 's earnings announcement in year t .

In the subsequent analyses, the interaction between earnings surprises and the variable $Decrease_DR_{i,t}$ is examined to investigate whether a low level of deferred revenue compared to industry peers affects the market's reaction to earnings (revenue) surprises:

$$Y_{i,t} = \beta_1 SUE_{i,t} + \beta_2 \%RecurringRev_{i,t} + \beta_3 SUE_{i,t} \times \%RecurringRev_{i,t} + \beta_4 Decrease_DR_{i,t} + \beta_5 Decrease_DR_{i,t} \times SUE_{i,t} + \beta_5 Decrease_DR_{i,t} \times \%RecurringRev_{i,t} + \beta_6 SUE_{i,t} \times \%RecurringRev_{i,t} \times Decrease_DR_{i,t} + \beta_7 Controls_{i,t} + \sigma_j + \gamma_t + \epsilon_{i,t}, \quad (3)$$

In model (3), $Decrease_DR_{i,t}$ is a dummy variable that takes the value of 1 if the ratio of deferred revenue divided by total assets for firm i in year t belongs to the lowest

tercile of the respective industry, and 0 otherwise. This test aims to examine whether the positive effect of firms' reliance on recurring businesses on ERCs is mitigated by a downward adjustment in future recurring revenue expectations. The sign of β_6 is expected to be negative if investors consider deferred revenue as an indicator of future revenue and react to a lesser extent to earnings surprises if the future revenue prospect is bad.

To assess the valuation implications of recurring revenue business models for firms within the same industry and to mitigate the influence of temporal variations, industry and year fixed effects are included in the analyses. All control variables are included in the model (2) and (3). To aid interpretation, $\%RecurringRev_{i,t}$ is standardized by subtracting the mean and dividing by the standard deviation of the variable itself. When using revenue surprises as the independent variable, I additionally control for expenses surprises of the period.

The results are presented in [Table 5](#). Panel B, Columns (1) and (2) display the outcomes of equation (2) using revenue and earnings surprises as the independent variables, respectively. Consistent with discussion in [subsection 2.1](#), the findings reveal that the market exhibits a stronger reaction to both earnings and revenue surprises when firms incorporate more recurring revenue businesses compared to their industry peers. Specifically, a one standard deviation increase in $\%RecurringRev_{i,t}$ is associated with a 0.057 (0.09) increase in the ERC for earnings (revenue) surprises.

The results of regression (3) are presented in columns (3) and (4). After controlling for earnings (revenue) surprises and firms' reliance on recurring businesses, the ERCs for earnings (revenue) surprises, as measured by 3-day CAR, decreases by 0.148 (0.200) when the firm reports a low level of deferred revenue ratio. This magnitude of the ERC decrease more than offsets the positive effects of firms' reliance on recurring revenue business model on ERC. These findings indicate that investors consider the reported levels of deferred revenues as an important signal of the future persistence of earnings (revenue) surprises from recurring businesses. Consequently, market participants largely discount the value of earnings (revenue) surprises if the deferred revenue level is low.

This section's results demonstrate that investors attach higher multiples to recurring

revenue firms and react more strongly to earnings surprises from recurring revenue business firms. However, the market assigns less value to earnings surprises when there is a decrease in the proxy for future recurring revenue streams. These findings indicate that while the stock market favors the recurring revenue model, market participants emphasize the potential for future recurring revenue over present performance. These valuation implications provide incentives for such firms to adopt distinct earnings management strategies, deviating from those indicated by prior literature - a subject explored in subsequent sections.

4.4 The Changing Earnings Management Incentives

Associated with the valuation focus explored in [subsection 4.3](#), recurring firms have incentives to avoid prematurely recognizing deferred revenue, as such premature recognition would compromise deferred revenue and therefore lead to a downward evaluation of their earnings surprises by the market. In this section, I investigate recurring firms' changing earnings management incentives. Building on the discussion in [subsection 4.3](#), I propose that, contrary to conventional belief, recurring firms are less likely to prematurely recognize deferred revenue when they are close to earnings benchmarks. This shift in behavior could be associated with the emergence of valuation metrics that prioritize future revenue streams over current reported revenue. As a result, when faced with incentives to manage earnings to meet benchmarks (Call et al., [2022](#); Graham et al., [2005](#)), recurring firms are more inclined to engage in discretionary expense management. Model (4) is employed to examine firms' earnings management choices:

$$EM_{i,t} = \beta_1 MeetBeat_{i,t} + \beta_2 \%RecurringRev_{i,t} + \beta_3 MeetBeat_{i,t} \times \%RecurringRev_{i,t} + \beta_4 Controls_{i,t} + \sigma_i + \gamma_t + \epsilon_{i,t}, \quad (4)$$

where the variable $MeetBeat_{i,t}$ is a dummy variable that takes a value of 1 if firm i 's earnings in year t are equal to or slightly higher than one of the four benchmarks: the

first and last earnings guidance issued in the period, analyst consensus, and the net income of the previous period (Call et al., 2022). Consistent with prior literature, it is assumed that firms reporting small positive amounts of earnings exceeding the benchmarks are more likely to have engaged in earnings management (Canace et al., 2018; Caylor, 2010). To capture which line items firms have managed to meet or beat earnings benchmarks, I estimate the earnings management of firms ($EM_{i,t}$) using models developed by previous studies, including abnormal discretionary expenses (Roychowdhury, 2006), abnormal current deferred revenue, and abnormal long-term deferred revenue (Zha-Giedt, 2018).¹⁷ Therefore, the coefficient β_3 captures the influence of firms' reliance on recurring revenue businesses on their earnings management strategies to meet or surpass earnings benchmarks.

I standardize the key variables of interests, $EM_{i,t}$, to facilitate the interpretation of findings. Additionally, the analysis controls for firm size ($Size_{i,t}$), market-to-book ratio ($MTB_{i,t}$), sales growth ($SalesGrowth_{i,t}$), institutional ownership ($InstOwn_Perc_{i,t}$), auditor type ($BIG4_{i,t}$), profitability ($ROA_{i,t}$), and capital structure ($LEV_{i,t}$). Furthermore, firm- and year-fixed effects are included to account for firm-specific factors that remain constant over time and general time trends that may influence firms' earnings management behavior.

The results of the analysis are presented in Table 6, which includes four panels utilizing different benchmarks to define firms that are close to earnings benchmarks. In column (1), abnormal discretionary expenses are used as the outcome variable, while columns (2), (3), and (4) utilize total, current, and long-term abnormal deferred revenue as outcome variables, respectively. The findings consistently demonstrate that firms with a higher reliance on recurring businesses defer more revenues into the future rather than prematurely recognizing them to meet earnings benchmarks, contrary to the assumptions and conclusions made in prior literature (e.g. Altamuro et al., 2005; Zhang, 2005).

For instance, when using the first earnings guidance of the period as the benchmark in

¹⁷The two stage approach that uses residuals as dependent variables may lead to incorrect inferences in certain circumstances, as discussed in Chen et al. (2018). Following Chen et al. (2018), I run a single stage regression including the first and the second stage regressors to eliminate the bias. The results are tabulated in Online Appendix, Table A2, and the inference remains consistent.

Panel A, a one standard deviation increase in the measure of firms' reliance on recurring revenue business is associated with a 0.166 standard deviation increase in their total abnormal deferred revenue. Although the coefficient on combined abnormal deferred revenue is insignificant when using the net income of the last period as the benchmark in Panel D, a one standard deviation increase in the measure of firms' reliance on recurring businesses is associated with a 0.070 standard deviation increase in current abnormal deferred revenue when firms are close to the benchmark. These results indicate that while recurring firms have more room to prematurely recognize revenue, they opt to defer more revenues when having strong earnings management incentives. This finding, combined with the results from Section 4.2, suggests that firms may choose to increase the recurring portion of their revenue in an attempt to enhance their valuation, despite their underwhelming performance.

Column (1) of the four panels presents the results of testing recurring firms' expense management incentives. Given that firms close to earnings benchmarks do have incentives to manage earnings (Call et al., 2022; Graham et al., 2005), and inflating revenues by prematurely recognizing deferred revenue is no longer a viable option for firms reliant on recurring revenue business, cutting discretionary expenses becomes the next viable alternative.¹⁸ With the exception of the last earnings guidance benchmark, firms with a higher reliance on recurring businesses consistently exhibit evidence of reducing discretionary expenses when they are close to the benchmark. For example, a one standard deviation increase in the measure of recurring revenue business reliance for firms on the verge of missing the first earnings guidance benchmark is associated with a 0.053 standard deviation decrease in reported abnormal expenses. These findings align with prior literature, which suggests that firms resort to real earnings management tactics when accrual earnings management is constrained (Srivastava, 2014a).

Overall, the results of this section support the discussion in subsection 2.2. When recurring firms are near missing their earnings targets, they are not more likely to

¹⁸As discussed in Section 2, firms can also engage in channel stuffing or sales pull-in to inflate the current period revenues as an alternative. In section 5.1, I perform additional test to rule out the statement that firms more reliant on these alternatives of inflating revenues to achieve earnings targets.

prematurely recognize deferred revenue due to the negative impact it would have on their valuation, as illustrated in Section 4.2. In contrast, they choose to defer even more revenue, possibly in an effort to achieve a higher valuation. Moreover, they engage in real earnings management by cutting discretionary expenses to meet earnings benchmarks. These findings contradict the conclusions of previous studies that indicate firms in the software industry prematurely recognize deferred revenue to meet earnings benchmarks (Altamuro et al., 2005; Zhang, 2005). The emergence of valuation metrics that place greater emphasis on future revenue streams rather than the current revenue figure may be driving this change in behavior.

5 Additional Analyses and Robustness Tests

5.1 Revenue Management

In Section 4, I present evidence that recurring firms are not more likely to engage in premature revenue recognition when they are close to earnings targets, contrary to prior literature and regulators' concern (Altamuro et al., 2005; Turner, 2001; Zhang, 2005). Instead, these firms defer more revenues into the future and cut discretionary expenses when they have stronger earnings management incentives. However, it is important to consider alternative mechanisms through which firms can manage revenues to achieve earnings targets, such as channel stuffing or sales pull-in. While firms with recurring revenue business models are less likely to employ such practices, it is necessary to empirically examine this possibility.

To address this concern, I conduct further tests to investigate the changes in profit margin and abnormal accounts receivables of recurring revenue business firms when they are close to the benchmarks. If firms are involved in channel stuffing or similar activities, revenues may be inflated through accounts receivables, while sales pull-in would lead to a decrease in profit margin. To test this alternative mechanism, I re-estimate model (4) by replacing the outcome variable with profit margin and abnormal accounts receivables, as estimated following Zha-Giedt (2018).¹⁹

¹⁹The inference remains unchanged if using abnormal accounts receivable model developed by Stubben (2010).

The results are presented in [Table 7](#). Panel A displays the findings for profit margin, while Panel B focuses on abnormal accounts receivables. All four earnings benchmarks are examined in columns (1) to (4). Panel A shows no consistent evidence that firms reliant on recurring revenue experience a decrease in profit margins when they are close to missing the earnings benchmark, indicating that they are not engaging in more sales pull-in compared to firms with lower reliance on recurring businesses. In Panel B, there is no statistically significant evidence suggesting that recurring business firms inflate their accounts receivables through channel stuffing or similar practices to manipulate reported revenues more than non-recurring business firms.

In summary, the results indicate that recurring business firms are not inflating their revenues through channel stuffing or sales pull-in more than non-recurring business firms when close to earnings benchmarks. Therefore, the abnormal increase in deferred revenue observed in [Section 4.3](#) is unlikely to be a result of recurring firms' efforts to artificially boost reported revenues. Furthermore, these findings support the notion that recurring business firms are more inclined to reduce discretionary expenses rather than engage in revenue inflation.

5.2 Analyst Coverage and the Earnings Management Incentives

In this section, I conduct a cross-sectional analysis to investigate the influence of a better information environment, as proxied by analyst coverage, on recurring firms' earnings management behaviors when they are close to earnings targets. Specifically, I examine how analyst coverage may affect two activities: cutting discretionary expenses and deferring revenues. It is unclear *a priori* how firms with recurring revenue business models would adapt their earnings management behaviors in response to analyst coverage, as there are two contradictory forces at play. On one hand, firms may reduce their levels of earnings management due to the monitoring role performed by analysts ([Yu, 2008](#)). On the other hand, greater analyst coverage may incentivize firms to engage in real earnings management tactics to meet or exceed earnings benchmarks ([Irani & Oesch, 2016](#)). Therefore, empirical analysis is necessary to determine whether analyst coverage can discipline or amplify earnings management behaviors of recurring business firms.

To examine the impact of analyst coverage, I introduce an analyst coverage component into model (4) and estimate the following regression equation:

$$\begin{aligned}
EM_{i,t} = & \beta_1 MeetBeat_{i,t} + \beta_2 \%RecurringRev_{i,t} + \beta_3 MeetBeat_{i,t} \times \%RecurringRev_{i,t} \\
& + \beta_4 AnalystCoverage_{i,t} + \beta_5 AnalystCoverage_{i,t} \times MeetBeat_{i,t} \\
& + \beta_6 AnalystCoverage_{i,t} \times \%RecurringRev_{i,t} \\
& + \beta_7 AnalystCoverage_{i,t} \times \%RecurringRev_{i,t} \times MeetBeat_{i,t} \\
& + \beta_8 Controls_{i,t} + \sigma_i + \gamma_t + \epsilon_{i,t},
\end{aligned} \tag{5}$$

The results of the analysis are presented in [Table 8](#), where all four earnings benchmarks are considered, and the outcome variables are abnormal discretionary expenses, abnormal current deferred revenue, and abnormal long-term deferred revenue in the three Panels. The variable $MeetBeat_{i,t}$ is defined differently in each column, representing meeting or beating the first and last earnings guidance, analyst consensus, and last year's performance, respectively. The variables $\%RecurringRev_{i,t}$ and abnormal line items are standardized to facilitate interpretation.

Panel A of [Table 8](#) displays the results for standardized abnormal discretionary expenses. Consistently across all four benchmarks, while holding other measures constant, an increase in analyst coverage is associated with an approximate 0.005 standard deviation increase in reported abnormal discretionary expenses. These findings provide evidence supporting the notion that analyst coverage can mitigate firms' engagement in real earnings management practices (Yu, 2008).

Panels B and C of [Table 8](#) present the results for abnormal current and long-term deferred revenue, respectively. In Panel B, an increase in analyst coverage is associated with greater abnormal current deferred revenue for recurring firms when they are close to all earnings benchmarks, except for the earnings change benchmark in column (4). The results for abnormal long-term deferred revenue in Panel C show less consistent patterns. The association between abnormal long-term deferred revenue and analyst

coverage is mostly statistically insignificant, and there are contradictory signs when using the first-issued guidance and last year's earnings as benchmarks. Overall, the findings indicate that when analyst coverage increases, recurring business firms are more likely to defer even more revenue as current deferred revenue, even when they are already close to missing the benchmark. This behavior may be attributed to recurring business firms aligning with analysts' preference for future revenue streams over the current revenue figure. In situations where performance is unsatisfactory, increasing the proportion of recurring revenue may be a strategy employed by these firms to enhance their valuation.

In conclusion, the findings are consistent with the notion that greater analyst coverage can mitigate the real earnings management behavior of cutting discretionary expenses by recurring business firms and encourage them to defer more abnormal revenues, thereby securing a higher valuation. These results align with the findings presented in section 4.2, which indicate that the market can discern revenue increases resulting from premature recognition of deferred revenue. As a result, recurring business firms opt to defer even more revenues to enhance their valuation when overall performance is less satisfactory.

5.3 Robustness Tests

To validate the findings presented in the previous sections, I perform four sets of robustness tests. First, I employ entropy balancing to address concerns that factors other than the choice of business model may influence firms' valuation and earnings management behavior. Secondly, as an alternative approach, I examine whether the patterns of earnings management change after mergers and acquisitions (M&A) where non-recurring firms acquiring recurring businesses. Additionally, I construct an alternative measure of firms' reliance on recurring businesses and assess whether the main conclusions remain robust. Lastly, I analyze a subsample consisting only of observations with a non-zero value for $\%RecurringRev_{i,t}$ to explore potential biases arising from zero values and non-linear relationships between dependent and independent variables.

Considering the possibility that recurring business and non-recurring business firms may differ in various aspects, I employ entropy balancing to create a more balanced sample. I include all control variables in the balancing procedure: firm size,

market-to-book ratio, sales growth, institutional ownership percentage, auditor type, profitability, and leverage. The sample is then reweighted based on the results of entropy balancing. Table 9 presents the outcomes of entropy balancing based on the continuous variable $\%RecurringRev_{i,t}$. Although the magnitude of firms' earnings management diminishes compared to the unmatched sample, the inferences drawn from the analysis remain robust after entropy balancing, supporting the conclusion that firms' earnings management incentives change over time.

As the second robustness test, I employ an alternative methodology to examine the impact of adopting recurring revenue business models on firms' earnings management behavior. Specifically, I identify M&A transactions that occurred during the sample period involving both parties from my sample firms. Moreover, I require that the acquirer did not previously report recurring revenues (qualified acquirer), while the acquiree did discuss recurring revenue prior to the M&A (qualified acquiree). I then utilize the M&A event as a shock to investigate how the qualified acquirer's earnings management patterns change following the merger or acquisition of a recurring firm. Due to the smaller sample size, I focus solely on analyst consensus as the earnings benchmark for this particular test. The following regression is employed to conduct this robustness analysis:

$$EM_{i,t} = \beta_1 MeetBeat_{i,t} + \beta_2 Post_Acquire_{i,t} + \beta_3 MeetBeat_{i,t} \times Post_Acquire_{i,t} + \beta_4 Controls_{i,t} + \sigma_i + \gamma_t + \epsilon_{i,t}, \quad (6)$$

Where $Post_Acquire_{i,t}$ is a dummy variable taking value of 1 if a qualified acquirer i has acquired a qualified acquiree in or before year t , and zero otherwise. Firm and year fixed effects, as well as other control variables are controlled for.

The results are presented in Table 10. The results in columns (1) indicate that non-recurring business firms, after acquiring a firm with a recurring business model, reduce their discretionary expenses when they are close to the earnings benchmarks. Although the coefficient on the interaction term between $Post_Acquire_{i,t}$ and $MeetBeat_{i,t}$ is not statistically significant in columns (2), the positive signs suggest that non-recurring

revenue business firms do not exhibit more premature revenue recognition behavior after acquiring a recurring revenue business firm, as suggested by prior literature (Altamuro et al., 2005; Zhang, 2005). Overall, the results suggest that becoming more reliant on recurring revenue businesses drives firms to cut more discretionary expenses and does not lead to more premature revenue recognition, as documented in earlier studies.

The second set of robustness tests employs two alternative measures of firms' reliance on recurring revenue. The first alternative measure is obtained by counting the occurrence of alternative words, including "subscription(s)", "subscriber(s)", "membership(s)", "SaaS", "BAAS", "IAAS", "PAAS", "Software as a Service", "Backend as a Service", "Infrastructure as a Service", "Platform as a Service", "Annual Recurring Revenue (ARR)", "Monthly Recurring Revenue (MRR)", "churn", and "cloud" in each 10-K filing, and divide the number by the total word count of the respective 10-K. Compared to the measure used in the main analyses, the alternative word list is more industry-specific and captures only words that are directly related to subscription businesses and prevalent valuation metrics, thereby reducing the potential Type-II error in the original measure while subject to lower power.

I repeat model (4) using the alternative measure and tabulated results in Table 11. The four earnings benchmarks introduced before are used in Panel A to Panel D, respectively. Using earnings guidance and last year's earnings as earnings benchmark, greater reliance on recurring revenues as measured by the alternative metric is associated with more evident cutting discretionary expenses behavior. Moreover, for firms close to missing their own guidance, a standard deviation increase in $Alt_{Measure}_{i,t}$ is associated with 0.0376 standard deviation increase in abnormal deferred revenue, suggesting no premature recognition of firms engaged in recurring revenue business. Overall, the findings are consistent with those using the main measure: recurring firms tend to cut more discretionary expenses when close to earnings benchmarks, while they are not more likely to engage in prematurely recognizing revenues.

The second alternative measure (*Recurring_Score*) assigns a score from 0 to 3 to each firm-year based on the occurrence of qualified "recurring" (*RecurringRev*), instead of the

scaled variable $\%Recurring_Rev$. Following Chen and Srinivasan (2023), firm-years that did not have qualified “recurring” in the 10-K filing receive a value of 0 as their recurring score. For firm-years with qualified “recurring”, I classified observations into terciles, and firm-years in the bottom, middle, and top tercile are assigned a value of 1, 2, and 3 as their recurring score. This alternative measure is designed to mitigate the concern that the main findings are driven by the denominator (the total word count of 10-K filings) of the main measure, instead of its numerator. To account for the increasing length of 10-K filings (Dyer et al., 2017), I additionally control for the total length of 10-K filings in this set of analyses.

The model (4) is tested using the recurring score as the outcome variable, and the results are tabulated in Table 12. The inference remains the same as in Table 6: Recurring firms report more abnormal deferred revenue when close to earnings benchmarks, instead of deferring more revenue to inflate earnings. Rather, they turn to cutting discretionary expenses to meet earnings benchmark. However, the discretionary expenses results are weaker than the main test shown in Table 6, as the coefficients in column (5) and (6) are insignificant. However, the sign of the two coefficients remains negative.

Lastly, since around 75% of the annual filings in my sample do not contain a qualified occurrence of “recurring”, the linear relationship between the recurring revenue reliance measure and outcome variables may be questionable. As the last robustness check, I keep only annual filings with the qualified occurrence of “recurring” and rerun model (4). I show the results in Table 13. The results are qualitatively similar to that of the main test presented in Table 13, with recurring firms deferring more revenues and cutting more discretionary expenses when about to miss earnings benchmarks. The findings suggest that the earlier findings are not a result of the distorted linear relationship between the reliance measure and outcome variables.

6 Conclusion

In this paper, I examine how recurring firms demonstrate distinct earnings management incentives compared to what has been documented in previous literature, affected by the emergence of valuation metrics that emphasize future revenue over

current reported revenue. The findings indicate that recurring firms are not more inclined to engage in premature revenue recognition, contrary to the findings of previous literature (Ali & Zarowin, 1992; Zhang, 2005). In contrast, they tend to cut discretionary expenses when they are approaching earnings benchmarks and also choose to defer even more revenue in an attempt to achieve a higher valuation. Importantly, the increase in abnormal deferred revenue is not due to inflating total revenue through real earnings management, but rather reflects an effort to enhance valuation despite disappointing performance. Consistently, I find that analyst coverage amplifies firms' incentives to defer revenues while deterring real earnings management practices related to cutting discretionary expenses.

This study contributes to the literature and has practical implications for both researchers and practitioners. It adds to the understanding of earnings management by providing empirical evidence that firms selectively manage different line items based on investors' valuation metrics, which is contingent on firms' specific business models. This phenomenon, not previously documented in the literature, underscores the need to update our understanding of earnings management incentives in light of the evolving economy. Moreover, by highlighting the shifting landscape of earnings management, the study offers an explanation for the changing nature of earnings quality, beyond the factors previously identified in the literature (Srivastava, 2014b). Moreover, it shows that the preference for managing specific line items may also contribute to the observed changes in earnings quality if the measurement of earnings quality is not adapted in a timely manner.

The findings have practical implications for regulators, investors, and other stakeholders. For regulators, the results suggest the importance of standardizing the definition of relevant measures and regulating their disclosure, particularly in light of the recent legal case involving unlawfully inflating the recurring portion of revenue.²⁰ As investors and other stakeholders are increasingly making decisions based on the emerging metrics, this standardization would help improve transparency in financial

²⁰Available at: <https://casetext.com/case/city-of-sunrise-firefighters-pension-fund-v-oracle-corp-1>. Accessed 06/07/2023.

reporting. For investors and other users of financial statements, the findings shed light on the earnings management practices of firms with subscription businesses, enabling more informed decision-making and reducing information integration costs (Blankespoor et al., 2020).

It is important to note some caveats of this study. Firstly, the primary measure of firms' reliance on recurring revenue utilizes information from firms' 10-K filings, which may capture firms' willingness to be perceived as being reliant on recurring business rather than the underlying nature of their business model. However, this limitation is unlikely to undermine the main findings, as firms self-select into valuation metrics that influence their earnings management incentives. Additionally, this study cannot conclude whether the earnings management is to mislead investors or to improve contracting efficiency. This unanswered question, along with other unexplored characteristics of the new subscription economy, presents opportunities for future research to further understand the evolving reporting incentives within the new economy.

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Appendix A: Variable Definition

Variable	Definition and Source
Recurring Revenue Reliance	
$\%RecurringRev_{i,t}$	For each 10-K of firm i in year t , count the number of occurrence of the word “recurring” with the word “sale(s)” or “revenue(s)” appearing in the 20-words window around it, then divide the number by the total word count. (EDGAR)
$\%Recurring_{i,t}$	For each 10-K of firm i in year t , count the number of occurrence of the word ”recurring”, then divide the number by the total word count. (EDGAR)
$RecurringRev_{i,t}$	For each 10-K of firm i in year t , count the number of occurrence of the word ”recurring” with the word ”sale(s)” or ”revenue(s)” appearing in the 20-words window around it. (EDGAR)
$Recurring_{i,t}$	For each 10-K of firm i in year t , count the number of occurrence of the word ”recurring”. (EDGAR)
$Alt_Measure_{i,t}$	For each 10-K of firm i in year t , count the number of occurrence of words “subscription(s)”, “subscriber(s)”, “membership(s)”, “SaaS”, “BAAS”, “IAAS”, “PAAS”, “Software as a Service”, “Backend as a Service”, “Infrastructure as a Service”, “Platform as a Service”, “Annual Recurring Revenue (ARR)”, and “Monthly Recurring Revenue (MRR)”, “churn”, “cloud”, and divide the number by the the total word count. (EDGAR)
$Recurring_Score_{i,t}$	Based on the value of $RecurringRev_{i,t}$, the firm-year is assigned value 0 if the $RecurringRev_{i,t}$ takes value of 0. For firm-years with non-zero $RecurringRev_{i,t}$, observations are classified into terciles. The bottom tercile firm-years receives a score of 1, the middle tercile a score of 2, and the top tercile a score of 3.
Valuation Variables	
$Rev_Multiple_{i,t}$	Firm i 's enterprise value (the market value of equity plus the book value of liabilities) divided by its revenue in year t . I then take log of the multiples to account for the highly skewed distribution. (COMPUSTAT)
$EBITDA_Multiple_{i,t}$	Firm i 's enterprise value (the market value of equity plus the book value of liabilities) divided by its EBITDA in year t . I then take log of the multiples to account for the highly skewed distribution. (COMPUSTAT)
$SUR_{i,t}$	The difference between firm i 's actual revenue per share and the analyst consensus of revenue forecast per share in year t divided by the price per share at the end of year $t - 1$. (I/B/E/S)

$SUE_{i,t}$	The difference between firm i 's actual EPS and the analyst consensus of EPS forecast in year t divided by the price per share at the end of year $t - 1$. (I/B/E/S)
$SUEX_{i,t}$	Calculated as $(SUR_{i,t} - SUE_{i,t})$. (I/B/E/S)
$UX_{i,t}$	Unexpected items, defined as either $SUR_{i,t}$ or $SUE_{i,t}$. (I/B/E/S)
$CAR_{i,t}$	The three day cumulative abnormal return around earnings announcement of firm i in year t . (CRSP)
$Low_DR_{i,t}$	Dummy variable taking value of 1 if firm i 's deferred revenue divided by total asset in year t belongs to the lower tercile of its respective industry in year t . (COMPUSTAT)
Earnings Benchmarks	
$MeetBeat_FirstGuidance_{i,t}$	Dummy variable taking value of 1 if the difference between firm i 's actual EPS and its first earnings guidance issued for year t is in $[0,0.01]$, and zero otherwise. (I/B/E/S)
$MeetBeat_LastGuidance_{i,t}$	Dummy variable taking value of 1 if the difference between firm i 's actual EPS and its last earnings guidance issued for year t is in $[0,0.01]$, and zero otherwise. (I/B/E/S)
$MeetBeat_Analyst_{i,t}$	Dummy variable taking value of 1 if the difference between firm i 's actual EPS and its first earnings guidance issued for year t is in $[0,0.01]$, and zero otherwise. (I/B/E/S)
$MeetBeat_LastEarnings_{i,t}$	Dummy variable taking value of 1 if the year over year change of net income of firm i in year t divided by the year end total asset in year $t - 1$ is in $[0,0.005]$, and zero otherwise. (COMPUSTAT)
Dependent Variables	
$abDISEXP_{i,t}$	The difference between firm i 's actual discretionary expenses and the predicted discretionary expenses using the model developed by Roychowdhury(2006). Discretionary expenses are defined as the sum of R&D expenses, advertising expenses, and selling, general, and administrative expenses. (COMPUSTAT)
$abDRC_{i,t}$	The difference between firm i 's actual change in current deferred revenue and the predicted change in current deferred revenue using the model developed by Zha-Giedt(2018). (COMPUSTAT)
$abDRLT_{i,t}$	The difference between firm i 's actual change in long-term deferred revenue and the predicted change in long-term deferred revenue using the model developed by Zha-Giedt(2018). (COMPUSTAT)
$abDR_{i,t}$	The sum of $abDRLT_{i,t}$ and $abDRC_{i,t}$. (COMPUSTAT)

$abAR_{i,t}$	The difference between firm i 's actual change in accounts receivable and the predicted change in accounts receivable using the model developed by Zha-Giedt(2018). (COMPUSTAT)
$Margin_{i,t}$	Firm i 's gross margin in year t defined as the difference between sales and cost of goods sold divided by sales. (COMPUSTAT)
Firm Characteristics	
$Rev_VOL_{i,t}$	To compute firms' revenue volatility, I first compute the growth rate of each quarter's revenue compared to that of the same quarter of the previous year. For each quarter, I calculate the standard deviation of the revenue growth rate over the next 12 quarters. I then aggregate the variable to the year level by taking the mean of the four standard deviation of each year. (COMPUSTAT)
$OverFirm_{i,t}$	Following Biddle et al. (2009), this variable is generated by first sorting firms' cash and leverage (multiplied with -1) into deciles separately, then calculating the average ranking and rescaling it to (0,1). (COMPUSTAT)
$Size_{i,t}$	The natural logarithm of firm i 's total asset in year t . (COMPUSTAT)
$MTB_{i,t}$	Firm i 's market value divided by book value of equity in year t . (COMPUSTAT)
$SalesGrowth_{i,t}$	Firm i 's market value divided by book value of equity in year t . (COMPUSTAT)
$InstOwn_Perc_{i,t}$	Firm i 's institutional ownership percentige in year t . (Thomson-Reuters)
$BIG4_{i,t}$	Dummy variable taking value of 1 if firm i is audited by a Big 4 auditor in year t . (COMPUSTAT)
$ROA_{i,t}$	Firm i 's return on asset in year t computes as net income divided by total asset. (COMPUSTAT)
$LEV_{i,t}$	Firm i 's leverage in year t computes as total liability divided by total asset. (COMPUSTAT)
Additional Variables	
$AnalystCoverage_{i,t}$	Number of analysts forecasting the next period EPS of firm i in year t . (I/B/E/S)
$ARR_Perc_{i,t}$	Firm i 's voluntarily disclosed annual recurring revenue (ARR) divided by its revenue in year t . (Conference Call Transcript)
$ARR_Disclosure_{i,t}$	Dummy variable taking value of 1 if firm i has voluntarily disclosed its annual recurring revenue (ARR) during conference call in year t . (Conference Call Transcript)

*Post_Acquire_{*i,t*}*

Dummy variable taking value of 1 if firm *i* has acquired or merged with another recurring firm in or before year *t* and firm *i* was a non-recurring firm before the M&A. The variable takes value of 0 if firm *i* has acquired a non-recurring firm and remains a non-recurring firm during the sample period. (Refinitiv Workspace, EDGAR)

Appendix B: Recurring Revenue Discussion

a) Adobe, Inc., 10-K 2018

We will continue to deepen our relationship with existing users through meeting their needs holistically and delivering additional features and value, including data-driven customer engagement, AI and machine learning through Adobe Sensei, and new design categories. As appropriate, we plan to optimize our pricing strategy and move our customers to higher priced and better value offerings and continue to employ targeted promotions that attract past customers and potential users to try out and ultimately subscribe to Adobe Creative Cloud. To target new customers and better address the needs of our existing customers, we will continue to invest in driving innovation to maintain the leadership position that we have established. We offer a marketplace for Creative Cloud subscribers to enable the delivery and purchase of stock content in our Adobe Stock service. Overall, our strategy with Creative Cloud is designed to enable us to increase our revenue with users, attract more new customers, and grow a recurring and predictable revenue stream that is recognized ratably.

NOTE 4. FAIR VALUE MEASUREMENTS

Assets and Liabilities Measured and Recorded at Fair Value on a Recurring Basis

We measure certain financial assets and liabilities at fair value on a recurring basis. There have been no transfers between fair value measurement levels during the year ended November 30, 2018.

b) Cisco System Inc., 10-K 2018

Fiscal 2018 Compared with Fiscal 2017

Revenue in our Security product category increased 9%, or \$200 million, driven by higher sales of unified threat management, web security, policy and access and advanced threat products. We continued to increase the amount of deferred revenue and the proportion of recurring revenue related to our Security product category.

Transforming our Business Model

We are transforming our offerings to meet the evolving needs of our customers. As part of the transformation of our business, we continued to make strides during fiscal 2018 to develop and sell more software and subscription-based offerings, which we expect will increase the amount of our recurring revenue. The Catalyst 9000 series of switches are an example of how we are beginning to shift more of our core business to a subscription-based model. Historically, our various networking technology products have aligned with their respective product categories. However, increasingly, our offerings are crossing multiple product categories. As our core networking evolves, we expect we will add more common software features across our core networking platforms. With respect to the disaggregation of hardware and software and how our customers want to consume our technology, we are increasing the amount of software offerings that we provide. We have various types of software arrangements including system software, on premise software, hybrid software and SaaS offerings. In terms of monetization, our software offerings fall into the broad categories of subscription arrangements and perpetual licenses.

Deferred Revenue The following table presents the breakdown of deferred revenue (in millions):

	July 28, 2018	July 29, 2017	Increase (Decrease)
Service	\$ 11,431	\$ 11,302	\$ 129
Product:			
Deferred revenue related to recurring software and subscription offers	6,120	4,971	1,149
Other product deferred revenue	2,134	2,221	(87)
Total product deferred revenue	8,254	7,192	1,062
Total	\$ 19,685	\$ 18,494	\$ 1,191
Reported as:			
Current	\$ 11,490	\$ 10,821	\$ 669
Noncurrent	8,195	7,673	522
Total	\$ 19,685	\$ 18,494	\$ 1,191

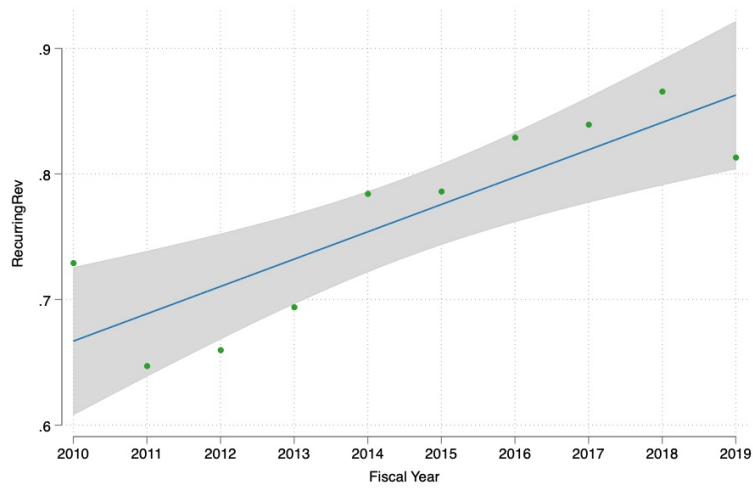
Total deferred revenue increased 6% in fiscal 2018. Deferred product revenue increased 15% primarily due to product deferred revenue related to recurring software and subscription offers, which grew 23% on a year-over-year basis to \$6.1 billion. Deferred service revenue increased 1%, driven by the impact of contract renewals, partially offset by amortization of deferred service revenue.

c) VMWARE Inc., 10-K 2021

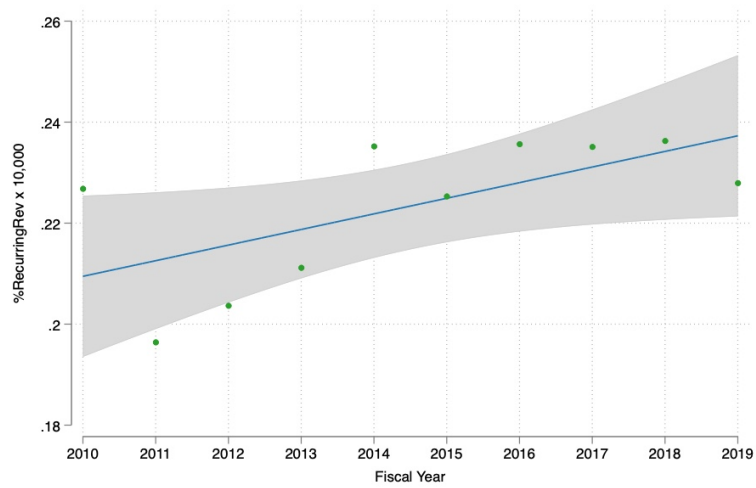
During fiscal 2022, we continued to see an increase in the portion of our sales occurring through our subscription and SaaS offerings compared to the portion of our on-premises solutions sold as perpetual licenses. We expect this trend to continue and as a result, a greater portion of our revenue will be recognized over time as subscription and SaaS revenue rather than license revenue, which is typically recognized in the fiscal period in which sales occur. As this trend continues, the rate of growth in our license revenue, which has historically been viewed as a leading indicator of our business performance, may be less relevant on a standalone basis, and we believe that the overall growth rate of our combined license and subscription and SaaS revenue and annual recurring revenue for subscription and SaaS, as well as the growth in the current portion of our remaining performance obligations, will become better indicators of our future growth prospects. In addition, we expect our operating margin to be negatively impacted in fiscal 2023 as a result of our incremental investment in our subscription and SaaS portfolio.

Figure 1: The Time Trend of Recurring Revenue Discussion

These figures plot the time trend of the two measures capturing firms' reliance on recurring revenue business: $RecurringRev_{i,t}$ and $\%RecurringRev_{i,t}$. $\%RecurringRev_{i,t}$ is multiplied by 10,000 to assist visualization. Panel a) and b) provide the average of $RecurringRev_{i,t}$ and $\%RecurringRev_{i,t}$ (multiplied by 10,000) by fiscal year, respectively.



(a) $RecurringRev_{i,t}$



(b) $\%RecurringRev_{i,t}$

Table 1: Recurring Revenue Business by Sector

This table tabulates the (unwinsorized) variables $\%RecurringRev_{i,t}$ (multiplied by 10,000), $\%RecurringRev_{i,t}$ (multiplied by 10,000), $RecurringRev_{i,t}$, $Recurring_{i,t}$, $\%RecurringFirmYear_j$, and $FirmYear_j$ by sectors, ranked by $\%RecurringRev_{i,t}$. $Recurring_{i,t}$ is defined as the number of the occurrence of the word “recurring” in file 10-K of firm i in year t , and $RecurringRev_{i,t}$ is defined as the number of the occurrence of the word “recurring” with the presence of words “revenue(s)” and “sale(s)” within 20 words in the 10-K of firm i in year t . $\%Recurring_{i,t}$ and $\%RecurringRev_{i,t}$ are $Recurring_{i,t}$ and $RecurringRev_{i,t}$ scaled by the total word count of respective 10-K. $\%RecurringFirmYear$ denotes percentage of firm-years in the respective sector with non-zero $\%RecurringRev_{i,t}$. $\%FirmYear$ denotes the percentage of firm-years of each sector in the whole sample.

Sector	$\%Recurring Rev_{i,t}$	$\%Recurring_{i,t}$	$Recurring Rev_{i,t}$	$\%Recurring_{i,t}$	$Recurring_{i,t}$	$\%Recurring Firmyear$	$\%FirmYear$
Information	14.68	25.32	4.80	8.64	56.42%	10.34%	
Professional, Scientific, and Technical Services	6.11	16.11	1.95	5.30	46.05%	4.61%	
Administrative, Support, and Waste Management Services	3.38	12.85	1.12	4.05	40.64%	2.03%	
Real Estate and Rental and Leasing	2.89	10.75	0.84	3.71	30.06%	0.86%	
Manufacturing (e.g., Computer and Electronic Product)	2.21	10.94	0.74	3.78	27.20%	30.43%	
Construction	1.79	9.31	0.68	3.57	34.66%	2.00%	
Arts, Entertainment, and Recreation	1.51	10.14	0.65	3.86	30.00%	0.75%	
Accommodation and Food Services	1.31	10.22	0.53	3.70	20.64%	2.81%	
Health Care and Social Assistance	1.14	6.24	0.51	2.89	26.27%	1.86%	
Retail Trade (e.g., Motor Vehicle, Furniture)	1.11	8.46	0.33	2.68	19.32%	3.64%	
Wholesale Trade	1.09	8.87	0.34	3.06	19.95%	4.00%	
Public Administration	0.84	13.87	0.45	7.61	35.48%	0.15%	
Educational Services	0.80	8.45	0.27	3.56	16.94%	0.62%	
Manufacturing (e.g., Wood, Paper, Chemical)	0.76	7.16	0.31	2.99	16.68%	22.65%	
Agriculture	0.637	10.57	0.36	3.81	12.07%	0.29%	
Manufacturing (e.g., Food, Apparel)	0.55	8.09	0.19	2.78	12.34%	4.61%	
Retail Trade (General Merchandise)	0.44	8.29	0.1	2.68	9.41%	2.12%	
Mining, Quarrying, and Oil and Gas Extraction	0.35	6.54	0.15	2.80	10.60%	5.79%	
Other Services (e.g., Repair, Death Care)	0.34	8.45	0.14	3.09	13.85%	0.32%	
Transportation and Warehousing	0.00	0.00	0.00	4.17	0.00%	0.09%	

Table 2: Summary Statistics

	Mean	Median	SD	p25	p75	N
Recurring Revenue Reliance						
$\%RecurringRev_{i,t}$	0.00002	0	0.00006	0	0.00002	20,024
$\%Recurring_{i,t}$	0.00010	0.00007	0.00011	0.00003	0.00014	20,024
$RecurringRev_{i,t}$	0.770	0	2.162	0	1	20,024
$Recurring_{i,t}$	3.696	3	4.001	1	5	20,024
$Alt_Measure_{i,t}$	0.0004	0.00004	0.00099	0	0.00018	20,024
$Recurring_Score_{i,t}$	0.4755	0	0.9171	0	1	20,024
Valuation Variables						
$Rev_Multiple_{i,t}$	1.453	1.201	1.018	0.810	1.739	19,148
$EBITDA_Multiple_{i,t}$	2.824	2.704	0.653	2.455	3.020	15,152
$SUR_{i,t}$	-0.013	-0.001	0.100	-0.021	0.009	15,647
$SUE_{i,t}$	-0.004	0.001	0.123	-0.002	0.003	15,868
$SUEX_{i,t}$	-0.236	0.002	1.510	-0.026	0.030	15,743
$CAR_{i,t}$	0.002	0.001	0.093	-0.046	0.051	18,970
$Low_DR_{i,t}$	0.513	1	0.500	0	1	19,100
Earnings Benchmarks						
$MeetBeat_FirstGuidance_{i,t}$	0.025	0	0.155	0	0	6,015
$MeetBeat_LastGuidance_{i,t}$	0.044	0	0.204	0	0	6,015
$MeetBeat_Analyst_{i,t}$	0.146	0	0.353	0	0	19,268
$MeetBeat_LastEarnings_{i,t}$	0.052	0	0.222	0	0	18,649
Dependent Variables						
$abDISEXP_{i,t}$	0.0003	-0.029	0.299	-0.155	0.090	14,857
$abDR_{t,t}$	-0.001	-0.001	0.033	-0.008	0.004	10,640
$abDRC_{i,t}$	-0.0004	-0.0005	0.023	-0.006	0.003	11,353
$abDRLT_{t,t}$	-0.0003	-0.0001	0.014	-0.002	0.001	10,640
$abAR_{t,t}$	-0.0002	-0.001	0.025	-0.010	0.009	12,086
$Margin_{t,t}$	-0.699	0.370	6.935	0.216	0.569	19,011
Firm Characteristics						
$Rev_VOL_{i,t}$	0.594	0.141	2.221	0.075	0.285	16,556
$OverFirm_{i,t}$	0.656	0.700	0.158	0.550	0.750	19,488
$Size_{i,t}$	6.592	6.627	2.058	5.176	7.996	20,029
$MTB_{i,t}$	3.820	2.458	7.963	1.371	4.524	19,928
$SalesGrowth_{i,t}$	0.149	0.063	0.540	-0.019	0.178	16,588
$InstOwn_Perc_{i,t}$	0.681	0.774	0.297	0.500	0.907	15,131
$BIG4_{i,t}$	0.765	1	0.424	1	1	19,882
$ROA_{i,t}$	-0.084	0.028	0.347	-0.080	0.073	20,028
$LEV_{i,t}$	0.524	0.501	0.301	0.312	0.675	19,993
Additional Variables						
$AnalystCoverage_{i,t}$	9.573	7	8.106	4	13	20,024
$ARR_Perc_{i,t}$	0.522	0.567	0.380	0.120	0.804	132
$ARR_Disclosure_{i,t}$	0.007	0	0.081	0	0	20,024
$Post_Acquire_{i,t}$	0.012	0	0.107	0	0	20,024

Table 3: Validation of the Reliance Measure

This table tabulates the results of validating the measure of recurring revenue reliance. Panel A validates the scaled measures ($\%RecurringRev_{i,t}$ and $\%Recurring_{i,t}$), and Panel B validates the measure using unstandardized, simple word-counts ($RecurringRev_{i,t}$ and $Recurring_{i,t}$). $DRC_{i,t}$ refers to firm i 's current deferred revenue scaled by total assets in year t , and $DRLT_{i,t}$ refers to firm i 's long-term deferred revenue scaled by total assets in year t . $DR_{i,t}$ is the sum of $DRC_{i,t}$ and $DRLT_{i,t}$. Panel C tabulates the results investigating the relation between firms' recurring revenue reliance measure $\%RecurringRev_{i,t}$ and the voluntarily disclosed Annual Recurring Revenue ($ARR_{i,t}$). Column (1) uses a dummy variable taking value of 1 if firm i has disclosed its ARR in year t ($ARR_Disclosure_{i,t}$), while column (2) uses the ratio of ARR to total revenue ($ARR_{i,t}$) as the independent variable. Control variables include $Size_{i,t}$, $ROA_{i,t}$, $MTB_{i,t}$, $LEV_{i,t}$, $BIG4_{i,t}$, $InstOwnperc_{i,t}$, $SalesGrowth_{i,t}$. All outcome variables and the four measures are standardized to facilitate interpretation. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Validation of Scaled Measures						
	(1)	(2)	(3)	(4)	(5)	(6)
	DRC	DRC	DRLT	DRLT	DR	DR
$\%Recurring$	0.0233 (1.38)		0.00533 (0.86)		0.0162 (1.31)	
$\%RecurringRev$		0.053* (1.76)		0.021*** (2.91)		0.045*** (3.02)
N	11,815	11,815	12,152	12,152	11,682	11,682
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.878	0.878	0.730	0.730	0.837	0.838

Panel B: Validation of Unscaled Measures						
	(1)	(2)	(3)	(4)	(5)	(6)
	DRC	DRC	DRLT	DRLT	DR	DR
Recurring	0.019 (1.21)		0.009 (1.48)		0.017 (1.30)	
RecurringRev		0.040 (1.41)		0.028*** (4.16)		0.042*** (2.76)
Observations	11,815	11,815	12,152	12,152	11,682	11,682
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.878	0.878	0.730	0.731	0.837	0.838

Panel C: Annual Recurring Revenue

	(1)	(2)
	%RecurringRev	%RecurringRev
ARR_Disclosure	0.370*** (6.18)	
ARR		0.334*** (10.30)
<i>N</i>	19560	101
Firm FE	Yes	Yes
Year FE	Yes	Yes
Cluster	Industry	Industry
Controls	No	No
Adjusted R^2	0.782	0.677

Table 4: Characteristics of Recurring Revenue Firms

This table tabulates the results investigating characteristics of firms reliant on recurring revenue models. Column (1) to (6) examine each characteristic separately, and column (7) tabulates results of aggregating all factors. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. All continuous variables are standardized to assist interpretation and winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	%RecurringRev	%RecurringRev	%RecurringRev	%RecurringRev	%RecurringRev	%RecurringRev	%RecurringRev
Rev_VOL	-0.108** (-2.07)						-0.164** (-2.29)
OverFirm		-0.153*** (-7.78)					-0.184*** (-5.39)
Age			-0.008** (-2.06)				-0.008* (-1.76)
Size				-0.025*** (-8.26)			-0.036*** (-5.42)
ROA					0.006 (0.20)		0.225*** (3.18)
MTB						0.830** (2.24)	1.262** (2.03)
N	16,550	19,480	12,007	20,020	20,019	19,919	9,839
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Adjusted R ²	0.128	0.135	0.135	0.135	0.132	0.132	0.137

Table 5: Valuation Implications of Recurring Business Model

This table tabulates the results investigating valuation implications of the recurring revenue model. Valuation multiples and earnings response coefficients (ERC) are examined in Panel A and B, respectively. In Panel A, revenue multiples ($Rev_Multiple_{i,t}$) and EBITDA multiples ($EBITDA_Multiple_{i,t}$) are used as the outcome variables. In Panel B, Column (1) and (2) investigates whether recurring firms exhibit greater ERC on earnings and revenue surprises, and column (3) and (4) examines whether this effect would be moderated by a low level of deferred revenue. 3-day cumulative abnormal return ($CAR_{i,t}$) is used as the outcome variable. $UX_{i,t}$ refers to unexpected earnings $SUE_{i,t}$ in column (1) and (3), and refers to unexpected revenue $SUR_{i,t}$ in column (2) and (4). $Low_DR_{i,t}$ is a dummy variable taking value of 1 if firm i 's total deferred revenue divided by asset in year t belongs to the lowest tercile of the respective industry in year t . Control variables include $Size_{i,t}$, $ROA_{i,t}$, $MTB_{i,t}$, $LEV_{i,t}$, $BIG4_{i,t}$, $InstOwnperc_{i,t}$, $SalesGrowth_{i,t}$. Expense surprise ($SAEX_{i,t}$) is additionally controlled for when the outcome variable is unexpected revenue. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Valuation Multiples		
	(1)	(2)
	Rev_Multiple	EBITDA_Multiple
$\%RecurringRev$	0.083** (2.07)	0.109*** (8.57)
N	12852	10893
Industry FE	Yes	Yes
Year FE	Yes	Yes
Cluster	Industry	Industry
Controls	Yes	Yes
Adjusted R^2	0.435	0.192

Panel B: Earnings Response Coefficient

	(1)	(2)	(3)	(4)
	3-day CAR	3-day CAR	3-day CAR	3-day CAR
$UX \times \%RecurringRev$	0.0571*** (4.34)	0.0902*** (3.36)	0.0824*** (4.54)	0.1180** (2.51)
$UX \times \%RecurringRev \times Low_DR$			-0.1480* (-1.73)	-0.2000** (-2.01)
UX	0.0566*** (5.88)	0.0570*** (5.12)	0.0491*** (3.09)	0.0899*** (4.71)
%RecurringRev	0.0001 (0.04)	0.0005 (0.21)	0.0003 (0.10)	0.0008 (0.34)
SAEX		0.0017 (1.28)		0.0021 (1.38)
Low_DR			-0.0016 (-1.16)	-0.0026 (-1.50)
$UX \times Low_DR$			-0.0058 (-0.21)	-0.0880*** (-3.57)
$\%RecurringRev \times Low_DR$			-0.0028 (-0.74)	-0.0054 (-1.51)
UX definition	Unexpected Earnings	Unexpected Revenue	Unexpected Earnings	Unexpected Revenue
<i>N</i>	11,893	11,767	11,228	11,117
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.014	0.014	0.013	0.015

Table 6: The Changing Earnings Management Landscape

This table tabulates the results of testing the impact of firms' business models on their earnings management choices. Panel A to D use four different earnings benchmarks to define $MeatBeat_{i,t}$: the first and the last earnings guidance issued for the period, analyst consensus, and earnings of the last period. $MeatBeat_{i,t}$ is a dummy variable taking value of 1 if firm i meets the respective earnings benchmark by a small positive amount in year t . Column (1) to (4) use abnormal discretionary expenses, total abnormal deferred revenue, abnormal current deferred revenue, and abnormal long-term deferred revenue as outcome variables. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: First Earnings Guidance

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.053*** (-3.41)	0.166*** (5.80)	0.194** (6.98)	0.020 (0.70)
$\%RecurringRev$	0.002 (0.15)	0.012 (0.28)	0.005 (0.15)	0.012 (0.51)
MeetBeat	-0.022 (0.15)	-0.002 (0.28)	0.058 (0.15)	-0.078 (0.51)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.885	0.402	0.392	0.236

Panel B: Last Earnings Guidance

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.055 (-1.59)	0.116*** (3.03)	0.127*** (4.49)	0.020 (0.37)
$\%RecurringRev$	0.003 (0.21)	0.012 (0.27)	0.005 (0.15)	0.011 (0.51)
MeetBeat	-0.002 (-0.12)	0.017 (0.97)	0.025 (0.71)	-0.001 (-0.04)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.885	0.402	0.391	0.234

Panel C: Analyst Consensus

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.019*** (-2.90)	0.005*** (4.99)	0.001 (0.91)	0.003** (5.09)
%RecurringRev	-0.007* (-1.74)	0.003 (1.32)	0.002 (1.50)	0.001 (0.18)
MeetBeat	-0.003 (-0.60)	-0.001 (-1.05)	-0.001 (-1.13)	0.001 (0.37)
<i>N</i>	10,772	8,245	8,618	8,245
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.829	0.255	0.230	0.180

Panel D: Last Period Earnings

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.073*** (-4.27)	0.023 (0.98)	0.070** (2.10)	-0.046 (-1.34)
%RecurringRev	-0.016** (-2.31)	0.074** (2.12)	0.043* (2.01)	0.031 (1.28)
MeetBeat	-0.017** (-2.57)	0.001 (0.03)	-0.001 (-0.08)	0.013 (1.52)
<i>N</i>	11,090	8,364	8,771	8,364
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.823	0.251	0.231	0.170

Table 7: Profit Margins and Accounts Receivables

This table tabulates the results of testing whether firms reliant on recurring revenue business model engage in other earnings management behavior to inflate reported revenue. Panel A and B use $Margin_{i,t}$ and $abAR_{i,t}$ as outcome variable, respectively. Across all panels, $MeetBeat_{i,t}$ is defined as meeting or beating the first and the last earnings guidance, analyst consensus, and last year's performance from column (1) to (4) respectively. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: Profit Margin				
	(1)	(2)	(3)	(4)
	Margin	Margin	Margin	Margin
$MeetBeat \times \%RecurringRev$	0.010 (1.64)	0.010* (1.82)	-0.120 (-1.24)	0.005 (0.10)
$\%RecurringRev$	-0.002 (-0.60)	-0.002 (-0.59)	0.0360* (1.85)	0.011 (0.56)
MeetBeat	0.010 (1.64)	0.008* (1.95)	0.088 (0.85)	0.012 (0.57)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
N	4,371	4,371	12,077	12,440
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.829	0.255	0.230	0.180
Panel B: Abnormal A/R				
	(1)	(2)	(3)	(4)
	abAR	abAR	abAR	abAR
$MeetBeat \times \%RecurringRev$	0.095 (1.53)	0.089 (1.60)	0.010 (0.26)	-0.008 (-0.17)
$\%RecurringRev$	-0.015 (-0.57)	-0.017 (-0.60)	0.012 (0.31)	0.007 (0.21)
MeetBeat	0.120 (1.01)	-0.007 (-0.12)	-0.007 (-0.37)	-0.002 (-0.05)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
N	3,228	3,228	8,870	9,129
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.093	0.092	0.065	0.067

Table 8: Analyst Coverage and Earnings Management Incentives

This table tabulates the results of testing how analyst coverage affects firms' earnings management incentives. Panel A to C use $abDISEXP_{i,t}$, $abDRC_{i,t}$, and $abDRLT_{i,t}$ as outcome variable, respectively. Across all panels, $MeetBeat_{i,t}$ is defined as meeting or beating the first and the last earnings guidance, analyst consensus, and last year's performance from column (1) to (4) respectively. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Abnormal Discretionary Expenses

	(1)	(2)	(3)	(4)
	abDISEXP	abDISEXP	abDISEXP	abDISEXP
$MeetBeat \times \%RecurringRev \times Analyst$	0.006** (2.76)	0.006** (1.79)	0.006*** (2.47)	0.005** (2.22)
$MeetBeat \times \%RecurringRev$	-0.131*** (-3.03)	-0.142*** (-4.76)	-0.102*** (-5.91)	-0.129*** (-2.81)
$MeetBeat \times Analyst$	0.001 (0.41)	0.002 (1.20)	0.001 (0.05)	-0.001 (-0.13)
$Analyst \times \%RecurringRev$	-0.001 (-0.29)	-0.001 (-0.30)	-0.003** (-2.45)	-0.003** (-2.34)
$\%RecurringRev$	0.010 (0.28)	0.011 (0.30)	0.017 (1.02)	0.010 (0.80)
MeetBeat	-0.034 (-0.78)	-0.029 (-1.01)	-0.005 (-0.23)	-0.014 (-1.32)
Analyst	-0.001 (-0.35)	-0.001 (-0.37)	-0.002 (-0.82)	-0.002 (-0.87)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
N	4,041	4,041	10,772	11,090
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.885	0.885	0.829	0.823

Panel B: Abnormal Current Deferred Revenue

	(1)	(2)	(3)	(4)
	abDRC	abDRC	abDRC	abDRC
<i>MeetBeat</i> × <i>%RecurringRev</i> × <i>Analyst</i>	0.014** (2.76)	0.010* (1.79)	0.008** (2.47)	-0.004 (-0.79)
<i>MeetBeat</i> × <i>%RecurringRev</i>	-0.034 (-0.28)	-0.024 (-0.24)	-0.051 (-0.97)	0.075 (0.86)
<i>MeetBeat</i> × <i>Analyst</i>	-0.001 (-0.21)	-0.002 (-0.24)	-0.000 (-0.04)	0.001 (0.66)
<i>Analyst</i> × <i>%RecurringRev</i>	-0.005 (-1.10)	-0.005 (-1.19)	-0.003 (-0.97)	-0.001 (-0.43)
<i>%RecurringRev</i>	0.060 (1.25)	0.067 (1.34)	0.024 (0.69)	0.015 (0.54)
<i>MeetBeat</i>	0.092 (0.91)	0.072 (1.04)	0.001 (0.03)	0.005 (0.20)
<i>Analyst</i>	-0.001 (-0.22)	-0.001 (-0.23)	-0.002 (-0.96)	-0.003 (-1.07)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
<i>N</i>	3,165	3,165	8,846	9,039
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.404	0.403	0.232	0.227

Panel C: Abnormal Long-term Deferred Revenue

	(1)	(2)	(3)	(4)
	abDRLT	abDRLT	abDRLT	abDRLT
<i>MeetBeat</i> × <i>%RecurringRev</i> × <i>Analyst</i>	0.006** (2.43)	0.007 (0.95)	0.003 (0.98)	-0.017*** (-4.53)
<i>MeetBeat</i> × <i>%RecurringRev</i>	-0.081 (-1.41)	-0.092 (-1.18)	0.078 (1.55)	0.174*** (3.63)
<i>MeetBeat</i> × <i>Analyst</i>	-0.005 (-1.05)	-0.001 (-0.45)	-0.002 (-1.01)	-0.003*** (-1.97)
<i>Analyst</i> × <i>%RecurringRev</i>	0.003 (0.59)	0.003 (0.62)	0.001 (0.19)	0.003 (0.87)
<i>%RecurringRev</i>	-0.027 (-0.35)	-0.027 (-0.35)	-0.006 (-0.10)	0.002 (0.04)
<i>MeetBeat</i>	-0.008 (-0.19)	0.022 (0.74)	0.035 (0.88)	0.055** (2.46)
<i>Analyst</i>	0.004* (1.91)	0.004* (1.82)	0.001 (0.57)	0.002 (1.12)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
<i>N</i>	3,062	3,062	8,245	8,364
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.236	0.235	0.280	0.170

Table 9: Entropy Balancing

This table tabulates the results of using entropy balanced sample to test model (2). Panel A to D use four different earnings benchmarks to define $MeatBeat_{i,t}$: the first and the last earnings guidance issued for the period, analyst consensus, and earnings of the last period. $MeatBeat_{i,t}$ is a dummy variable taking value of 1 if firm i meets the respective earnings benchmark by a small positive amount in year t . Column (1) to (4) use abnormal discretionary expenses, total abnormal deferred revenue, abnormal current deferred revenue, and abnormal long-term deferred revenue as outcome variables. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: First Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.030** (-2.42)	0.138*** (5.53)	0.146** (6.88)	0.023 (0.81)
$\%RecurringRev$	-0.002 (-0.17)	0.049 (1.06)	0.050 (1.31)	0.029 (1.21)
MeetBeat	-0.023 (-0.91)	-0.006 (-0.30)	0.051 (1.14)	-0.078 (-1.57)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.884	0.407	0.397	0.239
Panel B: Last Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.049 (-1.61)	0.104*** (2.99)	0.096*** (4.08)	0.019 (0.37)
$\%RecurringRev$	-0.001 (-0.09)	0.049 (1.02)	0.051 (1.28)	0.029 (1.21)
MeetBeat	-0.004 (-0.33)	0.018 (0.92)	0.020 (0.59)	-0.001 (-0.01)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.884	0.407	0.397	0.238

Panel C: Analyst Consensus

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.032** (-2.13)	0.079*** (4.69)	0.016 (0.53)	0.091*** (4.35)
%RecurringRev	-0.016** (-2.43)	0.056 (1.45)	0.050* (1.81)	0.011 (0.43)
MeetBeat	-0.006 (-0.59)	-0.011 (-1.02)	-0.024 (-1.19)	0.006 (0.37)
<i>N</i>	10,772	8,245	8,618	8,245
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.830	0.330	0.263	0.317

Panel D: Last Period Earnings

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.050*** (-3.09)	-0.025 (-0.50)	0.029 (0.94)	-0.077 (-1.22)
%RecurringRev	-0.013** (-2.25)	0.076* (1.93)	0.054** (2.09)	0.033 (1.17)
MeetBeat	-0.014** (-2.36)	-0.004 (-0.26)	-0.004 (-0.28)	0.010 (1.07)
<i>N</i>	11,090	8,364	8,771	8,364
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.825	0.326	0.263	0.307

Table 10: Merger and Acquisition

This table tabulates the results investigating the change of firms' behavior after merging with or acquiring a firm reliant on recurring revenue business model. Column (1) and (2) use $abDISEXP_{i,t}$ and $abDR_{i,t}$ as outcome variables, respectively. $MeetBeat_{i,t}$ is defined as meeting or beating analyst consensus in this table. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)
	abDISEXP	abDR
Post_Acquire \times MeetBeat	-0.042*	0.015
	(-1.80)	(0.31)
MeetBeat	0.006	-0.040*
	(0.44)	(-1.83)
Post_Acquire	0.021	0.064
	(1.09)	(0.82)
N	4,076	2,998
Firm FE	Yes	Yes
Year FE	Yes	Yes
Cluster	Industry	Industry
Controls	Yes	Yes
Adjusted R^2	0.847	0.256

Table 11: Alternative Measure

This table tabulates the results of using alternative measure of firms' reliance on recurring business model to test model (2). Panel A to D use four different earnings benchmarks to define $MeetBeat_{i,t}$: the first and the last earnings guidance issued for the period, analyst consensus, and earnings of the last period. $MeetBeat_{i,t}$ is a dummy variable taking value of 1 if firm i meets the respective earnings benchmark by a small positive amount in year t . Column (1) to (4) use abnormal discretionary expenses, total abnormal deferred revenue, abnormal current deferred revenue, and abnormal long-term deferred revenue as outcome variables. $Alt_Measure_{i,t}$ is number of occurrence of words [subscription(s), SaaS, Software as a service, ARR, MRR, annual (monthly) recurring revenue] divided by the respective word count of 10-K and is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: First Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
$MeetBeat \times Alt_Measure$	-0.020*** (-3.07)	0.038* (1.86)	0.070*** (4.00)	-0.042 (-1.43)
Alt_Measure	-0.012 (-1.06)	0.014 (1.15)	0.014 (1.61)	0.017 (0.64)
MeetBeat	-0.022 (-0.96)	-0.002 (-0.11)	0.055 (1.28)	-0.072 (-1.42)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.885	0.401	0.391	0.236
Panel B: Last Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
$MeetBeat \times Alt_Measure$	-0.033*** (-4.30)	0.017 (1.32)	0.019 (1.50)	-0.007 (-0.59)
Alt_Measure	-0.010 (-0.86)	0.014 (1.10)	0.014 (1.52)	0.017 (0.62)
MeetBeat	0.003 (0.18)	0.018 (0.81)	0.026 (0.69)	0.001 (0.01)
N	4,041	3,062	3,160	3,062
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.885	0.401	0.391	0.235

Panel C: Analyst Consensus

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times <i>Alt_Measure</i>	-0.023*** (-5.16)	0.028 (1.62)	0.009 (0.50)	0.026*** (3.73)
Alt_Measure	-0.007 (-0.41)	0.014 (1.15)	0.020 (1.32)	0.030** (2.39)
MeetBeat	-0.006 (-0.55)	-0.013 (-1.23)	-0.023 (-1.13)	0.005 (0.30)
<i>N</i>	10,772	8,245	8,618	8,245
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.829	0.254	0.230	0.179

Panel D: Last Period Earnings

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times <i>Alt_Measure</i>	-0.019*** (-4.71)	0.018* (1.86)	0.039** (2.63)	-0.018 (-1.15)
Alt_Measure	-0.008 (-0.44)	0.018 (1.53)	0.017 (1.18)	0.036*** (2.97)
MeetBeat	-0.014* (-1.88)	0.001 (0.06)	-0.002 (-0.13)	0.015* (1.86)
<i>N</i>	11,090	8,364	8,771	8,364
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.823	0.251	0.231	0.170

Table 12: Recurring Score

This table tabulates the results of using the score measure of firms' reliance on recurring business model to test model (2). Column (1) to (4) use total abnormal deferred revenue (*abDR*) as the outcome variable, and column (5) to (8) use abnormal discretionary expenses as the outcome variable (*abDISEXP*). Four different earnings benchmarks are employed to define *MeatBeat_{i,t}*: the first and the last earnings guidance issued for the period, analyst consensus, and earnings of the last period. *MeatBeat_{i,t}* is a dummy variable taking value of 1 if firm *i* meets the respective earnings benchmark by a small positive amount in year *t*. *Recurring_Score* is a scale variable taking value of 0 to 3, and a greater value of *Recurring_Score* corresponds to greater reliance on recurring businesses. Control variables include *Size_{i,t}*, *MTB_{i,t}*, *ROA_{i,t}*, *LEV_{i,t}*, *InstOwn_Perc_{i,t}*, *BIG4_{i,t}* and *SalesGrowth_{i,t}*, and the total word count of the respective 10-K filing. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	abDR	abDR	abDR	abDR	abDISEXP	abDISEXP	abDISEXP	abDISEXP
MeatBeat × <i>Recurring_Score</i>	0.076** (2.56)	0.040* (1.75)	0.033*** (3.56)	-0.006 (-0.41)	-0.009 (-0.63)	-0.015 (-0.68)	-0.024*** (-3.76)	-0.016* (-1.78)
MeatBeat	-0.047* (-1.76)	-0.008 (-0.28)	-0.030** (-2.47)	0.003 (0.17)	-0.018 (-0.71)	0.007 (0.33)	0.007 (0.59)	-0.005 (-0.78)
Recurring_Score	-0.012 (-0.64)	-0.012 (-0.66)	0.014 (0.86)	0.020 (1.18)	-0.003 (-0.42)	-0.003 (-0.37)	-0.004 (-0.65)	-0.004 (-0.77)
MeatBeat Definition	First Guidance	Last Guidance	Analyst Consensus	Last Earnings	First Guidance	Last Guidance	Analyst Consensus	Last Earnings
<i>N</i>	3,062	3,062	8,245	8,364	4,041	4,041	10,772	11,090
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted <i>R</i> ²	0.402	0.401	0.255	0.251	0.885	0.885	0.829	0.823

Table 13: Subsample Analysis

This table tabulates the results of using the subsample with only positive $\%RecurringRev_{i,t}$ to test model (2). Panel A to D use four different earnings benchmarks to define $MeetBeat_{i,t}$: the first and the last earnings guidance issued for the period, analyst consensus, and earnings of the last period. $MeetBeat_{i,t}$ is a dummy variable taking value of 1 if firm i meets the respective earnings benchmark by a small positive amount in year t . Column (1) to (4) use abnormal discretionary expenses, total abnormal deferred revenue, abnormal current deferred revenue, and abnormal long-term deferred revenue as outcome variables. $\%RecurringRev_{i,t}$ is standardized to facilitate interpretation. Control variables include $Size_{i,t}$, $MTB_{i,t}$, $ROA_{i,t}$, $LEV_{i,t}$, $InstOwn_Perc_{i,t}$, $BIG4_{i,t}$ and $SalesGrowth_{i,t}$. All continuous variables are winsorized at 1% and 99% levels. All variables are defined in the [Appendix A: Variable Definition](#). T-statistics are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Panel A: First Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.059*** (-3.00)	0.172*** (6.05)	0.198*** (7.55)	0.020 (0.38)
$\%RecurringRev$	0.002 (0.14)	0.006 (0.14)	0.001 (0.02)	0.006 (0.24)
MeetBeat	-0.012 (-0.33)	-0.014 (-0.56)	0.053 (0.54)	-0.077 (-0.86)
N	2,204	1,697	1,745	1,697
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.894	0.398	0.396	0.197
Panel B: Last Earnings Guidance				
	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times $\%RecurringRev$	-0.054 (-1.26)	0.113** (2.62)	0.120*** (4.24)	0.029 (0.41)
$\%RecurringRev$	0.002 (0.18)	0.006 (0.14)	0.001 (0.04)	0.005 (0.21)
MeetBeat	-0.001 (-0.05)	0.026 (0.96)	0.040 (0.88)	-0.011 (-0.21)
N	2,204	1,697	1,745	1,697
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.894	0.398	0.396	0.196

Panel C: Analyst Consensus

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.016*** (-2.75)	0.005*** (4.97)	0.001 (0.56)	0.003*** (4.31)
%RecurringRev	-0.007* (-1.73)	0.002 (1.22)	0.002 (1.61)	-0.001 (-0.32)
MeetBeat	-0.007 (-1.36)	0.001 (0.11)	0.001 (0.01)	-0.001 (-0.08)
<i>N</i>	5,670	4,408	4,584	4,408
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.832	0.227	0.147	0.221

Panel D: Last Period Earnings

	(1)	(2)	(3)	(4)
	abDISEXP	abDR	abDRC	abDRLT
MeetBeat \times %RecurringRev	-0.084*** (-4.95)	0.035*** (1.14)	0.083** (2.18)	-0.046 (-1.16)
%RecurringRev	-0.013* (-1.86)	0.069* (2.02)	0.043* (2.02)	0.023 (0.92)
MeetBeat	-0.007 (-0.67)	-0.014 (-0.56)	-0.015 (-0.63)	0.011 (0.61)
<i>N</i>	5,826	4,478	4,671	4,478
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Cluster	Industry	Industry	Industry	Industry
Controls	Yes	Yes	Yes	Yes
Adjusted R^2	0.824	0.224	0.220	0.132