

Externalities of Sales Information Along the Supply Chain

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Prior studies have shown that earnings information of customer firms is value relevant to the investors of their suppliers, but it remains unclear whether sales information has similar effects. In this study, we investigate the value relevance of customer firms' sales information to suppliers' investors using a large sample of monthly sales disclosures from U.S. retailers. We find that within the narrow window of retailers' monthly sales disclosures, suppliers' abnormal stock returns are positively related to retailers' sales growth in both same-store sales and store numbers. This finding suggests that sales information has spillover effects, or externalities, along the supply chain. We further conduct cross-sectional tests and find that the externalities of sales information vary with a supplier's dependence on the retailer. We also develop a prediction model to separate the expected and unexpected components of retailers' sales information and find that the unexpected component of sales growth is the primary source of externalities. Overall, this study provides new insights into the value relevance of sales disclosures.

Keywords: externalities, sales disclosures, supplier-customer relationship, value relevance

INTRODUCTION

Information externalities occur when one company's disclosed information becomes relevant to the stakeholders of another company (e.g., Badertscher et al., 2013). Previous research has demonstrated the presence of externalities with earnings information between customer firms and their suppliers (e.g., Cho et al., 2020; Pandit et al., 2011; Zhu, 2014; Chen et al., 2021). However, whether sales information has similar externalities along the supply chain remains largely unexplored. This study aims to provide initial evidence on the externalities of sales information or, more specifically, the transmission of a firm's sales information to its suppliers' stock market investors.

Compared to earnings (calculated by subtracting expenses from sales revenue), sales revenue is a unique line item in income statements with two advantages for exploring supplier-customer information externalities. First, sales revenue exhibits greater persistence than expenses (e.g., Jegadeesh & Livnat, 2006). Unlike certain non-recurring expense items (e.g., write-offs and restructuring charges), sales revenue primarily reflects the demand for a firm's goods or services (e.g., Nagar & Rajan, 2001; Curtis et al., 2014), which is essential for the customer firm's long-term survival and therefore relevant to its suppliers. In certain scenarios, what appears as positive news for customer firms could potentially have adverse effects on their suppliers. For example, a customer firm's cost of goods sold (COGS) can represent a significant

portion of its suppliers' sales revenue. A reduction in COGS (and, in turn, an increase in earnings) for the customer firm may reflect its bargaining power to negotiate lower prices with its suppliers. Consequently, increased earnings at the customer firm may not be beneficial for its suppliers, but suppliers generally prefer higher sales revenue at the customer firm. Second, sales revenue is less susceptible to managerial manipulations than expenses (Ertimur et al., 2003). It could provide higher informational value to suppliers' investors because it more faithfully represents the underlying operations. In contrast, manipulated expenses can distort customer firms' earnings numbers and reduce their value relevance to suppliers' investors. Therefore, we expect systematic externalities of sales information along the supply chain.

It is possible that there are no sales information externalities between customers and suppliers. Research suggests that sales revenue has limited explanatory power for stock returns compared to other performance metrics such as operating earnings or net income (e.g., Francis et al., 2003; Jegadeesh & Livnat, 2006; Barton et al., 2010). If investors of a customer firm do not heavily weigh its sales information when predicting future performance, the investors of its suppliers are less likely to find this information useful. In addition, Pandit et al. (2011) disaggregate quarterly earnings into sales revenue, cost of goods sold, and other expenses and find little evidence of sales information externalities along the supply chain. Thus, whether a supplier firm's investors significantly react to its customer firms' sales announcements remains an empirical question.

In this study, we create a sample of monthly sales disclosures, a practice that was once common in the U.S. retail industry during the 2000s. Our research focuses on retailers' monthly sales announcements for several reasons. First, these disclosures are typically standalone and unaccompanied by other types of disclosures (e.g., earnings announcements or management forecasts), making it an ideal setting for assessing the externalities of sales information. By isolating sales information from other performance metrics, we can better investigate the role of sales in firm valuation and identify any externalities along the supply chain. To this end, our findings on monthly sales may diverge from the null results of Pandit et al. (2011) regarding quarterly sales. Second, these disclosures are usually issued several days after the month ends, which provides timely information about a retailer's demand and reduces the opportunities for managerial manipulations. By focusing on the U.S. retail industry, we further ensure homogeneity in sales information and avoid any confounding effects from cross-industry variations. Third, the controversial discontinuation of monthly sales announcements by many U.S. retail firms around 2009 has drawn considerable attention from practitioners and regulators. For example, Walmart stopped providing monthly sales information in 2009, claiming that the cessation helps reduce managers' short-termism. However, critics expressed concerns about the loss of this key performance indicator of retailers (Anderson, 2009). By studying the externalities of monthly sales information, we aim to improve the understanding of the cost-benefit trade-offs in decisions to issue monthly sales announcements.

We examine the stock price response of supplier firms to monthly sales disclosures from 53 U.S. retail firms. Our empirical analyses provide systematic evidence on the externalities of sales information along the supply chain. Specifically, we find that supplier firms' investors react positively to retail firms' monthly sales disclosures. This positive reaction is evident for both same-store sales (SSS) growth and store number growth. Our cross-sectional tests further indicate that the externalities of sales information are more pronounced when a supplier firm is more dependent on a specific customer firm for its sales revenue. In additional analyses, we develop a prediction model to decompose monthly sales information into predicted and residual components. We expect that the predicted components contain information already known to the market, while the residuals likely convey new and incrementally useful information. This unexpected information helps suppliers' investors assess customer firms' prospects and the sustainability of customer-supplier relationships. Consistent with this expectation, we find that the externalities of monthly sales information along the supply chain exist only for the residual components of sales growth.

Our study contributes to the existing literature in two ways. First, we extend the literature on the value relevance of sales information in capital markets. Hong et al. (2019) show that monthly same-store sales announcements are relevant to stock market investors and financial analysts. In our study, we view firms as interconnected entities within a larger business ecosystem, which allows us to investigate the value

relevance of one firm's monthly sales disclosures to another firm. Our findings suggest that a customer firm's sales announcements provide valuable information to investors of its supplier firms.

Second, our study breaks new ground in supply chain research. To our knowledge, we are the first to systematically document the externalities of sales information along the supply chain. While Pandit et al. (2011) also examine the information externalities of sales revenue in the context of quarterly earnings announcements, they find no evidence of a customer's sales information being relevant to its suppliers' investors. This is surprising, as sales revenue reflects the market demand for a firm's products or services and should provide valuable information to investors of both the disclosing firm and its suppliers. By isolating sales revenue from earnings and other performance metrics, we not only identify the existence of sales information externalities but also explore how the strength of the customer-supplier relationship could affect these externalities. Our findings shed new light on the complex information transmission mechanisms within the supply chain, opening up fresh avenues for future research.

Our research carries important practical implications, especially for managers who decide to stop issuing monthly sales disclosures. Managers might underestimate the benefits of these monthly announcements without considering the externalities of sales information and its potential to improve the information flow within the supply chain. In fact, a significant number of U.S. retail firms stopped providing monthly sales disclosures around 2009, asserting that this cessation shifted their focus from short-term sales performance to long-term firm value. Our study urges practitioners also to consider information externalities when weighing the costs and benefits of such monthly disclosures.

The remainder of this paper is organized as follows. Section 2 briefly reviews the literature and develops hypotheses. Section 3 presents models and variables. Section 4 describes sample selection and descriptive statistics. Section 5 reports our empirical results. Section 6 concludes the paper.

RELATED STUDIES AND HYPOTHESIS DEVELOPMENT

Background of Monthly Sales Disclosures

The growth rate of same-store sales (SSS) for retail firms refers to the percentage increase in average sales from stores that have been open for at least one year and are still operational. It has long been a common practice for U.S. retailers to voluntarily disclose SSS growth rates as well as total revenue in their monthly reports. Practitioners closely watch these interim sales disclosures, with SSS growth being arguably more informative because it is more difficult to predict than growth from store openings/closings (Standard & Poor's Industry Surveys—Retailing: General). Around 2009, many U.S. retail firms discontinued their monthly sales announcements, which caused significant stock market reactions, highlighting the importance of retail firms' decisions regarding monthly sales information (Anderson, 2009; Zhou & Yu, 2023).

Appendix 1 presents a typical example of monthly sales disclosures by retailers. From October 3, 2006, to December 4, 2006, Walgreens issued three disclosures of the growth in total sales and SSS shortly after the end of each month. On December 22, 2006, the company announced its quarterly earnings, net sales, and SSS growth in the earnings announcement. As illustrated by Appendix 1, monthly sales disclosures provide researchers with a clean setting for investigating the information content of sales because these disclosures are not bundled with information on other performance metrics.

Market Reaction to Sales Information

As a primary driver of quarterly earnings and cash flows, sales revenue reveals a firm's operating activities and the demand for its products or services (e.g., Curtis et al., 2014). Because it has the potential to influence the valuation of the disclosing firm (e.g., Chandra & Ro, 2008; Nagar & Rajan, 2001), investors, analysts, and other stakeholders should pay close attention to newly released sales information. However, as most firms disclose quarterly sales and earnings simultaneously, it has been challenging for previous studies to fully separate the value relevance of sales from that of earnings (e.g., Francis et al., 2003; Ertimur et al., 2003; Jegadeesh & Livnat, 2006; Barton et al., 2010).

Recent studies start to explore the impact of retail firms' monthly sales reports. Van Buskirk (2012) notes that the level of detail in monthly sales disclosures, instead of the mere presence of this information channel, reduces the information asymmetry between informed and uninformed stock investors. Hong et al. (2019) demonstrate that investors and analysts adjust their assessments of firm value in response to monthly SSS disclosures. Zhou and Yu (2023) examine the discontinuation of monthly SSS reports and find that when external parties struggle with forecasting sales revenue, the cessation of monthly SSS announcements may reduce firm value.

Overall, existing research provides insights into the value relevance of monthly sales disclosures. However, to the best of our knowledge, no previous study has explored the potential externalities of these disclosures within the supply chain. Our study seeks to fill this gap.

Information Externalities Along the Supply Chain

Over the past two decades, there has been a growing literature on information externalities within supply chains. This stream of research emphasizes the value of information from a customer firm to its suppliers and their investors. For example, Cohen and Frazzini (2008) find a strong positive relationship between a customer firm's stock returns and those of its suppliers. Radhakrishnan et al. (2014) document a positive association between the information environment of customer firms and the financial performance of supplier firms. Chiu et al. (2019) further demonstrate that when customer firms provide more informative risk factor disclosures, their supplier firms tend to make more efficient investment decisions. Additionally, third parties, such as financial analysts and auditors, can improve the quality of their services to supplier firms by leveraging their information advantages obtained from a customer firm (Guan et al., 2015; Johnstone et al., 2014; Luo & Nagarajan, 2015).

More closely related to our study, Pandit et al. (2011) examine whether investors of supplier firms respond to quarterly earnings announcements of customer firms. While the authors provide systematic evidence regarding the externalities of earnings information along the supply chain, they find little evidence for sales information externalities after disaggregating earnings into sales, cost of goods sold, and other expenses. In contrast, our study focuses on monthly sales disclosures, which exclusively contain sales information. We argue that these standalone sales disclosures from a customer firm provide relevant information on the demand for its products and services. This information is useful not only to the disclosing firm's investors but also to investors of the supplier firms that generate revenue from the customer. Therefore, we predict a positive reaction from suppliers' investors to an increase in sales growth of a customer firm. We formally state this prediction as Hypothesis 1.

***Hypothesis 1:** Investors of supplier firms react positively to customer firms' monthly sales disclosures with a higher growth in sales revenue.*

The aforementioned hypothesis addresses the average relationship between a customer firm's monthly sales information and its suppliers' stock market reactions. We propose that the relevance of a customer's sales information to its suppliers' investors should increase with the strength of the supplier-customer relationship. Specifically, we predict that the relationship between a customer firm's monthly sales information and its suppliers' stock market reactions, if present, will be more pronounced for suppliers with a greater proportion of sales from a customer. We formally state this prediction as Hypothesis 2.

***Hypothesis 2:** The value relevance of a customer firm's sales information to its supplier firms increases with the suppliers' dependence on the customer firm.*

RESEARCH DESIGN

Suppliers' Stock Market Reactions to Customers' Monthly Sales Disclosures

We estimate the following regression model to investigate whether and how investors of supplier firms react to customer firms' monthly sales disclosures (Hypothesis 1).

$$BHAR_Supplier = \beta_0 + \beta_1 SSS_Growth + \beta_2 SN_Growth + \beta_3 Size_Customer + \beta_4 Size_Supplier + \beta_5 MB_Customer + \beta_6 MB_Supplier + Month \& Firm Fixed Effects + \varepsilon \quad (1a)$$

In Model 1a, *BHAR_Supplier* represents the supplier's three-day [-1, +1] buy-and-hold stock return (size adjusted) around the retailer's monthly sales announcement date. *SSS_Growth* is the monthly same-store sales growth obtained from press releases, and *SN_Growth* is the monthly store number growth calculated using the approach by Curtis et al. (2014). Specifically, calculate *SN_Growth* as $(TS_Growth - SSS_Growth)/(1+SSS_Growth)$, where *TS_Growth* is the total sales growth rate, as reported in retailers' monthly sales disclosures. We include both *SSS_Growth* and *SN_Growth* in Model 1 because *SSS_Growth* and *TS_Growth* are typically disclosed simultaneously in monthly sales releases. We tested for potential multicollinearity among all variables and obtained Variance Inflation Factors (VIFs) below two, suggesting no multicollinearity problems in our market reaction tests.

Regarding control variables, *Size_Supplier* (*Size_Customer*) is the logarithm of total market value of the supplier (the disclosing retailer), and *MB_Supplier* (*MB_Customer*) is the market-to-book ratio of the supplier (the disclosing retailer).

Under Hypothesis 1, we expect positive coefficients for β_1 and β_2 , suggesting that supplier firms' investors positively respond to customer firms' sales growth in both same-store sales and store numbers.

Moreover, it is important to ascertain that suppliers' investors respond not only to fluctuations in retailers' stock prices but also to the specific contents of retailers' monthly sales disclosures. To address this potential alternative explanation, we introduce the three-day abnormal stock return of the retailer (*BHAR_Customer*) as a controlling variable in Model 1b.

$$BHAR_Supplier = \beta_0 + \beta_1 SSS_Growth + \beta_2 SN_Growth + \beta_3 Size_Customer + \beta_4 Size_Supplier + \beta_5 MB_Customer + \beta_6 MB_Supplier + \beta_7 BHAR_Customer + Month \& Firm Fixed Effects + \varepsilon \quad (1b)$$

In Model 1b, *BHAR_Customer* is the disclosing retailer's three-day [-1, +1] buy-and-hold stock return (size adjusted) around its monthly sales announcement date, and all other variables are defined the same as in Model 1a. We expect positive coefficients for β_1 and β_2 after controlling for the influence of *BHAR_Customer*.

Moderating Effect of Suppliers' Dependence on Customers

We estimate the following regression models to test the moderating effects of suppliers' dependence on customers. Consistent with prior studies (e.g., Bauer et al., 2018; Raman & Shahrur, 2008), we define this dependence as the proportion of sales revenue a supplier derives from a particular customer. To evaluate how suppliers' stock market reactions to customers' sales disclosures vary with this dependence (Hypothesis 2), we apply Models (2a) and (2b) to a subsample of firms with available data on suppliers' sales to specific retailers (i.e., customer firms).

$$BHAR_Supplier = \beta_0 + \beta_1 SSS_Growth + \beta_2 SN_Growth + \beta_3 BHAR_Customer + \beta_4 Depend + \beta_5 SSS_Growth*Depend + \beta_6 SN_Growth*Depend + \beta_7 Size_Supplier + \beta_8 Size_Customer + \beta_9 MB_Supplier + \beta_{10} MB_Customer + Month \& Firm indicators + \varepsilon \quad (2a)$$

$$BHAR_Supplier = \beta_0 + \beta_1 SSS_Growth + \beta_2 SN_Growth + \beta_3 BHAR_Customer + \beta_4 HighDepend + \beta_5 SSS_Growth*HighDepend + \beta_6 SN_Growth*HighDepend + \beta_7 Size_Supplier + \beta_8 Size_Customer + \beta_9 MB_Supplier + \beta_{10} MB_Customer + Month \& Firm indicators + \varepsilon \quad (2b)$$

In Model 2a, *Depend* is defined as the percentage of a supplier's sales to a specific retailer in the supplier's total sales. In Model 2b, *HighDepend* is an indicator variable based on *Depend* quartiles, which equals one for the top quartile of *Depend* and zero for the lowest. All other variables are defined the same as in Models 1a and 1b. We expect significantly positive coefficients for β_5 and β_6 (Hypothesis 2).

SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

Data and Sample Selection

We start the sample selection process with 391,900 revenue-related press releases of U.S. companies from the RavenPack database between 2001 and 2012. In our data collection, we noted a substantial decline in monthly sales disclosures since 2009, consistent with the trend among U.S. retail firms to discontinue such disclosures (Anderson 2009). The paucity of monthly sales disclosures after 2012 limits our sample period but highlights the practical implications of our study. We refer readers to the first section of this paper for the practical implications.

TABLE 1
SAMPLE SELECTION

Panel A: Revenue-related press releases used to collect monthly sales disclosures	
# of revenue press releases for U.S. companies in Ravenpack between 2001 and 2012	391,900
(Exclude press releases without a match to Compustat/CRSP)	(9,081)
(Exclude press releases of “revenue guidance” or “revenue estimate” types)	(99,178)
(Exclude press releases of non-retail companies)	(214,994)
# of revenue press releases by retail firms used to collect data	68,647
Panel B: Firms in the sample	
# of retail firms (SIC code 5200-5999) in Compustat between 2001 and 2012	832
(Exclude retail firms without any revenue press releases covered in RavenPack)	(466)
# of retail firms (SIC code 5200-5999) in RavenPack	366
(Exclude retail firms not reporting monthly sales information)	(231)
# of retail firms (SIC code 5200-5999) reporting monthly sales information	135
(Exclude firms without a supplier-customer linkage in Compustat Segment Database)	82
# of retail firms in the final sample	53
# of supplier firms in the final sample	389

This table summarizes the sample selection process. We start from 391,900 revenue-related press releases in RavenPack for U.S. companies between 2001 and 2012. We match the RavenPack observations with the CRSP and Compustat datasets using the ISIN-GVKEY matching table. To eliminate the impact of management forecasts (revenue guidance/estimate), we exclude press releases that are classified by RavenPack as “Revenue guidance” or “Revenue estimates”. We identify retail firms as having a historical SIC code between 5200 and 5999. Retail firms (with 366 distinct GVKEYs) produce 68,647 (about 25%) of all revenue-related press releases. About 1/3 of the 366 retail firms provide interim (monthly) sales disclosures. Other retail firms provide either quarterly, semi-annual, or annual revenue-related press releases. We then obtain customer-supplier relationship information from the Compustat Segment database and link it with the monthly sales data of retail firms.

Next, we merge the dataset of the revenue-related press releases with the Compustat and CRSP databases. We exclude unmatched observations and obtain 68,647 press-release articles from 366 retail companies (with SIC codes 5200-5999). We read through these articles and manually collect the growth rates in total sales (*TS_Growth*) and same-store sales (*SSS_Growth*) from the monthly reports of 135 retail companies. To avoid confounding effects of earnings information, we exclude monthly sales disclosures that fall in the seven-day windows (i.e., [-3,+3]) centered on the retailer’s quarterly earnings announcements. We then obtain customer-supplier relationship information from the Compustat Segment database and link it with the monthly sales data of retail firms. Our final sample comprises 20,711 firm-year observations for 389 supplier firms. Table 1 describes our sample selection process.

Descriptive Statistics and Correlations

Table 2, Panel A presents the summary statistics of the variables. Consistent with Curtis et al. (2014), the average (median) growth rates for same-store sales (*SSS_Growth*) and total sales (*TS_Growth*) in retail companies are 2.8% (3.0%) and 8.3% (9.0%), respectively. We notice larger growth rates of total sales than same-store sales, primarily due to the expansion of retail store chains during our sample period. We calculate the growth rate of store numbers (*SN_Growth*) using the methodology suggested by Curtis et al. (2014). The average (median) of *SN_Growth* is 5.3% (5.6%). The statistics of *Size* and *MB* ratio indicate that retailers are generally larger with higher *MB* ratios than their suppliers, also in line with the literature (e.g., Bauer et al., 2018; Raman & Shahrur, 2008).

TABLE 2
DESCRIPTIVE STATISTICS AND CORRELATIONS

Panel A: Descriptive statistics

Variable	N	Mean	Std Dev	Q1	Median	Q3
<i>BHAR_Supplier</i>	20,711	-0.001	0.049	-0.022	-0.001	0.020
<i>BHAR_Customer</i>	20,711	0.001	0.035	-0.019	0.001	0.019
<i>TS_Growth</i>	20,711	0.083	0.101	0.032	0.090	0.118
<i>SSS_Growth</i>	20,711	0.028	0.089	0.009	0.030	0.051
<i>SN_Growth</i>	20,711	0.053	0.115	0.018	0.056	0.071
<i>MKT_Supplier</i>	20,711	3952.54	16143.50	91.300	406.41	1926.51
<i>MKT_Customer</i>	20,711	106867.01	99747.06	14771.70	40997.25	210081.00
<i>Size_Supplier</i>	20,711	6.099	2.074	4.525	6.010	7.564
<i>Size_Customer</i>	20,711	10.700	1.673	9.601	10.621	12.255
<i>MB_Supplier</i>	20,711	2.449	3.083	1.135	1.839	2.941
<i>MB_Customer</i>	20,711	3.605	1.935	2.330	3.291	5.087

Panel B: Correlation Matrix

No.	Variable	1	2	3	4	5	6	7	8	9
1	<i>BHAR_Supplier</i>	-	0.061	0.002	0.002	0.002	0.042	-0.003	0.036	-
2	<i>BHAR_Customer</i>	0.063	-	0.070	0.149	-0.029	0.003	0.002	-0.009	0.004
3	<i>TS_Growth</i>	0.002	0.059	-	0.704	0.702	-0.026	0.514	0.121	0.632
4	<i>SSS_Growth</i>	0.002	0.065	0.264	-	0.100	-0.029	0.329	0.069	0.436
5	<i>SN_Growth</i>	0.001	0.001	0.658	-0.108	-	-0.005	0.508	0.108	0.558
6	<i>Size_Supplier</i>	0.030	-0.001	0.002	-0.004	0.005	-	0.029	0.506	-
7	<i>Size_Customer</i>	-0.012	-0.015	0.274	0.148	0.118	0.085	-	0.060	0.734
8	<i>MB_Supplier</i>	0.013	-0.011	0.073	0.028	0.041	0.268	0.069	-	0.063
9	<i>MB_Customer</i>	-0.008	0.004	0.318	0.193	0.120	-0.034	0.634	0.061	-

Panel A of this table presents summary statistics of the variables used in multivariate tests. Panel B of this table presents Pearson (lower diagonal) and Spearman (upper diagonal) correlations. All variables are defined in Appendix 2.

Table 2, Panel B tabulates the Pearson and Spearman correlations among variables. We observe positive correlations between *BHAR_Customer* and *SSS_Growth* (*SN_Growth*), consistent with prior studies that investors of retail companies respond to monthly sales disclosures (Hong et al., 2019). We also notice positive, albeit relatively weaker, correlations between *BHAR_Supplier* and *SSS_Growth* (*SN_Growth*). These positive associations could indicate potential responses from suppliers' investors to retailers' monthly sales disclosures. Additionally, we find positive correlations between *BHAR_Customer* and *BHAR_Supplier*, implying direct spillover effects in stock market prices along the supply chain. To explore

whether suppliers' investors genuinely care about retailers' disclosures rather than simply responding to retailers' stock prices, we conduct multivariate analyses in the next section.

MULTIVARIATE TEST RESULTS

Suppliers' Market Reactions to Customer's Monthly Sales Information

Table 3 reports positive coefficients in Column (1) for both *SSS_Growth* (0.0108; $t = 2.97$) and *SN_Growth* (0.0071; $t = 1.95$), indicating a strong reaction from suppliers' investors to the retailer's growth in both same-store sales and store numbers. These results align with our expectation that monthly sales information from customers provides valuable insights for investors evaluating suppliers' prospects.

TABLE 3
SUPPLIERS' MARKET REACTION TO RETAILERS' INTERIM SALES DISCLOSURES

Variables	Dependent Variable = <i>BHAR_Supplier</i>	
	(1)	(2)
<i>SSS_Growth</i>	0.0108*** (2.97)	0.0077** (2.17)
<i>SN_Growth</i>	0.0071* (1.95)	0.0054* (1.75)
<i>Size_Supplier</i>	0.0039*** (3.34)	0.0039*** (3.31)
<i>Size_Retailer</i>	-0.0006 (-1.39)	-0.0007 (-1.50)
<i>MB_Supplier</i>	0.0001 (0.24)	0.0001 (0.25)
<i>MB_Retailer</i>	-0.0004 (-1.05)	-0.0003 (-0.93)
<i>BHAR_Retailer</i>		0.0516** (2.16)
Firm/Month Fixed Effects	Yes	Yes
Obs.	20,711	20,711
Adjusted R ²	0.029	0.030

This table reports suppliers' market reactions to monthly sales disclosures of retailers. The t -statistics reported in parentheses are based on standard errors clustered by firm and by month. Significance levels are based on two-tailed tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All variables are defined in Appendix 2.

An alternative explanation for the notable reaction of suppliers' investors during the retailers' disclosure window could be the resonance in stock prices along the supply chain. Instead of responding to the information content of retailers' monthly sales disclosures, suppliers' investors might actually react to the unusual fluctuations in retailers' stock prices. To further examine the relationship between suppliers' stock price reactions and retailers' monthly sales disclosures, we introduce retailers' three-day abnormal stock return (*BHAR_Retailer*) as a controlling variable in the regression model. In Column (2), the coefficients for *SSS_Growth* (0.0077; $t = 2.17$) and *SN_Growth* (0.0054; $t = 1.75$) remain significant, albeit with smaller magnitudes. This evidence implies that suppliers' investors not only respond to the unusual fluctuations in retailers' stock prices but also react to the original information conveyed by retailers' monthly sales announcements.

Taken together, the results from Table 3 support our Hypothesis 1. We demonstrate that the growths in same-store sales and store numbers of retailers are informative to suppliers' investors. These findings highlight the value relevance of monthly sales disclosures in conveying useful information to stakeholders along the supply chain.

TABLE 4
HOW SUPPLIERS' DEPENDENCE ON RETAILERS AFFECT MARKET REACTION

Variables	Dependent Variable = <i>BHAR_Supplier</i>			
	(1)	(2)	(3)	(4)
<i>SSS_Growth</i>	-0.0072 (-0.81)	-0.0093 (-1.04)	0.0019 (0.22)	-0.0005 (-0.05)
<i>SN_Growth</i>	0.0033 (0.44)	0.0014 (0.19)	0.0008 (0.09)	-0.0007 (-0.09)
<i>Depend</i>	0.0055 (0.67)	0.0059 (0.72)		
<i>SSS_Growth*Depend</i>	0.1610** (2.19)	0.1500** (2.05)		
<i>SN_Growth*Depend</i>	0.0207 (0.40)	0.0245 (0.49)		
<i>HighDepend</i>			-0.0028 (-0.81)	-0.0027 (-0.78)
<i>SSS_Growth*HighDepend</i>			0.0852*** (3.14)	0.0803*** (2.97)
<i>SN_Growth*HighDepend</i>			0.0220 (1.29)	0.0228 (1.36)
<i>Size_Supplier</i>	0.0035*** (2.92)	0.0035*** (2.90)	0.0033** (2.07)	0.0032** (2.05)
<i>Size_Retailer</i>	-0.0006 (-1.02)	-0.0007 (-1.14)	0.0003 (0.40)	0.0002 (0.32)
<i>MB_Supplier</i>	0.0005** (2.25)	0.0005** (2.27)	0.0003 (0.93)	0.0003 (0.94)
<i>MB_Retailer</i>	-0.0005 (-1.15)	-0.0005 (-0.98)	-0.0011** (-2.22)	-0.0010** (-2.06)
<i>BHAR_Retailer</i>		0.0485*** (2.75)		0.0446** (2.03)
Firm/Month Fixed Effects	Yes	Yes	Yes	Yes
Obs.	17,506	17,506	8,723	8,723
Adjusted R ²	0.027	0.028	0.027	0.027

This table presents cross-sectional test results on supplier-customer relationships. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and by month. Significance levels are based on two-tailed tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All variables are defined in Appendix 2.

The Moderating Effect of Suppliers' Dependence on Customers

In the previous section, we observe that suppliers' investors respond to retailers' interim sales information because of both its intrinsic value relevance and the resonance effects in stock prices. Previous research notes the importance of considering suppliers' dependence on customers when assessing the performance of supplier firms (e.g., Bauer et al., 2018; Lian, 2017; Raman & Shahrur, 2008). We now explore whether the stock market reactions of suppliers differ across firms on the strength of their customer-supplier relationships (Hypothesis 2).

Table 4 reports Models (2a) and (2b) regression results. The independent variables of interest are the interaction items between retailers' sales information and our measures of supplier-customer dependence (i.e., *Depend* and *HighDepend*). As expected, Column (1) reveals a significantly positive coefficient for *Depend*SSS_Growth* (0.1610; $t = 2.19$), indicating that suppliers' investors respond more strongly to a retailer's same-store sales growth when the supplier relies more heavily on the disclosing retailer. In Column (2), we include *BHAR_Retailer* (retailers' stock market reactions) into the model and obtain similar

results. Columns (3) and (4) replace the continuous variable *Depend* with a dummy variable *HighDepend*. We find that suppliers' market reactions to retailers' sales growth differ significantly between suppliers with various levels of sales dependence on the disclosing retailer. All controlling variables remain consistent with our earlier discussion. These findings support Hypothesis 2, that for supplier firms with stronger customer dependence, investors tend to follow their customers' monthly sales disclosures more closely.

Overall, both Tables 3 and 4 suggest that retailers' monthly sales disclosures provide valuable information to stock market participants. This information not only matters to the disclosing retailer's investors but also ripples through the supply chain. When the customer-supplier relationship is stronger, investors of supplier firms react more profoundly to retailers' monthly sales disclosures.

Additional Analyses

In this section, we investigate whether suppliers' stock market response primarily arises from unexpected sales information of retailers. Considering that investors have access to macroeconomic indicators such as U.S. GDP growth rates, inflation rates, unemployment rates, and political uncertainties, any sales information associated with these factors would have already been incorporated into suppliers' stock prices before monthly sales disclosures. In addition, investors generally possess knowledge of the retail industry's dynamics and characteristics. Therefore, we anticipate that only unexpected sales information from retailers will trigger a significant market reaction in suppliers' stock prices.

We use regression models (Models 3a and 3b) to separate the predicted monthly sales growth from the residuals. Such prediction models are necessary because financial analysts generally do not provide estimates for monthly sales growth rates. Macroeconomic information plays a crucial role in determining stock prices because it provides investors with valuable insights into the economic condition of a country or region. The macroeconomic indicators available before monthly sales disclosures, including U.S. GDP growth rates, inflation rates, unemployment rates, and political uncertainties, allow investors to make well-informed investment decisions.

$$SSS_Growth = \beta_0 + \beta_1\Delta GDP + \beta_2\Delta Unemploy + \beta_3\Delta CPI + \beta_4\Delta EPU + \beta_5HHI + \beta_6 MedSale + \beta_7 Size_Customer + \beta_8 MB_Customer + \varepsilon \quad (3a)$$

$$SN_Growth = \beta_0 + \beta_1\Delta GDP + \beta_2\Delta Unemploy + \beta_3\Delta CPI + \beta_4\Delta EPU + \beta_5HHI + \beta_6 MedSale + \beta_7 Size_Customer + \beta_8 MB_Customer + \varepsilon \quad (3b)$$

In Models 3a and 3b, *SSS_Growth* and *SN_Growth* are defined as in Models 1a and 1b; ΔGDP is the quarterly U.S. GDP growth rate; $\Delta Unemploy$ is the monthly U.S. unemployment rate; ΔCPI is the monthly U.S. inflation rate calculated from changes in the Consumer Price Index (CPI), and ΔEPU is the changes in economic policy uncertainty (Baker et al., 2016). *HHI* (Herfindahl-Hirschman Index) measures market concentration by summing up the squares of each firm's market share in the retail industry. *MedSale* represents the industry trend, defined as the median of retailers' quarterly total sales. *Size_Customer* and *MB_Customer* are defined as in previous models. To proxy for the expected sales growth of retailers, we use the predicted values from Models 3a and 3b, *Pred_SSS_Growth* and *Pred_SN_Growth*, because these values capture sales growth explained by pre-monthly disclosure information. The residuals, *Res_SSS_Growth* and *Res_SN_Growth*, contain the unexpected portion of retailers' sales information and noise.

Table 5, Column (1) presents insignificant coefficients for both *Pred_SSS_Growth* and *Pred_SN_Growth*. This evidence implies that suppliers' stock prices have already incorporated the information content of retailers' expected sales, which can be reasonably inferred from macroeconomic indicators, industry conditions, and firm-specific data (Cole & Jones, 2004; Curtis et al., 2014). In contrast, in Column (2), the coefficients for *Res_SSS_Growth* (0.0131; $t = 3.40$) and *Res_SN_Growth* (0.0093; $t = 2.69$) remain highly significant, likely because suppliers' investors strongly react to the unexpected sales growth of retailers. These findings support the idea that retailers' sales growth from different sources carries

distinct implications for suppliers' investors (Curtis et al., 2014), and the unexpected component of sales could be the primary source of value relevance in monthly sales disclosures. Other coefficients in Table 5 align with those reported in previous sections.

TABLE 5
EXPECTED VERSUS UNEXPECTED SALES INFORMATION

Variables	Dependent Variable = <i>BHAR_Supplier</i>		
	(1)	(2)	(3)
<i>Pred_SSS_Growth</i>	-0.0040 (-0.29)		-0.0043 (-0.31)
<i>Pred_SN_Growth</i>	0.0001 (0.02)		0.0004 (0.08)
<i>Res_SSS_Growth</i>		0.0131*** (3.40)	0.0132*** (3.43)
<i>Res_SN_Growth</i>		0.0093*** (2.69)	0.0092** (2.63)
<i>Size_Supplier</i>	0.0039*** (3.35)	0.0039*** (3.33)	0.0039*** (3.36)
<i>Size_Retailer</i>	-0.0006 (-1.41)	-0.0007 (-1.48)	-0.0007 (-1.55)
<i>MB_Supplier</i>	0.0003 (0.22)	0.0003 (0.22)	0.0003 (0.21)
<i>MB_Retailer</i>	-0.0001 (-0.47)	-0.0002 (-0.50)	-0.0001 (-0.41)
<i>BHAR_Retailer</i>	0.0537** (2.20)	0.0511** (2.14)	0.0513** (2.15)
Firm/Month Fixed Effects	Yes	Yes	Yes
Obs.	20,609	20,609	20,609
Adjusted R ²	0.030	0.030	0.030

This table presents suppliers' market reactions to retailers' expected and unexpected sales information. The *t*-statistics reported in parentheses are based on standard errors clustered by firm and by month. Significance levels are based on two-tailed tests: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All variables are defined in Appendix 2.

CONCLUSION

This study examines the externalities of sales information along the supply chain. Using a large sample of monthly sales disclosures from U.S. retail firms, we find a systematic positive relationship between the retailers' sales growth and the stock market response of their suppliers. This relationship remains significant after controlling the retailers' stock market response during the disclosure period. Our cross-sectional analyses reveal that suppliers' investors react more strongly to monthly sales announcements when the supplier's revenue relies more heavily on the disclosing retailer. Additionally, we find that the externalities of sales information primarily arise from unexpected changes in sales growth.

This study contributes to the literature on the value relevance of sales information and the literature on customer-supplier relationships. Our findings hold practical implications that managers should also consider the potential benefits to external parties when making disclosure decisions of monthly sales information.

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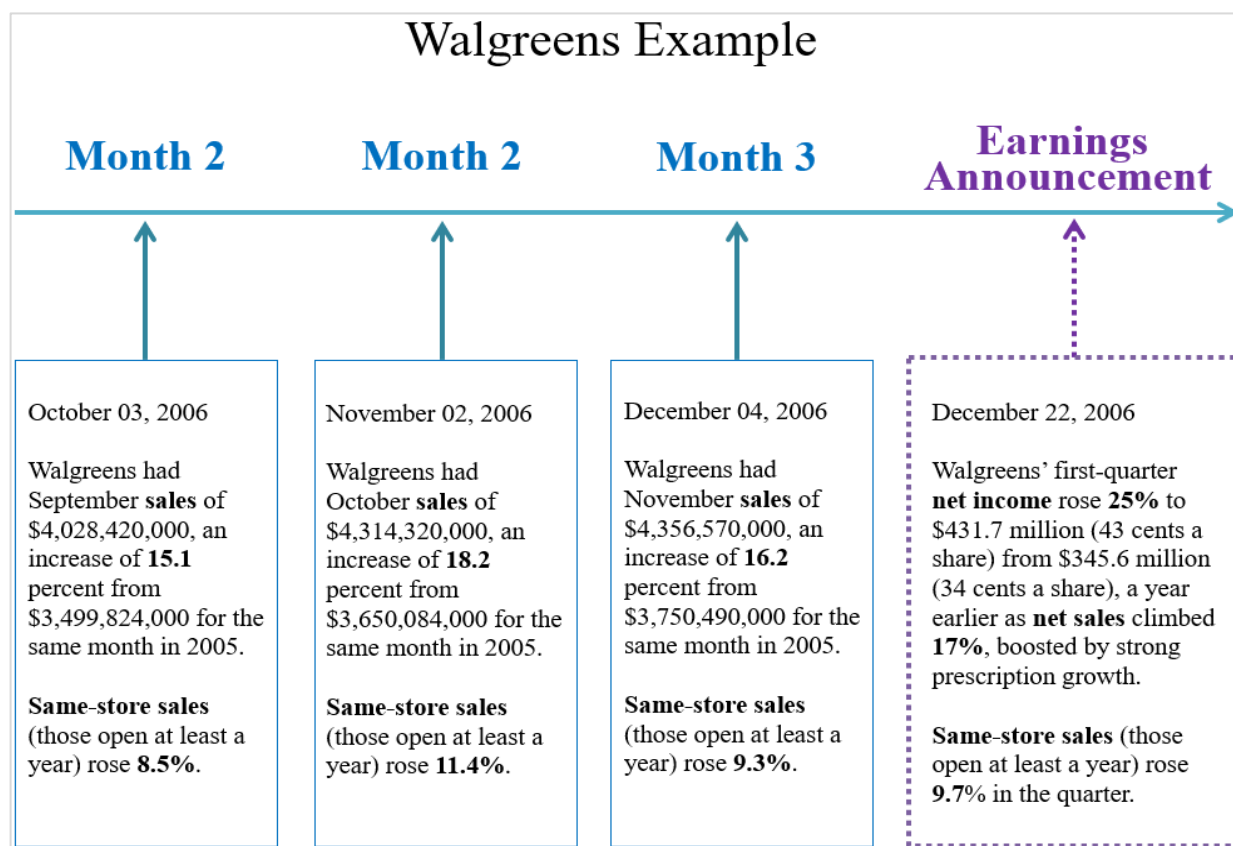
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APPENDIX 1: EXAMPLES OF MONTHLY SALES DISCLOSURES BY RETAILERS



APPENDIX 2: VARIABLE DEFINITIONS

Variable	Definition
Variables Based on Retailers' Monthly Sales Disclosure	
<i>TS_Growth</i>	Total sales growth rate from retailers' monthly disclosures.
<i>SSS_Growth</i>	Same-store sales growth rate from retailers' monthly disclosures.
<i>SN_Growth</i>	Store number growth rate, calculated as $(TS_Growth - SSS_Growth) / (1 + SSS_Growth)$.
Variables of Stock Market Reaction	
<i>BHAR_Supplier</i>	Supplier's size-adjusted three-day buy-hold abnormal return around the retailer's monthly sales announcement dates.
<i>BHAR_Retailer</i>	Retailer's size-adjusted three-day buy-hold abnormal return around its monthly sales announcement dates.
Other Variables	
<i>CPI</i>	U.S. Consumer Price Index, obtained from the U.S. Bureau of Economic Analysis (BEA).
<i>ΔCPI</i>	U.S. inflation rate, calculated from changes in U.S. monthly CPI before the retailer's monthly sales announcement date.
<i>Depend</i>	Percentage of a supplier's sales to a specific customer retailer, calculated as the supplier's sales to the retailer divided by the supplier's total annual sales.
<i>EPU</i>	Monthly U.S. economic policy uncertainty index (Baker et al. 2016) before the retailer's monthly sales announcement date, obtained from https://www.policyuncertainty.com/ .
<i>GDP</i>	U.S. Gross Domestic Product, obtained from the BEA.
<i>ΔGDP</i>	Quarterly growth rate of U.S. GDP before the retailer's monthly sales announcement date.
<i>HHI</i>	Herfindahl-Hirschman Index of the retail industry, calculated using quarterly data before the retailer's monthly sales announcement date.
<i>HighDepend</i>	Dummy variable equal to one for observations in the top quartile of <i>Depend</i> and zero for those in the bottom quartile of <i>Depend</i>.
<i>MB_Supplier</i>	Ratio of the supplier firm's market to book value of equity at the end of year t-1.
<i>MB_Retailer</i>	Ratio of the retail firm's market to book value of equity at the end of year t-1.
<i>Med_Sale</i>	Industry median of quarterly sales before the retailer's monthly sales announcement date.
<i>MKT_Supplier</i>	Market value of equity of the supplier at the end of year t-1.
<i>MKT_Retailer</i>	Market value of equity of the retailer at the end of year t-1.
<i>Size_Supplier</i>	Natural logarithm of the supplier's market value of equity at the end of year t-1.
<i>Size_Retailer</i>	Natural logarithm of the retailer's market value of equity at the end of year t-1.
<i>Unrate</i>	Monthly U.S. unemployment rate before the retailer's monthly sales announcement date, obtained from the BEA.