DISCLOSURE DYNAMICS ALONG THE SUPPLY CHAIN

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ABSTRACT

We examine suppliers' disclosure decisions in responses to disclosures made by major customers. We find that the propensity of suppliers to respond with their own disclosures increases in the magnitude of their stock price drop from negative customer disclosures and these disclosures tend to be bad news. Furthermore, the stock price of suppliers who keep silent following negative customer disclosures subsequently underperforms forthcoming suppliers. However, we do not find a relationship between the magnitude of supplier stock price increases from positive customer disclosures and the propensity for suppliers to disclose or the disclosure content. While prior research has investigated disclosure dynamics between intra-industry firms, our results suggest that there exists interplay in the disclosure decisions of firms along the supply chain.

***Key Words**: Voluntary Disclosure, Disclosure Dynamics, Supply Chain, Management Earnings Forecasts, Information Externality, Disclosure Threshold, Investor Belief, Stock Price*

INTRODUCTION

A growing stream of research investigates intra-firm disclosure dynamics (e.g., Dye & Sridhar, 1995; Sletten, 2012; Tse & Tucker, 2010). However, these studies primarily focus on how a firm's voluntary disclosure can be affected by other firms within the same industry. This paper examines the disclosure dynamics of firms in a supply chain relationship. We study the impact of major customers' voluntary disclosures on the subsequent disclosure decisions of their suppliers. We also investigate the relation between suppliers' subsequent disclosure decisions and their future stock market performance.

Theoretical studies suggest that a firm's value-maximizing voluntary disclosure decision can be influenced by the disclosures of other firms (Dye & Sridhar, 1995; Acharya, DeMarzo & Kremer, 2011). Dye and Sridhar (1995) analyze the disclosure decisions of firms in the same industry when there is a positive correlation in the timing of the receipt of information by intra-industry firms. In Dye and Sridhar (1995), investors revise upward their beliefs of a firm's receipt of information if they observe the disclosures of other intra-industry firms. With the fear of being considered as the firm with the worst possible news, firms with news that is above the disclosure threshold (news that are better than the worst) disclose their information following the disclosures of other firms in the industry. Assuming that firms receive positively correlated news content, Acharya, DeMarzo and Kremer (2011) show that when bad news from related firms lowers investors' estimate of a firm's value, disclosure

threshold drops and previously withheld bad news are disclosed. However, good news from related firms leads investors to revise upwards a firm's value, which increases the disclosure threshold and thus reduces a firms' propensity to disclose.

The unique features of a supply chain relationship make it an interesting test ground to investigate the disclosure dynamics of related firms. Suppliers and customers have a strong positive correlation between their cash flows because of their business tie (Cohen & Frazzini, 2008). The close link of supplier and customer cash flows suggests that the timing and the content of information received by suppliers and customers are likely to be positively correlated. This strong positive correlation satisfies the assumptions of disclosure dynamics models (Dye & Sridhar, 1995; Acharya et al., 2011) and makes the supply chain relationship an ideal setting to test predictions of theories. In contrast, the timing and content of information received by firms within the same industries can be positively or negatively related depending on whether the information is about the overall industry or just pertains to competition among a few intra-industry firms (Kim, Lacina & Park, 2008; Pandit, Wasley & Zach, 2011). This ambiguous correlation of information can potentially weaken the power of tests using the intra-industry setting.

We study the impact of major customers' disclosure on their suppliers' disclosure decisions. Previous literature shows that suppliers are usually smaller than their major customers and receive a substantial portion of their sales from their major customers (Cohen & Frazzini, 2008; Pandit et al., 2011). These findings suggest that major customers have a greater impact on the business of suppliers than vice versa. Thus, investors can reliably infer the timing and content of information received by suppliers and revise their beliefs of the suppliers' value based on the disclosures of their major customers. Based on the predictions of Dye and Sridhar (1995) and Acharya et al. (2011), we expect that disclosures from major customers can significantly impact suppliers' disclosure decisions.

Our primary measure of voluntary disclosure is management earnings forecasts (MEFs). We use MEFs because these disclosures can greatly influence investors' belief of firm value (Beyer, Cohen, Lys & Walther, 2010; Ball & Shivakumar, 2008). We examine a supplier's decision to provide MEFs in a two-week window following its customer's MEFs announcement. We define supplier MEFs as good (bad) news if supplier MEFs exceed (fall short of) analysts' expectations. Following Pandit et al. (2011), we use supplier stock price reaction to customer MEFs to measure the impact of customer MEFs on investors' belief of supplier value. We classify customer MEFs as a positive (negative) information externality to the supplier if supplier three-day cumulative abnormal return surrounding their customers' MEFs is positive (negative). If the supplier's cumulative abnormal return is positive (negative), we interpret that the customer's MEFs represents good (bad) news for the supplier.

We examine the effects of positive and negative customer information externality on supplier disclosures separately because these effects can be asymmetric (Acharya et al., 2011). We find that suppliers are more likely to provide MEFs when they experience a greater stock price drop from customer MEFs and those supplier MEFs tend to be bad news. We also find that the subsequent stock returns of suppliers remaining silent underperform those of suppliers that disclose in response to negative customer MEFs. However, when suppliers experience a positive stock price reaction from customer MEFs, we don't find a relation between these

price increases and the supplier's propensity to disclose nor do we find a relation with the content of the disclosure. We also show that the subsequent stock price performance of suppliers that disclose and those that remain silent to positive customer MEFs is not statistically different. Overall, these results suggest that customer disclosures influence supplier disclosure decisions when customer disclosures create a negative information externality on their suppliers.

Our paper contributes to the literature in the following aspects. First, this paper extends our knowledge of disclosure dynamics across related firms. While prior research has focused on the interplay in the disclosure decisions between intra-industry firms, this paper sheds light on the disclosure dynamics within a supply chain relationship. Our paper also adds to the growing accounting literature on supply chain relationships. Empirical studies find that supply chain relationships are associated with important economic consequences such as equity mispricing (Cohen & Frazzini 2008), earnings management (Raman & Shahrur, 2008), and firm performance (Lanier, Wempe & Zacharia, 2010; Gosman & Kohlbeck, 2009). Our results suggest that supply chain relationships can also impact firms' decision to provide voluntary disclosure.

HYPOTHESES

We develop our hypotheses based on the theoretical predictions of dynamics disclosure models. Since Dye and Sridhar (1995) predict more disclosures when peer firms disclose either good or bad news, while Acharya et al. (2011) predict more disclosures only when peer firms disclose bad news, we develop our hypotheses separately when customer MEFs create a positive or negative information externality on the supplier.

Using different assumptions, Dye and Sridhar (1995) and Acharya et al. (2011) generate the same predictions when related firms disclose bad news. Dye and Sridhar (1995) assume that there is a positive correlation among the timing when related firms receive new information. Based on the argument of Dye and Sridhar (1995), greater supplier stock price drop in response to major customer MEFs leads investors to revise upwards the probability that the supplier receives some information. Therefore, there is less ability for suppliers with bad news to hide, resulting in more supplier disclosures, particularly bad news disclosures. Silent suppliers are firms with the worst news and thus subsequently underperform those that disclose with better than the worst news. On the other hand, Acharya et al. (2011) assume that the content of information received by related firms are positively correlated and generate similar predictions. According to Acharya et al. (2011), a greater supplier stock price drop in response to major customer MEFs indicates that investors are more likely to expect bad news from the supplier and thus lower their posterior estimate of supplier value. In return, the disclosure threshold is reduced, resulting in more disclosure of previously held bad news. Silent suppliers are firms with the worst news and thus subsequently underperform those that disclose with better news. Therefore, we form the following hypotheses when customer MEFs result in a negative information externality to suppliers.

H1 *Suppliers are more likely to provide MEFs when they experience greater stock price decline in response to customer MEFs.*

H2 *Suppliers are more likely to disclose negative MEFs when they experience greater stock price decline in response to customer MEFs.*

H3 *When suppliers experience a negative information externality from customer MEFs, the subsequent stock returns of suppliers remaining silent underperforms the returns of suppliers that disclose.*

However, when related firms disclose good news, Dye and Sridhar (1995) and Acharya et al. (2011) give different predictions. The model in Dye and Sridhar (1995) suggests that a greater supplier stock price increase in response to major customer MEFs signals a greater probability of suppliers' receipt of information to investors, making it harder for suppliers to hide their bad news. This in turn reduces the disclosure threshold and results in more disclosure, and in particular bad news disclosure, which is driven by investors' demand for information. In contrary, the model by Acharya et al. (2011) suggests that a greater supplier stock price increase in response to major customer MEFs leads investors to believe that suppliers have good news and raise their expected value of suppliers. This increases the disclosure threshold and leads to fewer supplier disclosures, particularly bad news disclosure. Therefore, whether positive information externalities from major customer MEFs trigger more supplier disclosure and what information suppliers are prompted to release are empirical issues. Yet, both theories predict that silent suppliers with the worst news underperform those suppliers that disclose their better news. Given the competing predictions, we form the following hypotheses when customer MEFs create a positive information externality on suppliers (in the null form):

H4 *There is no association between a supplier's propensity to provide MEFs and the magnitude of stock price increases from customers MEFs.*

H5 *There is no association between the content of supplier MEFs and the magnitude of stock price increases from customer MEFs.*

H6 *There is no association between the subsequent stock returns of silent suppliers and the magnitude of stock price increases from customer MEFs.*

DATA

We collect supplier-major customer relationships data from the Compustat segment database between August 2000 and December 2010. The start month corresponds with the enactment of Regulation Fair Disclosure (Reg FD). Prior to Reg FD, Management may privately provide forecasts to a select group of analysts. Thus, these forecasts would not be captured in any database. We identify major customer MEFs from the First Call Company Issued Guidance (CIG) database and use the supplier-major customer relationship data to trace subsequent supplier MEFs. We match the data with annual Compustat financial statement data, CRSP for stock prices, and IBES for analyst forecasts. Our final sample contains 34,595 customer-supplier disclosure events.

PROXIES

Our primary measure of voluntary disclosure is MEFs. MEFs have been used extensively in the accounting literature as proxies for voluntary disclosure (Hirst et al., 2008). Forecasts reflect managements' belief of firm future cash flows and can greatly influence the expectations of investors and analysts (e.g., Hirst, Koonce & Venkataraman, 2008).

We define a supplier voluntary disclosure event as the announcement of MEFs by the supplier in a two-week window following a customer's MEFs announcement. We choose a two-week window because a long window may capture other events that drive the supplier to provide forecasts and a window that is too short may not give enough time for the supplier to formulate a response. Specifically, we code an indicator variable (*SupDisclose*) that is set to one if the supplier provides MEFs within two weeks following MEFs provided by a major customer, and zero otherwise.

We further measure the content of supplier disclosure. We consider supplier MEFs as good (bad) news if the forecasted earnings exceed (fall short of) analysts' expectations. When supplier MEFs are given as a range, we use the midpoint of the range for determining the disclosure content following the previous literature (e.g., Tse & Tucker, 2010; Goodman, Neamtiu, Shroff & White, 2014). The supplier MEFs content (*SupDiscloseCont*) is a trichotomous variable that equals 1 if the supplier provides good news; -1 if the supplier provides a bad news forecast; and 0 if the supplier provides no forecast within a two-week period following customer MEFs.

We measure the information externality experienced by the supplier as the supplier's stock price reaction to a major customer's MEFs (|*SupCAR*|) following Pandit et al. (2011) and Tse and Tucker (2010). We classify a major customer's MEFs as a positive (negative) information externality to the supplier if the supplier's three- day cumulative abnormal return surrounding the customer's MEFs is positive (negative). If the supplier's cumulative abnormal returns are positive (negative), we interpret that the major customer's MEFs represent good (bad) news for the supplier.

SUMMARY STATISTICS

Table 1 provides summary statistics of the characteristics of the suppliers and their major customers in the overall sample. On average, suppliers are smaller than their major customers. This is reflected in terms of total sales (1,914.16 vs. 17,263.01), net income (73.86 vs. 954.02), total assets (1,973.22 vs. 26,046.65), and market capitalization (2,860.52 vs. 24,680.35). These results are consistent with customer disclosure requirements set forth by the Securities and Exchange Commission (SEC) in Regulation S-K and the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) 280-10-50-42, which states that firms are required to disclose both the identities of and revenues from their major customers. Suppliers also have poorer performance compared to their major customers with an average return on assets of -0.07 compared with 0.04. However, suppliers have more growth opportunities as measured by the market-to-book ratio (2.74 versus 0.33). The average percentage of sales that a supplier derives from its disclosed customers is 20.94%, indicating that suppliers obtain a significant portion of their revenue from major customers. The table

also shows that suppliers have 1.39 disclosed customers while customers have 3.35 suppliers. While customers have multiple suppliers, fewer major customers are disclosed by suppliers.

Table 1: Supplier and Customer Firm Characteristics	
Panel A: Supplier	
	Mean
Annual Sales (in millions)	1,914.16
Net income (in millions)	73.86
Total assets(in millions)	1,973.22
Market capitalization (in millions)	2,860.52
Return on assets	-0.07
Market-to-book ratio	2.74
Average percentage of sales derived from each major customer	20.94
Average number of major customers listed per year	1.39
Panel B: Customers	
	Mean
Annual Sales (in millions)	17,263.01
Net income (in millions)	954.02
Total assets(in millions)	26,046.65
Market capitalization (in millions)	24,680.35
Return on assets	0.04
Market-to-book ratio	0.33
Number of suppliers	3.35

Table 2 details the industry composition of suppliers and customers in the sample using the Fama-French 48 industry classification scheme. The industries with the greatest concentration of suppliers are pharmaceutical products (16.9%), business services (11.26%), and electronic equipment (10.66%). No other industry accounts for more than 7% of the supplier sample. As for the set of major customers, retailers (30.24%) and wholesalers (16.30%) dominate the list of disclosed customers. Overall, this table shows that customers and suppliers in our sample concentrate in certain industries, necessitating the need to control for industry effects in our multivariate analyses.

Table 2: Supplier and Customer Industry Composition		
Industry	Supplier (%)	Customer (%)
1. Agriculture	0.42	0.14
2. Food Products	4.14	0.70
3. Candy and Soda	0.56	0.11
4. Beer and Liquor	0.16	0.39
5. Tobacco Products	0.05	0.43
6. Recreation	2.40	0.15
7. Entertainment	0.36	0.06
8. Printing and Publishing	0.27	0.11
9. Consumer Goods	2.71	2.01
10. Apparel	6.74	0.30
11. Healthcare	1.29	0.40
12. Medical Equipment	2.91	1.42
13. Pharmaceutical Products	16.90	7.38
14. Chemicals	1.33	0.55
15. Rubber and Plastic Products	1.19	0.03

Table 2: Supplier and Customer Industry Composition Cont.		
Industry	Supplier (%)	Customer (%)
16. Textiles	0.66	0.01
17. Construction Materials	2.58	0.04
18. Construction	0.47	0.10
19. Steel Works Etc.	0.58	0.09
20. Fabricated Products	0.23	0.00
21. Machinery	3.08	1.48
22. Electrical Equipment	2.23	0.08
23. Automobiles and Trucks	1.76	3.48
24. Aircraft	2.01	3.39
25. Shipbuilding and Railroad Equipment	0.18	0.03
26. Defense	0.58	1.13
27. Precious Metals	0.00	0.00
28. Non-Metallic and Industrial Metal Mining	0.10	0.01
29. Coal	0.50	0.01
30. Petroleum and Natural Gas	2.47	0.39
31. Utilities	0.00	2.04
32. Communication	0.62	1.99
33. Personal Services	0.08	0.04
34. Business Services	11.26	3.93
35. Computers	8.13	6.46
36. Electronic Equipment	10.66	5.51
37. Measuring and Control Equipment	2.87	0.64
38. Business Supplies	1.33	0.40
39. Shipping Containers	0.49	0.01
40. Transportation	0.96	0.42
41. Wholesale	3.36	16.30
42. Retail	0.67	30.24
43. Restaurants, Hotels, Motels	0.00	0.50
44. Banking	0.00	0.32
45. Insurance	0.00	1.81
46. Real Estate	0.00	0.00
47. Trading	0.00	0.10
48. Other	0.71	4.87
Total	100.00	100.00

Table 3 Panel A presents descriptive statistics of various supplier and customer characteristics divided between suppliers that disclose and those that remain silent. Among the 34,595 customer-supplier disclosure events, suppliers provide a subsequent disclosure in 2,874 events (8.4%) and remain silent in 31,721 events (91.6%) following customer MEFs. The descriptive statistics in Panel A show that performance (*ROA*), firm size (*Size*), litigation risk (*Lit*), institutional investor holdings (*InstInvst*), and analysts following (*AFolw*) are higher for suppliers who provide subsequent MEFs following customer MEFs compared to those that remain silent. They also issue equity more frequently (*EqtyIss*), are more likely to regularly provide MEFs (*RegCast*) that are of a longer horizon (*CustFH*), and are more likely to issue forecasts with their earnings announcements (*SupEA*). Furthermore, suppliers who disclose subsequently have lower stock return volatility (*RetVol*) and the investor reaction to customer MEFs is lower (|*SupCAR*|). These suppliers are also more likely to have other customers concurrently providing MEFs (*OCD*).

Table 3: Descriptive Statistics

Panel A

	Suppliers that disclose		Suppliers that are silent		2-Sided T-Test
	Mean	Std. Dev.	Mean	Std. Dev.	Difference in Means
|SupCAR|	0.037	0.0008	0.042	0.0003	-0.005***
ROA	0.024	0.0031	-0.059	0.0015	0.083***
Size	7.211	0.0326	5.697	0.0116	1.514***
Lit	0.046	0.0008	0.030	0.0002	0.016***
InstInvst	0.542	0.0071	0.389	0.0020	0.153***
AFolw	1.165	0.0129	0.970	0.0042	0.195***
EqtyIss	0.922	0.0050	0.850	0.0020	0.072***
RetVol	0.137	0.0017	0.168	0.0006	-0.031***
OCD	0.253	0.0081	0.197	0.0022	0.056***
RegCast	0.061	0.0044	0.001	0.0001	0.060***
CustFH	139.70	2.3261	130.18	0.7039	9.519***
SupEA	0.743	0.0082	0.005	0.0004	0.738***
N	2,874		31,721		

Panel B

	Negative Supplier Stock Price Reaction to Customer Disclosure		Positive Supplier Stock Price Reaction to Customer Disclosure		2-Sided T-Test
	Mean	Std. Dev.	Mean	Std. Dev.	Difference in Means
|SupCAR|	0.040	0.0003	0.043	0.0004	-0.003***
ROA	-0.056	0.0020	-0.047	0.0020	-0.009***
Size	5.814	0.0155	5.831	0.0162	-0.017
Lit	0.032	0.0003	0.031	0.0003	0.001*
InstInvst	0.398	0.0027	0.407	0.0028	-0.009**
AFolw	0.991	0.0057	0.981	0.0057	0.010
EqtyIss	0.856	0.0026	0.856	0.0027	0.000
RetVol	0.168	0.0008	0.164	0.0008	0.004***
OCD	0.202	0.0030	0.202	0.0031	0.000
RegCast	0.005	0.0005	0.006	0.0006	-0.0011**
CustFH	131.02	0.9304	130.92	0.9773	0.09
SupEA	0.063	0.0018	0.070	0.0020	-0.007***
N	18,086		16,509		

*/**/*** represent statistical significance at the 10%/5%/1% level, respectively.

When we divide the sample between suppliers who experience a negative stock price reaction to customer MEFs and those that receive a positive reaction in Panel B of Table 3, we also see systematic differences in various customer and supplier characteristics, namely *|SupCAR|*, *ROA*, *Lit*, *InstInvst*, *RetVol*, *RegCast*, and *SupEA*. These significant differences indicate the importance of controlling for these factors.

SUPPLIERS' PROPENSITY TO PROVIDE MEFS FOLLOWING CUSTOMER MEFS

Model

We use the following logistic regression model to analyze a supplier's decision to provide MEFs following a stock price drop (increase) due to negative (positive) customer MEFs (hypotheses H1 and H4):

$$\begin{aligned}\Pr(\text{SupDisclose} = 1) = {} & \alpha + \beta_1|\text{SuppCAR}| + \gamma_1\text{ROA} + \gamma_2\text{Size} + \gamma_3\text{Lit} + \gamma_4\text{InstInvst} \\ & + \gamma_5\text{Analyst} + \gamma_6\text{EqtyIss} + \gamma_7\text{RetVol} + \gamma_8\text{OCD} + \gamma_9\text{RegCast} \\ & + \gamma_{10}\text{CustFH} + \gamma_{11}\text{SupEA} + \sum \text{Industry fixed effects} + \varepsilon\end{aligned} \quad (1)$$

where the dependent variable, *SupplierDisclose*, is an indicator variable that equals one if the supplier provides MEFs in a two-week interval following customer MEFs and zero otherwise. |*SupCAR*| measures the magnitude of a supplier's three-day cumulative abnormal return surrounding a customer MEFs announcement and is our main variable of interest. According to H1, we predict that the estimated coefficient on |*SupCAR*| is positive when the supplier experiences a negative stock price reaction from customer MEFs. As for H4, we have competing arguments for how suppliers will respond following positive customer MEFs and thus have an ambiguous prediction of the coefficient's sign for |*SupCAR*|.

Following the previous literature (e.g., Miller 2002; Chen et al. 2011; Houston et al. 2010; Skinner 1994; Sletten 2012), we control for a number of covariates that can affect a supplier's propensity to provide MEFs. These variables include supplier return on assets (*ROA*), market cap (*Size*), litigation risk (*Lit*), institutional investor holdings (*InstInvst*), analysts following (*AFolw*), equity issues in the current year (*EqtyIss*), and stock return volatility (*RetVol*). We further control for forecasting characteristics of the customer and the supplier. These controls are indicator variables for whether another customer provides concurrent disclosures (*OCD*), for whether the supplier regularly provides management forecasts (*RegCast*) and for whether the forecast is bundled with an earnings announcement (*SupEA*). We further control for the horizon of the customer forecast (*CustFH*). Detailed variable definitions are provided in Appendix A.

Results

Table 4 presents the logistic regression results of the supplier's propensity to provide MEFs following customer MEFs. The model includes industry fixed effects based on the Fama-French 48 industry classification. Standard errors are clustered at the supplier firm level to take into account the correlation of residuals related to MEFs issued by the same supplier.

Consistent with hypothesis H1, the coefficient on |*SupCAR*| is positive and statistically significant in column (1), indicating that the propensity for suppliers to disclose increases in the magnitude of the supplier's stock price drop to customer MEFs. The magnitude on the coefficient is also large (6.22) relative to other factors in the model indicating that |*SupCAR*| is a significant determinant of suppliers' propensity to provide MEFs following negative customer MEFs disclosure. Coefficients on the control variables are broadly consistent with prior literature (e.g., Chen et al. 2011 and Houston et al. 2010).

Column (2) of Table 4 displays results of the propensity for suppliers to provide MEFs following positive customer MEFs. The coefficient on |*SupCAR*| is not statistically significant. This result suggests that the predictions of both Dye and Sridhar (1995) and Acharya et al. (2011) may both at play resulting in the statistical insignificance. Our results suggest that suppliers only respond with subsequent MEFs when customer MEFs create a negative information externality on their suppliers.

Table 4: Determinants of Suppliers' Propensity to Provide MEFs Following Customer MEFs (Logit Model)				
	Negative Supplier Stock Price Reaction to Customer Disclosure		Positive Supplier Stock Price Reaction to Customer Disclosure	
	Supplier Provides Forecast (1)		Supplier Provides Forecast (2)	
	Coefficient	Z-Statistic	Coefficient	Z-Statistic
|SupCAR|	6.22***	(4.49)	0.46	(0.30)
ROA	0.72*	(1.93)	0.32	(0.67)
Size	0.44***	(8.85)	0.46***	(7.24)
Lit	-2.43	(-1.24)	-1.99	(-0.81)
InstInvst	0.00	(0.01)	0.28	(1.47)
AFolw	0.15***	(2.60)	0.15	(1.58)
EqtyIss	0.35	(1.62)	0.34	(1.37)
RetVol	0.14	(0.18)	0.63	(0.80)
OCD	0.20	(1.12)	0.22	(1.24)
RegCast	2.80***	(3.64)	3.45***	(5.88)
CustFH	-0.00	(-0.87)	0.00	(1.37)
SupEA	6.44***	(33.66)	6.49***	(33.10)
Intercept	-6.33***	(-13.38)	-6.95***	(-12.85)
Observations	18,086		16,509	
Industry FE	Yes		Yes	
Pseudo R^2	0.613		0.656	

*/**/*** represent statistical significance at the 10%/5%/1% level, respectively.

CONTENT OF SUPPLIER MEFS FOLLOWING CUSTOMER MEFS

Model

We next analyze the content of supplier MEFs to test hypotheses H2 and H5. Specifically, we investigate the determinants of the propensity for suppliers to provide specific type of news (either bad or good news) in their forecasts following positive and negative customer MEFs. The model for testing H2 and H5 is similar to the model for testing hypotheses H1 and H4 except that the dependent variable is now a trichotomous variable (*SupDiscloseCont*) with three levels: no disclosure, bad news supplier disclosure, and good news supplier disclosure. Therefore, we run a multinomial logistic regression with no disclosure as the base level.

Results

Results of the multinomial logistic regression are shown in Table 5. Column (1) of Panel A in Table 4 provides results for the propensity of suppliers to provide bad news disclosures following negative stock price reaction to customer MEFs. As Column (1) shows, |*SupCAR*| is positive and statistically significant with a coefficient of 6.87. This result is consistent with

hypothesis H2 which states that suppliers disclose more bad news following negative customer MEFs. Looking at the controls, the variables of *ROA*, *Size*, *Lit*, *AFolw*, *RegCast*, *CustFH*, and *SupEA* are all significant and carry the predicted sign. Column (2) of the same panel presents results for the propensity of suppliers to provide good news disclosures following negative stock price reaction to customer disclosures. The column shows that the coefficient of |*SupCAR*| is negative but not significant. Significant control variables include *Size*, *AFolw*, *OCD*, *RegCast*, and *SupEA*.

Taken together, the results of column (1) and column (2) in Panel A confirm hypothesis H2. Suppliers are more likely to disclose bad news following negative spillover effects from customer disclosure. Investors infer a noisy signal of the information that suppliers possess when major customers disclose bad news. As a result, when suppliers provide a disclosure following customer disclosure, they are more likely to disclose bad news. Suppliers disclose bad news in order to separate themselves from other types who may have worse.

Table 5: Determinants of Supplier MEFs Content Following Customer MEFs (Multinomial Logit Model)

Panel A

	Negative Supplier Stock Price Reaction to Customer Disclosure			
	Supplier Provides Bad News Forecast (1)		Supplier Provides Good News Forecast (2)	
	Coefficient	Z-Statistic	Coefficient	Z-Statistic
|SupCAR|	6.87***	(5.68)	-1.60	(-0.92)
ROA	1.03***	(2.98)	-0.26	(-0.83)
Size	0.44***	(9.48)	0.36***	(6.79)
Lit	-4.94***	(-2.61)	-1.23	(-0.58)
InstInvst	0.11	(0.79)	0.01	(0.08)
AFolw	0.18***	(2.76)	0.19**	(2.55)
EqtyIss	0.17	(0.93)	0.28	(1.28)
RetVol	0.68	(1.03)	0.48	(0.60)
OCD	-0.03	(-0.24)	0.30**	(2.01)
RegCast	1.89***	(3.60)	1.61***	(2.88)
CustFH	-0.00*	(-1.85)	0.00	(0.83)
SupEA	5.24***	(44.11)	5.56***	(40.61)
Intercept	-6.28***	(-10.59)	-7.26***	(-9.08)
Observations	18,086			
Industry FE	Yes			
Pseudo R^2	0.489			

*/**/*** represent statistical significance at the 10%/5%/1% level, respectively.

In Panel B, we investigate the news content of supplier disclosures following positive customer MEFs. As the panel shows, the coefficient of |*SupCAR*| is not statistically significant

at conventional levels across both columns (1) and (2). These results suggest that there is no differential impact of customer disclosure on supplier disclosure content when the customer releases good news. The results of Panel B answer hypothesis H5. When a customer provides a good news disclosure, suppliers are neither more likely to provide good news nor bad news in the forecasts that they provide. These results suggest that predictions of both Dye and Sridhar (1995) and Acharya et al. (2011) may be at play leading to no statistically significant effect.

Table 5: Determinants of Supplier MEFs Content Following Customer MEFs (Multinomial Logit Model)				
Panel B				
	Positive Supplier Stock Price Reaction to Customer Disclosure			
	Supplier Provides Bad News Forecast (1)		Supplier Provides Good News Forecast (2)	
	Coefficient	Z-Statistic	Coefficient	Z-Statistic
|SupCAR|	-2.17	(-1.38)	1.83	(1.18)
ROA	0.30	(0.77)	0.64	(1.52)
Size	0.37***	(7.23)	0.36***	(6.55)
Lit	0.17	(0.08)	-0.25	(-0.12)
InstInvst	0.14	(0.84)	0.27	(1.55)
AFolw	0.15*	(1.91)	0.09	(1.07)
EqtyIss	0.03	(0.14)	0.16	(0.75)
RetVol	-0.55	(-0.68)	1.35*	(1.67)
OCD	0.07	(0.46)	0.11	(0.69)
RegCast	2.14***	(5.00)	2.36***	(5.53)
CustFH	0.00	(0.24)	0.00**	(2.40)
SupEA	5.54***	(42.30)	5.86***	(41.27)
Intercept	-6.21***	(-7.97)	-9.03***	(-7.31)
Observations	16,509			
Industry FE	Yes			
Pseudo R^2	0.527			

*/**/*** represent statistical significance at the 10%/5%/1% level, respectively.

Overall, our results suggest that suppliers more readily disclose after negative stock price reaction from major customer MEFs and that these disclosures tend to be bad news. A natural question then is what happens to suppliers who remain silent. We investigate this issue in the next section.

STOCK PRICE REACTION TO SILENCE

Model

Suppliers who stay silent following customer MEFs are predicted to underperform relative to suppliers who disclose (H3 and H6). Since managers self-select to keep quiet or to disclose, we use a two stage least squares model to test the association between supplier silence and subsequent stock returns following positive or negative reaction to customer disclosure. Following Wooldridge (2002), we first instrument the *Silent* dummy by running the first-stage regression (2).

$$\text{Silent} = \alpha + \beta_1|\text{SuppCAR}| + \gamma_1\text{ROA} + \gamma_2\text{Size} + \gamma_3\text{Lit} + \gamma_4\text{InstInvst} + \gamma_5\text{Analys} + \gamma_6\text{EqtyIss} + \gamma_7\text{RetVol} + \gamma_8\text{OCD} + \gamma_9\text{RegCast} + \gamma_{10}\text{CustFH} + \gamma_{11}\text{SupEA} + \sum \text{Industry fixed effects} + \varepsilon \quad (2)$$

where the dependent variable *Silent* is an indicator for whether a supplier stays silent or provides forecasts following customer MEFs. Other control variables are the same as those in regression model (1).

We then use the instrumented variable (*Silent**) in the following the second-stage regression (3):

$$\text{Sup1yrCAR} = \alpha + \beta_1\text{Silent}^* + \gamma_1|\text{SupCAR}| + \gamma_2\text{ROA} + \gamma_3\text{MB} + \gamma_4\text{Size} + \sum \text{Industry fixed effects} + \varepsilon \quad (3)$$

where the dependent variable, *Sup1yrCAR,* is the one-year cumulative abnormal return of the supplier following the date of customer disclosure. *Silent** is the predicted values from the first-stage regression. In addition to |*SupCAR*| and *ROA*, we control for future growth (*MTB*), firm size (*Size*), and industry fixed effects following Fama and French (1992).

Results

Table 6 presents the second-stage results of the subsequent supplier stock price performance. In Column (1), the instrumented variable *Silent**, is negative and statistically significant at the 10% level. This result provides some support of H3 that silent suppliers are associated with lower stock returns following negative customer forecasts. |*SupCAR*| is positively associated with cumulative annual returns following customer disclosure suggesting that there may be an under reaction to the initial customer disclosure. Size and MTB also have statistically significant coefficients at conventional levels. Column (2) presents results examining annual returns following a positive customer disclosure and answers hypothesis H6. *Silent* is not significant at conventional levels, suggesting that good news customer disclosures have no discernible impact on long-term supplier stock returns.

Overall, the results in this table suggest that the stock price of silent suppliers underperforms that of forthcoming suppliers following negative customer disclosure. However, when a customer provides positive disclosure, there is no difference in subsequent stock returns

between suppliers who provide subsequent disclosure and those that remain silent.

Table 6: Subsequent Supplier Stock Price Performance Following Supplier Disclosure Decision				
	Negative Supplier Stock Price Reaction to Customer Disclosure		Positive Supplier Stock Price Reaction to Customer Disclosure	
	Supplier CAR Over the Following Year (1)		Supplier CAR Over the Following Year (2)	
	Coefficient	T-Statistic	Coefficient	T-Statistic
Silent	-0.03*	(-1.68)	-0.01	(-0.29)
|SupCAR|	0.41***	(2.71)	-1.41***	(-9.33)
ROA	0.03	(0.67)	0.01	(0.16)
MTB	-0.17***	(-6.89)	-0.15***	(-6.26)
Size	0.01*	(1.73)	0.01***	(2.67)
Intercept	0.11	(0.79)	0.13	(1.19)
Observations	18,086		16,509	
Industry FE	Yes		Yes	
Adjusted R^2	0.041		0.052	

*/**/*** represent statistical significance at the 10%/5%/1% level, respectively.

CONCLUSIONS

In this study, we extend the finance and accounting literature by documenting the impact of customer disclosures on subsequent supplier disclosures and stock prices. Specifically, we examine the determinants of supplier disclosure propensity and content in response to news from customer disclosures. We also investigate the subsequent stock price performance of suppliers that provide a disclosure following customer disclosure versus those that remain silent.

We find that suppliers are more likely to disclose when they suffer a negative information externality from customer disclosures and that the supplier disclosures are more likely to contain bad news. In terms of subsequent stock returns, we find that suppliers who disclose following negative reaction to customer disclosure perform better than those that remain silent. When suppliers experience a positive externality from customer disclosures, there appears to be no association between the externality and the propensity for suppliers to disclose. Furthermore, good news from customer disclosures does not appear to impact the content of subsequent supplier disclosures. In addition, the stock price performance of suppliers that disclose following positive reaction to customer disclosures is not significantly different from those that remain silent.

While prior research has primarily focused on disclosure decisions between horizontal (intra-industry) firms, our findings suggest that firms take into account vertical (supply chain) relationships as part of their overall disclosure strategy. Future research can examine the interplay between vertical and horizontal relationships in a firm's voluntary disclosure

decisions. For example, it may be interesting to investigate under what conditions voluntary disclosures act as a complement or a substitute to disclosures provided by supply chain partners and those made by industry peers.

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Appendix A: Variable Definitions

Supplier Characteristics	
SupDisclose	An indicator that equals 1if the supplier provides MEFs within a two-week period following customer MEFs, and 0 otherwise.
SupDiscloseCont	A trichotomous variable with that equals 1 if the supplier provides positive MEFs; -1 if the supplier provides negative MEFs; and 0 if the supplier provides no MEFs within a two-week period following customer MEFs.
|SupCAR|	The magnitude of the supplier's three-day cumulative abnormal return around customer MEFs with the announcement date centered at day 0. Daily abnormal return is computed as the raw return minus the value-weighted market return.
ROA	Net income divided by total assets in the previous year.
Size	Natural logarithm of the market value of equity in the previous year.
Lit	The probability of a lawsuit over the previous year based on the modified model of Rogers and Stocken (2005).
InstInvst	Average percentage of shares held by institutional investors divided by total shares outstanding over the previous year.
AFolw	Number of analysts which provided at least one forecast of the supplier over the previous year.
EqtyIss	An indicator that equals 1 if the firm issued equity in the current year, and 0 otherwise.
RetVol	Standard deviation of daily stock returns over the past year.
OCD	An indicator that equals 1 if another major customer of the supplier provides MEFs within a two-week period from the customer guidance announcement, and 0 otherwise.
RegCast	An indicator that equals 1 if the supplier has provided forecasts in three out of the four quarters over the previous year, and 0 otherwise.
SupEA	An indicator that equals 1 if the supplier had an earnings announcement in the two-week period after a major customer provides MEFs and 0 otherwise.
MTB	Natural logarithm of the market value of equity to the book value of equity in the previous year.
Silent	An indicator that equals 1 if the supplier stays silent, and 0 otherwise.
Customer Characteristics	
CustFH	Number of days between customer forecast announcement and the end of the forecast period.