5-2015

The Performance of Institutional Investor Trades Across the Supply Chain

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To the Graduate Council:

I am submitting herewith a dissertation written by Dallin Max Alldredge entitled "The Performance of Institutional Investor Trades Across the Supply Chain." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

Andy Puckett, Major Professor

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A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Dallin Max Alldredge
May 2015

Acknowledgements

Special thanks to Andy Puckett, my doctoral committee chairman, for guidance throughout this project. I would like to thank Eric Kelley, David Cicero, Larry Fauver, Bruce Behn, Honghui Chen, Jim Upson, Brian Blank and seminar participants at the University of Tennessee, Seton Hall University, University of Mississippi, Washington State University, University of Texas at El Paso and University of Central Florida for helpful comments. Finally, I thank my wife, Allison, for being patient and supportive during my graduate studies.

Abstract

In this paper I investigate institutional ownership and trading across the supply chain. I find that institutions are more likely to own stock in a supplier firm, if they own stock in an economically linked customer firm. Institutions with stock in a pair of customer-supplier linked firms (i.e. joint owners) experience abnormal trading profits in supplier stocks. The magnitude of trading profits increases when institutions own a larger stake in the customer and when the supplier relies upon a concentrated customer base for sales revenue. Furthermore, I document that joint owner trading predicts unexpected earnings news, consistent with these institutional investors extracting material information from economic relationships. The results show that the supply chain is a rich source of information through which some skilled traders can forecast firm fundamentals and realize trading profits.

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Chapter 1

Introduction

Business relationships across the supply chain have important financial implications for both customer and supplier firms. In particular, significant trading bonds between a customer and supplier firm-pair are likely to engender economies of scale in the production and delivery process. The interconnected nature of such relationships also exposes customer and supplier firms to common economic shocks (Menzly and Ozbas, 2010; Cohen and Frazzini, 2008; Pandit, Wasley and Zach, 2011). While the importance of such relationships have been acknowledged by market participants[1], recent research suggests that value-relevant observable information for customer firms is only slowly impounded into the stock prices of linked suppliers. Cohen and Frazzini (2008), for example, document predictable and economically large abnormal returns in supplier companies following shocks to the customer. Of particular importance in this setting is whether certain market participants are able to capitalize on the benefit of these informational inefficiencies.

Recent research suggests that both corporate insiders and sell-side analysts incorporate supply chain information in their trading and earnings estimates (Alldredge and Cicero, 2014; Guan, Wong, and Zhang, 2014). In particular, Guan, Wong, and Zhang (2014) find that sell-side analysts covering both firms in a customer-supplier relationship

[1]For example, following news hype about the new iPhone 6, the stock prices of Apple's component suppliers soared in anticipation that Apple sales would positively impact future supply firm profits. See Reuters July 6, 2014 news article: http://www.reuters.com/article/2014/07/07/apple-investors-taiwan-idUSL4N0PE1F920140707

are able to improve their earnings forecast accuracy of supplier firms significantly more than analysts who only cover the supplier. The implications of these findings are that the complexity of customer-supplier relationships prevent market participants who are not intimately familiar with a firm's customer from impounding value-relevant information into the supplier. I extend this line of analysis to consider whether other market participants – institutional investors –capitalize on supply-chain information through their trading activity.[2]

Institutional investors are often viewed as informed market participants and their ability to capture abnormal returns has important implications for market efficiency proponents. As such, my paper contributes to several strands of extant finance research. First, I contribute to the literature on the determinants of institutional investor ownership (Gompers and Metrick, 1998; Sias, 2004; Yan and Zhang, 2009) by showing that institutional investors are significantly more likely to own a supplier firm if they already own a stake in the firm's customer (hereafter I refer to ownership by a single institution in a customer-supplier linked firm relationship as *joint ownership*). Second, I contribute to the literature on the informativeness of institutional trade (Chen, Jegadeesh and Wermers, 2000; Kacperczyk, Sialm and Zheng, 2005; Alexander, Cici and Gibson, 2007; and Puckett and Yan, 2011) by showing institutional trading in supply firm stocks forecasts economically large abnormal returns. Conditioning on joint ownership, I find

[2] Huang and Kale (2013) find some evidence that mutual funds that invest in customer and supplier linked industries have superior performance, consistent with the industry-level informational advantage identified by Kacperczyk, Sialm and Zheng (2005). In Section III C I test whether institutional trading profits in this study can be attributed to industry-level information, and provide evidence inconsistent with this alternative hypothesis.

that supplier firms most heavily purchased by institutions outperform supplier stocks most heavily sold by institutions by approximately 1% per month in the quarter following portfolio formation. The magnitude of abnormal returns is increasing in the institution's percentage ownership in the customer and the strength of the customer-supplier bond. Finally, I add to the argument that institutions are able to anticipate otherwise unexpected shocks to future earnings news (Baker, Litov, Wachter and Wurgler, 2010; Yan and Zhang, 2009; and Ali, Durtschi, Lev and Trombley, 2004). I find that joint owner trading is five times more predictive of upcoming earnings surprises than short-term institutional traders identified by Yan and Zhang (2009). Baker, Litov, Wachter and Wurgler (2010) find that institutional trading skill is in part a function of institutions' ability to forecast earnings news. This study identifies that the institutions' ability to extract material information from the supply chain is a channel through which they can forecast earnings-related fundamentals.

I collect information on customer-supplier relationships over the period from 1986 to 2010 from the Compustat Customer Segments database and institutional ownership from 13F filings obtained by Thompson Financial. I operationalize the concept of investor attention by looking separately at institutions who own the customer stock and institutions that do not. My metric is consistent with that employed by Guan, Wong, and Zhang (2014) and relies on the supposition that institutions that own a stock are intimately more familiar with the nuances of its business than those that do not. I propose that an intimate understanding of a customer firm allows an institutional investor to more efficiently understand the financial intricacies of the firm's suppliers.

Given the economies of scale and scope in information acquisition, I posit that institutions that own shares in a customer firm are significantly more likely to own shares in that firms' supplier. My findings unambiguously support the hypothesis that supply chain linkages are an important determinant of institutional ownership. Univariate analyses show that institutions that own a customer's stock are 4.28 times more likely to also own stock in the corresponding supplier. While untabulated multivariate analyses confirm these findings, I also employ a difference-in-differences approach in order to alleviate concerns of endogeneity. Specifically, I explore changes in both the breadth and depth of institutional ownership around new sales relationships between a customer and supplier. My regression estimates suggest that institutions that own a customer firm are significantly more likely to initiate ownership in the linked supplier firm after a sales relationship is consummated, relative to institutions that do not own shares in the customer firm. Institutions that already have an ownership stake in the customer-supplier linked pair are also more likely to increase supplier ownership after a sales relationship begins. My results are consistent with economies of scale in information gathering and processing and information complementarities across linked pairs of customer-supplier firms.

I then test whether institutional investors attain economic rents in their trading activities as a result of these informational complementarities. In a rational equilibrium framework, revealed information by customer firms that contain value-relevant pricing information for a firm's supplier should be immediately impounded in supply-firm asset prices. Cohen and Frazzini (2008) hypothesize that capacity constraints on investor

attention provide a market friction that allows for slow incorporation of this relevant information into supply-firm asset prices. If the underlying mechanism proposed by Cohen and Frazzini (2008) is correct, one should expect that attentive market participants are able to capitalize on the documented slow diffusion of information and capture appropriate economic rents. Alternatively, if other limits to arbitrage (e.g. liquidity or short sale constraints) drive this documented market inefficiency, one would not expect attentive institutional investors to capitalize on the documented anomaly.

My analysis of abnormal trading returns begins using calendar-time long-short portfolios. I aggregate changes in quarterly holdings (i.e. institutional trades) for all supplier firms across institutions in the sample and divide supplier firms into quartile portfolios by trade imbalance. I follow the value- and equal-weighted performance of supply firm portfolios over the adjacent quarter. For aggregate changes across all institutions, I find modest evidence that the quartile of suppliers most heavily bought outperforms the portfolio of suppliers most heavily sold during the adjacent quarter. Such findings suggest that, in aggregate, institutions are able to capture the benefit of informational complementarities across the supply chain. However, it is possible that the nuanced information flow is captured by a subset of institutions and the profitable trading observed in the aggregate sample is driven by those institutions intimately familiar with supply chain information.

In order to test this possibility, I divide institutional investors in each quarter into two groups: 1) institutions that own the corresponding customer-firm stock, and 2) institutions that do not own the corresponding customer-firm stock, and repeat the trading

experiment. For institutions that own the customer-firm stock, the portfolio of supplier firms most heavily purchased outperforms the portfolio of supplier firms most heavily sold by 1.08 % (0.73%) per month using value-weighted (equal-weighted) averages. The second group of institutions (those who do not own customer-firm stock) represent a natural counterfactual example, since any public value signal can also be observed by this set of institutions. Results for the second sample reveal that the portfolio of supplier stocks most heavily bought do not outperform the portfolio of supplier stocks most heavily sold. My findings provide unique insight into institutional trading profits. Specifically, I identify a setting in which institutions are able to exploit informational inefficiencies by extracting information from the complex economic relationship between customer and supplier firms.

If joint ownership is the mechanism that facilitates institutions' information advantage, I posit that institutions with a greater familiarity of the customer-supplier relationship should be better equipped to obtain and process value-relevant information. I consider the institutions' level of ownership in customer firms as a proxy for the institutions' familiarity with the customer-supplier relationship. I repeat my calendar-time portfolio analysis by partitioning the joint owner trading sample into joint owners with above median customer stock holdings and those with below median customer stock holdings. For joint owners with above median customer stock holdings, the portfolio of supplier stocks most heavily purchased outperforms the portfolio of supplier stocks most heavily sold by 1.14% (0.99%) per month in the quarter following portfolio formation when using value-weighted (equal-weighted) averages. These abnormal portfolio returns

are consistent with joint owner institutions that have a higher ownership stake in the customer being more acutely aware of the customer firm's performance and its impact on the linked supplier firm.

If familiarity with the supply chain yields valuable information about future supplier firm performance, then supply chain characteristics such as the strength of the customer-supplier relationship should impact the profitability of joint owner trade in supplier stock. Following the calendar-time long-short portfolio methodology from previous tests, I investigate how suppliers' customer-base concentration impacts the profitability of trades by joint owners. Consistent with previous tests I create quintile portfolios based on aggregate changes in joint owner holdings, however I partition the sample of supplier firms into those with above median customer-base concentration and those with below median customer-base concentration. Joint owner trading portfolios of heavily purchased high customer-base concentration suppliers outperforms the portfolios of heavily sold high customer-base concentration suppliers by 1.49% (0.92%) per month using value-weighted (equal-weighted) averages. On the other hand, the profitability of joint owner trades in low customer-base concentration suppliers is much lower. In this case, the portfolio of heavily purchased low customer-base concentration suppliers only marginally outperform the portfolio of heavily sold low customer-base concentration suppliers by 0.86% (0.42%) per month using value-weighted (equal-weighted) averages. Elevated joint owner trading profits in suppliers with a concentrated customer base is consistent with joint owner institutions attaining greater benefit from analyzing supply chain information if the firm's customer base is relatively dense. The value of

information mined from supply chain relationships is disparate across firms with varying customer-base concentrations. Tightly linked supply chains are more likely to contain valuable information for institutional traders than loosely knit supply chains.

A potential alternative explanation for my results is that institutions derive and benefit from industry-level information rather than firm-specific information obtained from unique customer-supplier pairs (Huang and Kale, 2013). To explore this possibility, I assign each customer stock to a "pseudo-supplier" firm that closely matches its actual supplier. If industry-level information is the mechanism that drives informed trades, one should expect profitable institutional trading in pseudo-supplier firms. However, I find no evidence of informed trading by institutions trading in pseudo-supplier firms. It appears that joint owner trading profits are not driven by related industry-level information, but by information gathering about customer and supplier linked pairs and timely trading in supplier stock.

Given my evidence of informed trading in supplier stock, another possible source of the information advantage that drives outperformance is that joint owners possess a superior ability to predict the upcoming earnings of supplier firms. I follow the methodology of Yan and Zhang (2009) to investigate this possibility. I find that joint owner trading predicts both earnings surprises and abnormal returns around earnings announcements. The quintile of suppler stock most heavily bought by institutions has 0.89% higher earnings announcement returns (0.41% higher earnings surprise) around the subsequent quarter's earnings announcement than the quintile of supplier stock most heavily sold by institutions. These findings support other studies that document

institutional trading skill is a function of institutions' ability to forecast earnings (Baker, Litov, Wachter and Wurgler, 2010; Yan and Zhang, 2009; and Ali, Durtschi, Lev and Trombley, 2004). More importantly, my findings suggest one channel through which skilled traders are able to forecast earnings. Institutions extract information from complex economic relationships in the supply chain that is of material significance to future firm performance. These information gains are evidenced by the combination of profitable joint owner trading behavior and the predictive nature of joint owner trading on unexpected future earnings.

In summary, this study identifies some explanations for why institutional investors are attracted to ownership of customer-supplier linked pairs. Institutional investors that own customer and supplier linked firms have the skill necessary to sort through information about complex customer-supplier relationships which allows them to affectively forecast future supplier earnings and leads to profitable trading in supplier stock. I document timely institutional trading by institutions that own a large stake in customer stock and in suppliers with strong economic ties to customer firms, which is consistent with institutional investors extracting material information from the complex supply chains to their benefit.

The remainder of this study proceeds as follows. Section II discusses the data and sample selection for the study. Section III contains the empirical results of the study. Finally, Section IV contains a summary and conclusion of the research findings.

Chapter 2

Data and Sample Selection

The data for this study are obtained from several sources. Customer-supplier relationships are collected from the Compustat Customer Segments database. Public companies are required to annually disclose customers that account for more than 10% of their annual sales, and the Compustat Customer Segments database reports statistics from these disclosures.[3] Thomson-Reuters Institutional Holdings (13F) Database is used to extract the quarterly institutional holdings.[4] I exclude quasi-indexers from the sample of institutions in order to screen out institutional managers that passively form investment portfolios.[5] Stock price and returns data are obtained from the Center for Research in Security Prices (CRSP) monthly dataset and financial statement data are collected from Compustat Annual. I include only common stocks (CRSP share codes 10 and 11) from NYSE, AMEX and NASDAQ, and following the convention of Patatoukas (2012), financial services firms are excluded from my analysis.[6]

After restricting the sample to firms with corresponding institutional holdings data, stock returns and financial statement data, my sample includes 2,483 unique

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[3] The process of retrieving the customer-supplier relationships from the database includes hand matching. Some companies report abbreviated customer names (e.g. IBM Corp instead of International Business Machines Corporation), which complicates comparisons to the full company name listed in Compustat. In an effort to match the customer names conservatively I am careful to check company websites and the Business Week company profiles.

[4] Securities law requires that institutional investment managers with over $100 million in common stock positions must disclose their holdings in the SEC Form 13F. A manager is exempt from disclosing holdings fewer than 10,000 shares and less than $200,000 in market value.

[5] The Bushee (2001) "quasi-indexer" classification identifies institutions with low turnover in their diversified portfolios. The long investment horizon and diversified holdings are characteristics consistent with a diversified buy-and-hold strategy. In an effort to isolate informed institutional trading from categorical portfolio formation, the sample excludes quasi-indexers.

[6] I eliminate illiquid stock by dropping those with market capitalizations below $100 million. Further, to eliminate the effect of outliers I winsorize all variables at the 1% and 99% levels.

customer-supplier pairs. Each paired relationship lasts an average of 2.54 years resulting in a sample of 5,184 supplier firm years and 4,520 customer firm years over the 1986 to 2010 sample period.[7] The average supplier has between one and two principle customers, each of which account for at least 10% of the supplier's total sales; and the average customer has between two and three suppliers, which is consistent with the statistics reported in Cohen and Frazzini (2009).

Summary statistics presented in Table 1 show that supplier firms are fundamentally different from customer firms. Consistent with prior literature (Pandit, Wasley and Zach, 2011), I find that customer firms are older and larger than supplier firms. Customer firms have an average market capitalization of $18.6 billion compared to $3.6 billion for supplier firms, and the average age of customer firms is approximately 13 years larger than suppliers. Moreover, customer firms experience more than twice as much monthly trading volume, while the average supplier has greater volatility.

Despite these differences between customer and supplier firms, the percent of total institutional ownership and book-to-market ratios in the two groups are similar. The average supplier firm is 61.15% owned by institutions and the average customer firm is 63.38% owned by institutions. Book-to-market ratios for customer and supplier firms are also economically similar (0.469 versus 0.489).

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[7] Patatoukas (2012) and Cohen and Frazzini (2008) also limit their samples to unique supplier observations and use sales-weighted average customer characteristics across all principle customers of each supplier, if customer characteristics are needed in their analysis.

Table 1. Summary Statistics

This table shows summary statistics for the sample used in the study. Panel A presents a comparison of firm characteristic averages for three sets of firms: customer firms, supplier firms and all Compustat firms. Customer firms are recipients of at least 10% of a supplier's sales. The sample consists of all firm-year observations between 1986 and 2010 with non-zero institutional ownership, excluding quasi-indexed institutions. Also, the sample excludes financial firms. The difference between the average customer firm and the average supplier firm is presented, where the statistical significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively. *Size* is the market capitalization at the end of the fiscal year. *Volume* is the average monthly trading volume during the fiscal year. *B/M* is the book to market ratio, in which the book value is calculated for the fiscal year ended before the most recent June 30 and the market value is calculated as of December 31 in that fiscal year. *Total IO* is the aggregate institutional ownership at the end of the fiscal year. *Dividend yield* is the cash dividend for the fiscal year ended before the most recent June 30 divided by the market capitalization as of December 31 in that fiscal year. *Price* is the stock price at the end of the fiscal year. *Turnover* is total trading volume divided by shares outstanding. *Age* is the number of months since the firm is listed in CRSP. *Leverage* is the total liabilities divided by the total liabilities plus the market capitalization. *Volatility* is the variance of monthly returns over the previous two years. Panel B presents customer-supplier relationship characteristics. It shows the average number of suppliers linked to each customer and the average number of customers linked to each supplier. The average institution's percentage ownership in the customer and supplier are documented, as well as the average change in supplier ownership. Panel B also shows the average number of years the customer-supplier link persists and the strength of the customer-supplier relationship. Customer-supplier relationship strength is measured in two ways: 1) Percentage of total supplier sales accounted for by customer and 2) Customer-base concentration measure (*CC*) introduced by Patatoukas (2012) to identify the supplier's dependence on its customer base.

Panel A: Firm Characteristics

	Customer Firms	Supplier Firms	Difference (Customer-Supplier)	All Compustat
Size ($millions)	18619	3586	15033***	3951
Volume (million)	43.74	17.570	26.17***	14.8
B/M	0.469	0.489	-0.02***	0.507
Total IO (%)	63.38	61.15	2.23***	59.23
Dividend yield (%)	1.59	0.84	0.75***	1.31
Price	39.82	24.63	15.19***	28.52
Turnover (%)	16.08	18.26	-2.18***	15.07
Age (months)	297.9	127.1	170.83***	157.8
Leverage (%)	38.74	30.87	7.87***	34.97
Volatility (%)	10.81	14.33	-3.52***	12.84
Number of firm years	4520	5184		35142

Table 1. Continued.

Panel B: Customer-Supplier Relationship Characteristics			
	Mean	Median	Std Dev
Number of suppliers linked to customer	2.765	1.000	4.654
Number of customers linked to supplier	1.612	1.000	0.751
Avg. ownership of customer (%)	0.288	0.026	1.204
Avg. ownership of supplier (%)	0.512	0.055	1.645
Avg. change in supplier ownership (abs %)	0.180	0.016	0.653
Length of link (years)	2.535	2.000	2.399
Percent of supplier total sales to customer	0.213	0.163	0.143
Customer-base concentration (*CC*)	0.088	0.040	0.140

It appears that the most of customer-supplier relationships do not exist in isolation, but are part of a greater network of economic relationships. The interconnectedness of customer-supplier relationships is illustrated in Figure 1, which shows a snapshot from the web of economically linked firms in the 2010 fiscal year. Each node in the web is a customer or supplier firm and each edge is a sales relationship connecting the two. The right side of the figure highlights the relationships of two customers: Macy's Inc. and Nordstrom's Inc. The nodes connected to Macy's and Nordstrom are supplier firms (i.e. Ellis Perry International Inc., Deckers Outdoor Corp., Jones Group Inc., Estee Lauder Companies Inc., Joes Jeans Inc., etc.). The illustration underscores the interdependent nature of U.S. publically traded companies. In this study I explore potential information that is extracted from economic relationships by institutional investors.

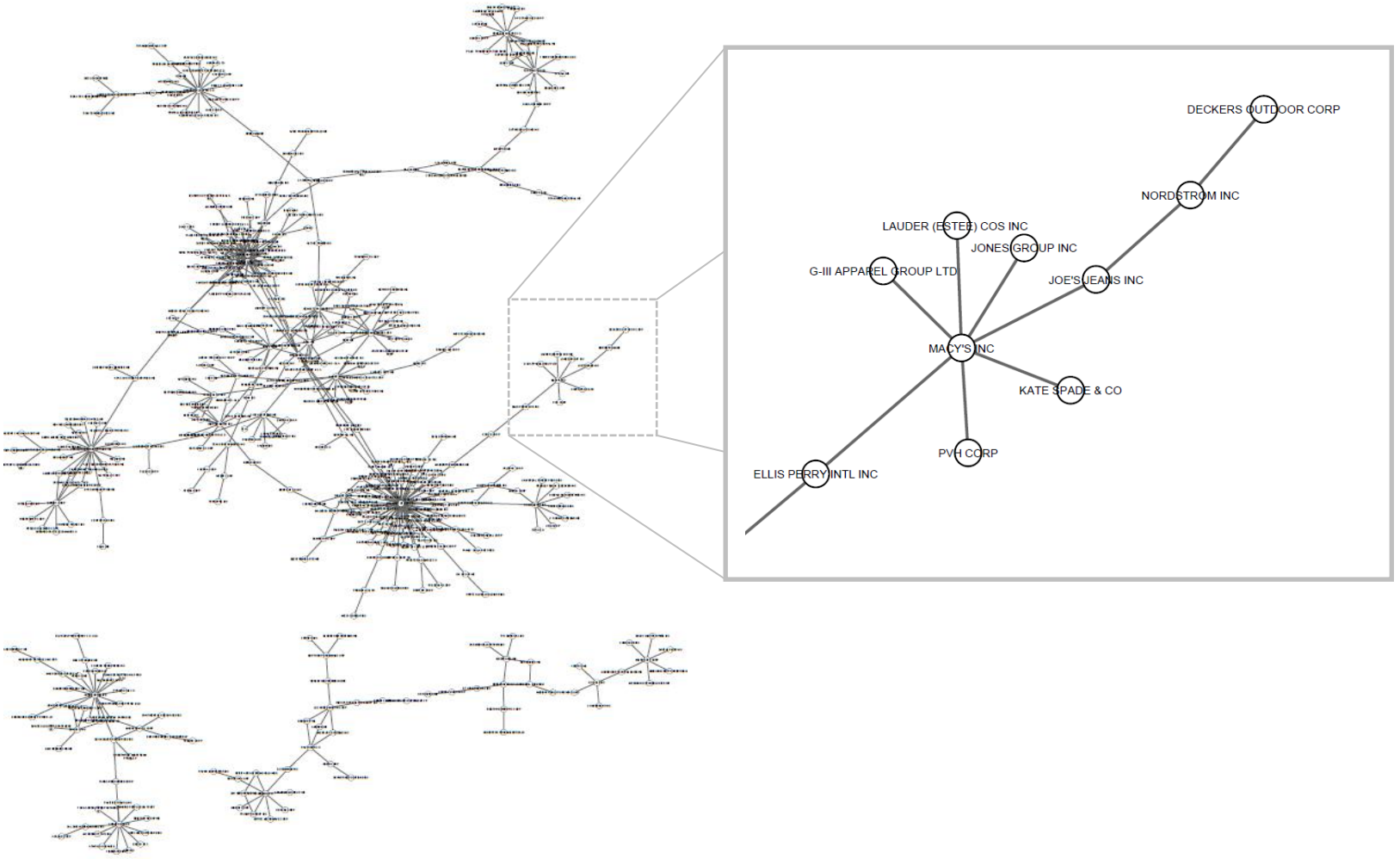

Figure 1: Map of Customer-Supplier Linked Network

Chapter 3

Empirical Results

I investigate institutional ownership along the supply chain and institutional trading in supplier firms to determine whether institutions incorporate supply chain information into their ownership and trading decisions. I first investigate whether supply chain linkages are a significant determinant of institutional ownership. I then explore the impact supply chain linkages have on institutional trading profits. Finally, I examine the cross-sectional dispersion in institutional trading profits across different institutions and supplier firms.

Supply Chain Linkages – Determinants of Institutional Ownership

I investigate the likelihood of joint ownership (i.e. a single institution owning both a customer and supplier stock) in a univariate setting. Specifically, I calculate the conditional probability in each calendar year that an institution owns a supplier stock for two groups of institutions: i) those that own the paired customer, and ii) those that do not own the paired customer. Results presented in Table 2, Panel A show that 13.7% of institutions that own stock in the customer firm also own stock in the linked supplier firm. Alternatively, only 3.2% of institutions that do not own stock in the customer firm have an ownership stake in the linked supplier firm. Taken together, my results suggest that an institution is 428% more likely to own a supplier if it also owns the customer.

In Panel B of Table 2, I reverse my research design and calculate the conditional probability that an institution owns a customer stock for two groups of institutions: i) those that own the paired supplier, and ii) those that do not own the paired supplier. Of

Table 2. Determinants of Customer and Supplier Firm Ownership
This table presents probabilities of customer and supplier firm ownership conditional on ownership in one of the corresponding customer or supplier linked firms. The sample consists of all possible firm-institution pairings for each year. Panel A presents the probability of institutions owning supplier stock conditional on owning or not owning customer stock. Panel B presents the probability of institutions owning customer stock conditional on owning or not owning supplier stock.

Panel A: Supplier Ownership Conditional on Customer Ownership (firm-manager-year observations)		
	Owns customer (yes) (*N=1,530,842*)	Owns customer (no) (*N=4,991,044*)
Owns supplier (yes)	13.7%	3.2%
Owns supplier (no)	86.3%	96.8%

Panel B: Customer Ownership Conditional on Supplier Ownership (firm-manager-year observations)		
	Owns supplier (yes) (*N=370,228*)	Owns supplier (no) (*N=6,151,658*)
Owns customer (yes)	56.6%	21.5%
Owns customer (no)	43.4%	78.5%

the institutions that own stock in the supplier firm, 56.6% of them also have an ownership stake in the linked customer. For institutions that do not own stock in the supplier firm, only 21.5% have an ownership stake in the linked customer firm. My results suggest that an institution is 263% more likely to own a customer stock if the institution owns the supplier. These conditional probabilities suggest that institutions demonstrate a preference for joint ownership in customer-supplier linked pairs.

Univariate tests presented in Table 2 are informative but are also subject to concerns about selection and endogeneity bias. For example, large institutions are more likely to own a broad portfolio of stocks, and it is possible that this analysis simply uncovers the ownership characteristics of large versus small institutions. Alternatively, institutional investors might display ownership preferences for related industries but not

necessarily customer-supplier pairs. In order to alleviate concerns about these potential biases, I run two different multivariate tests. In the first (untabulated) multivariate tests, I explore the propensity for institutions to own customer-supplier linked pairs following the spirit of Yan and Zhang (2009).[8] I augment the methodology used in Yan and Zhang (2009) by creating a unique observation for each potential institution-stock ownership pairing. I include independent variables for stock characteristics as in the model of Yan and Zhang (2009) and also include indicator variables that capture whether the institution has an ownership stake in the corresponding customer or supplier linked firm. I run Fama-MacBeth style cross-sectional regressions in each quarter and find that the coefficients on both the customer ownership and supplier ownership indicators are positive and statistically significant in all 100 quarterly regressions. While this analysis supports the view that supply chain linkages are an important determinant of institutional ownership, this multivariate analyses does not overcome potential endogeneity critiques.

In order to overcome these endogeneity concerns and more clearly identify the tendency of institutions to own both customer and supplier linked stocks, I design a difference-in-difference test around the commencement of a new customer-supplier relationship. I identify the first year of each unique customer supplier relationship (year *t*) and sort institutions into two groups in the year before a customer-supplier relationship begins (year *t*-1): institutions that own the customer stock and institutions that do not own

[8] My approach, while consistent with Yan and Zhang (2009) differs in several important ways. Specifically, Yan and Zhang (2009) investigate determinants of aggregate institutional ownership, whereas I investigate determinants of ownership at the institution-stock level. For each potential institution-stock pairing, I include a separate observation. This innovation allows me to control for institution-specific features – including prior ownership of the customer firm.

the customer stock. For each group I calculate two variables of interest: 1) the number of unique institutions that own the corresponding supplier firm in the year prior to the customer-supplier relationship and in the year following, and 2) the total percentage ownership in the supplier firm across this same time horizon.

I employ a pooled cross-sectional regression where the dependent variable is either: the percentage change in the number of unique institutions that own the supplier stock (*% Change in Supplier Institutions*) or the percentage change in the total ownership of the supplier stock (*% Change in Supplier Inst Own).* The research design produces two observations for each customer-supplier relationship commencement – one observation aggregated across institutional investors that own customer stock and one observation aggregated across institutional investors that do not own customer stock.

The independent variable of interest, *Customer Owner Dummy*, is an indicator equal to one for institutions that own the customer stock and zero otherwise. All independent variables are expressed as of year *t*-1. Since large increases in institutional ownership are less likely for firms with high institutional ownership already (or large decreases for low beginning levels of institutional ownership), it is important to control for the composition of institutional ownership in year *t*-1. *Institutional Ownership* is the level of aggregate joint ownership or non-joint ownership in supplier stock as of the end of year *t*-1. The remainder of independent variables are consistent with those used in extant literature that investigates the determinants of institutional ownership (Gompers and Metrick, 2001; Yan and Zhang, 2009). The variables can broadly be categorized as proxies for investor prudence, liquidity or return predictability. The following four firm

characteristics proxy for investor prudence: *Age* – the number of months since the firm is listed in CRSP, *S&P 500* – an indicator equal to one for S&P 500 firms, *Volatility* – the two year variance of monthly returns, and *Dividend yield* – the cash dividend divided by the market capitalization. The following three firm characteristics proxy for liquidity and transaction costs: *Price* – the stock price, *Size* – the market capitalization, and *Turnover* – the total trading volume divided by shares outstanding. The following three firm characteristics are determinants of stock returns: *B/M* – the book to market ratio, *Long Momentum* – the cumulative return over the previous year, and *Short Momentum* – the cumulative return over the previous three months.

The difference-in-difference regressions are presented in Table 3. I utilize the year after the new customer-supplier relationship (year t+1) as the post-period in the difference-in-difference tests reported in Table 3.[9] In Column 1 I measure changes in the breadth of supplier ownership. The coefficient on the *Customer Owner Dummy* is 0.0254 (P-value = 0.000) in Column 1 indicating that, on average, institutions with customer stock ownership are 2.54% more likely to initiate a position in the supplier stock in the first two years of the new customer-supplier relationship when compared to institutions with no customer stock ownership.

Further, I explore whether institutions are likely to increase their level of supplier stock ownership after the commencement of a new customer-supplier relationship. In Column 2 I measure changes in the amount of supplier stock owned by institutions. The

[9] Since some institutions might acquire information about customer contracts from suppliers prior to their disclosure in supplier annual reports, I run the difference-in-difference regressions using year t as the post-period. The results are qualitatively similar using this alternative model specification.

Table 3. Changes in Joint Ownership around New Customer-Supplier Relationships
This table presents OLS regression estimates from a difference-in-difference test around the commencement of a new customer-supplier relationship (year *t*). The dependent variable in column (1), *% Change in Supplier Institutions*, is the change in the number of joint owners or non-joint owners that own supplier stock from year *t*-1 to year *t*+1 around the initiation of the customer-supplier relationship, relative to the total number of institutions that own the customer stock before the initiation of the customer-supplier relationship. The dependent variable in column (2), *% Change in Supplier Inst Own*, is the change in aggregate joint ownership or non-joint ownership in the supplier from year *t*-1 to year *t*+1 around the initiation of the customer-supplier relationship, relative to the total number of supplier shares outstanding. The dependent variables produce two observations for each customer-supplier relationship commencement event, one observation for aggregate joint owners and another for aggregate non-joint owners. The variable of interest, *Customer Owner Dummy*, is an indicator equal to one for joint owners and zero for non-joint owners. Control variables include supplier firm and stock characteristics expressed as of year *t*-1. *Institutional Ownership* is the level of aggregate joint owner or non-joint owner institutional ownership as of the end of year *t*-1. *Age* is the log of the number of months since the firm is listed in CRSP. *B/M* is the log of the book to market ratio, in which the book value is calculated for the fiscal year *t*-1 ended before the most recent June 30 and the market value is calculated as of December 31 in fiscal year *t*-1. *Long Momentum* is the 9-month cumulative return starting at the beginning of year *t*-1. *Short Momentum* is the 3-month cumulative return during the last quarter of year *t*-1. *Price* is the log of the stock price at the end of year *t*-1 *Size* is the log of the market capitalization at the end of year *t*-1. *S&P 500* is an indicator equal to one if the firm is included in the S&P 500. *Turnover* is log of the total trading volume divided by shares outstanding. *Volatility* is the log of the variance of monthly returns over year *t*-1 and year *t*-2. *Dividend yield* is the log of the cash dividend for the fiscal year *t*-1 ended before the most recent June 30 divided by the market capitalization as of December 31 in fiscal year *t*-1. P-values, in parentheses, are based on White-corrected standard errors and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

	(1) *% Change in Supplier Institutions*	(2) *% Change in Supplier Inst Own*
Customer Owner Dummy	0.0254***	0.0335***
	(0.000)	(0.000)
Institutional Ownership	-0.172***	-0.542***
	(0.000)	(0.000)
B/M	0.00684	0.0173
	(0.631)	(0.278)
Size	0.00396	-0.00366
	(0.355)	(0.227)
Short Momentum	0.0405***	-0.00734
	(0.000)	(0.482)
Long Momentum	0.00228	0.00469
	(0.542)	(0.336)
Price	0.00840	0.0165***
	(0.154)	(0.002)
Dividend Yield	0.153	0.349
	(0.632)	(0.237)
Volatility	-0.146***	0.00879
	(0.003)	(0.880)
Turnover	0.0151	0.0489**
	(0.530)	(0.039)
Age	-0.00981**	-0.00478
	(0.016)	(0.250)
S&P 500	-0.0111	-0.00625
	(0.345)	(0.542)
Constant	0.0420	0.0340
	(0.114)	(0.193)
Observations	1,610	1,610
R-squared	0.064	0.306

coefficient on the *Customer Owner Dummy* is 0.0335 (P-value = 0.000) in Column 2 indicating that, on average, institutions that own customer stock increase their supplier stock ownership 3.35% more than institutions with no customer stock ownership in the first two years of a new customer-supplier relationship. These results suggest that institutions are not coincidentally holding customer and supplier stock in their portfolios, but are intentionally seeking out stock ownership in customer-supplier linked pairs.

Profitability of Supply Firm Institutional Trading

Value relevant information revealed by customer firms is impounded into supplier stock prices with a lag. Cohen and Frazzini (2008) conjecture that this return predictability across customer and supplier linked pairs is driven by investor inattention. If return predictability across the supply chain is a function of investor inattention, then any investor observing a shock to a customer firm should be able to profitably trade in the corresponding supplier. I examine whether institutional investors, who are typically characterized as informed traders, are able to capitalize on the inefficiency in prices along the supply chain.

My tests employ calendar time portfolios to investigate the profitability of institutional trading in supplier stocks. For each supplier firm-quarter I aggregate changes in quarterly holdings by institutions. I then divide supplier firms into quintiles based on aggregate changes in quarterly institutional ownership. I follow the value- and equal-weighted returns of quintile portfolios for the subsequent three months using excess

returns, Fama French three-factor returns and DGTW benchmark adjusted returns.[10] Excess returns are calculated as the raw return less the risk-free rate. The three-factor returns are the alphas from regressions of excess returns on Fama and French (1993) market, size and book-to-market risk factors. DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmarks from the returns for the stocks within each of the benchmark portfolios. The DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 portfolios based on size, book-to-market and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004).[11] Long-short abnormal return portfolios are created to simulate the abnormal return from a zero-cost portfolio in which I buy the stocks in the quintile most heavily bought by institutions over the previous quarter and sell short the stocks in the quintile most heavily sold by institutions over the previous quarter.

I present institutional trading results in Panel A of Table 4, which provides weak evidence of abnormal trading profits. The long-short portfolio DGTW benchmark adjusted return is 0.610% per month (P-value = 0.044). Institutional investor abnormal trading profits in supplier stock suggests that, in aggregate, institutional investors obtain a slight information advantage in trading across the supply chain. However, the information advantage might not be shared equally across all institutional investors.

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[10] We explore institutional trading in supplier stock as opposed to customer stock, because shocks to the customer firm are incorporated into supplier stock in a lagged fashion (Cohen and Frazzini, 2009). The supplier firms' dependency on linked customer firms as a prominent source of revenue is why shocks to customer earnings, cash flows and stock returns have a ripple effect up the supply chain to supplier firms (Pandit, Wasley and Zach, 2011).

[11] The DGTW benchmarks are available via http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm

Table 4. Supplier Abnormal Returns Following Change in Institutional Holdings
This table contains calendar time portfolio monthly supplier abnormal percentage returns following changes in institutional holdings. At the beginning of each quarter, supplier stocks are sorted into quintile portfolios based on aggregate institutional trading over the prior quarter. Then the portfolio monthly supplier abnormal percentage returns are observed over the subsequent quarter. The analysis in Panel A includes all institutional trading at the supplier stock for each quarter. In Panel B the analysis is restricted to institutional trading by institutions that have ownership in the customer stock (i.e. joint owners), and in Panel C the analysis is restricted to institutional trading by institutions that do not have ownership in the customer stock (i.e. non-joint owners). The returns are measured using excess returns, Fama French three-factor returns and DGTW benchmark adjusted returns. Excess returns are calculated as the raw return less the risk-free rate. The three-factor returns are the alphas from regressing excess returns on Fama and French (1993) market, size and book-to-market risk factors. DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmarks from the returns for the stocks within each of the benchmark portfolios. The DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 portfolios based on size, book-to-market and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004). L/S is the abnormal return from a zero-cost portfolio that buys the stocks in the top quintile (Q5) and sells short the stocks in the bottom quintile (Q1). P-values for the L/S portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: All Institutions

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.28787	-0.30129	-0.37187	0.33099	-0.41311	-0.26740
Q2	0.32461	-0.14340	-0.08214	0.59785	-0.11343	-0.10130
Q3	0.51073	0.05585	0.12202	0.71626	-0.00267	0.16207
Q4	0.58434	0.11440	-0.05309	0.74886	0.05857	0.08436
Q5	0.84790	0.33201	0.23792	1.02885	0.32991	0.32638
L/S	0.56003*	0.63330*	0.60979**	0.69786***	0.74302***	0.59377**
P-value	(0.09229)	(0.05348)	(0.04398)	(0.00502)	(0.00268)	(0.01259)

Panel B: Joint Owners

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.02860	-0.55278	-0.55112	0.32204	-0.36314	-0.31808
Q2	0.29413	-0.20307	-0.00014	0.59572	-0.15203	-0.04145
Q3	0.62505	0.27398	-0.08792	0.73922	0.06196	0.09084
Q4	0.39890	-0.12652	-0.19024	0.60758	-0.15283	-0.02396
Q5	1.10374	0.57382	0.52482	1.14090	0.45732	0.41115
L/S	1.07513***	1.12659***	1.07593***	0.81886***	0.82047***	0.72923**
P-value	(0.00883)	(0.00617)	(0.00591)	(0.00544)	(0.00483)	(0.01094)

Table 4. Continued.

Panel C: Non-joint Owners						
	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.38053	-0.22465	-0.18873	0.54163	-0.19301	-0.10624
Q2	0.42895	-0.01822	-0.17735	0.58923	-0.10213	-0.06981
Q3	0.70752	0.23663	0.30538	0.56394	-0.15017	-0.02171
Q4	0.82222	0.31536	0.27634	0.93747	0.24316	0.28688
Q5	0.66784	0.14074	0.10899	0.78774	0.05069	0.11480
L/S	0.28730	0.36538	0.29772	0.24611	0.24371	0.22104
P-value	(0.39787)	(0.27586)	(0.33150)	(0.24933)	(0.26193)	(0.28468)

Complex supply chain information might be better understood by investors that are relatively more familiar with customer-supplier relationships.

Given that customer and supplier firms are exposed to common economic shocks (Menzly and Ozbas, 2010; Cohen and Fazzini, 2008; Pandit, Wasley and Zach, 2011), one potential reason why institutions intentionally maintain ownership in pairs of customer-supplier linked firms is because of the economies of scale associated with information gathering. Further, stock ownership in economically linked firms might lead to superior understanding about how customer firm behavior translates into the future health of supplier firms. In subsequent tests, I use joint ownership to identify institutions with superior information about economic relationships.

I explore the profitability of joint ownership trades using the calendar time methodology from Table 4, Panel A. First, I partition institutional ownership in each supplier firm-quarter into two groups: 1) institutions that have ownership in the customer

(i.e. joint owners) and 2) institutions that do not have ownership in the customer (i.e. non-joint owners). For each supplier firm-quarter I aggregate changes in quarterly holdings by joint owners and non-joint owners. I divide supplier firms into quintiles based on aggregate changes in quarterly ownership. I then follow the returns of the portfolios over the adjacent three months.

When looking at the institutional trading in the supplier stocks conditional on institutions owning the customer stock, institutional trading profits are much higher than the unconditional aggregate institutional trading profits reported in Panel A. According to the long-short portfolio returns in Table 4, Panel B, joint owner trades in the supplier generate abnormal returns of 1.076% per month (P-value = 0.006).[12] These results demonstrate that supply chain trading gains are attained, to a much larger extent, by institutions that own pairs of customer-supplier linked firms. It appears that with institutions that own corresponding pairs of customer and supplier firms benefiting from superior information about the customer-supplier relationships.

On the other hand, institutional trading in the supplier stock conditional on the institutions not owning the linked customer stock does not represent informed trading. On average, the long-short portfolio abnormal returns for non-joint owner trades is 0.298%

[12] I find that joint owner trading in the supplier yields abnormal returns close to zero over the twelve month horizon. It appears that the sizeable joint owner trading profits begin to fade away in the long-run. I do not lean heavily on this result because of the issues associated with long-run abnormal return measurement.

per month (P-value= 0.332). Results from this analysis suggest that trading gains in supplier stock may be difficult to capture using widely observed public information.[13]

These results suggest that institutional trading in supplier stock is more profitable if the institution owns stock in both sides of the customer-supplier relationship.[14] This is consistent with the analyst literature that documents analysts covering both the customer and supplier stocks are more accurate in forecasting supplier earnings than analysts that do not cover the linked customer (Guan, Wong, and Zhang, 2014). Like securities analysts, institutional managers seem to have an informational advantage when they are familiar with linked pairs of customers and suppliers. In the case of institutional managers, joint ownership provides the familiarity necessary to produce profitable trading in supplier stock.[15]

While ownership in the customer firm seems to be important for institutional trading in the supplier to be profitable, is a large ownership stake in the customer more beneficial to the institutional trading profits than a small ownership stake in the customer? According to Demsetz and Lehn (1985) greater ownership increases the benefits and costs incurred by the owner, which entices owners to be astute to changes at

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[13] The lack of trading profits by non-joint owner trades provides evidence that the institutional trading profits by joint owners are not driven by firm characteristics. In a slightly restricted sample, I investigate joint owner and non-joint owner trading profits at suppliers that have at least one joint owner and non-joint owner and I find a similar contrast between joint owner trading profits and non-joint owner trading profits. If the joint owner trading profits are a product of firm specific characteristics, then I would also find trading profits by the non-joint owners of these stocks. Moreover, DGTW benchmark adjusted returns and factor model alphas control for the most important idiosyncratic risk factors.

[14] In untabulated results I make similar inferences from regression output using one-factor alphas, four-factor alphas and five-factor alphas.

[15] The 13f data does not allow me to know precisely when these institutional trades occur during the calendar quarter. The coarseness of 13f data biases me against finding evidence of profitable trading in supplier stock.

the firm. Following this logic, a larger stake in the customer will benefit institutional trading profits at the supplier firm. However, concentrated ownership could also represent overconfidence that could hinder institutional trading profits. Institutions that have experienced historical success in picking stocks might become overconfident in their skill level. They might believe that their knowledge about a security's value is greater than it actually is and unwisely under-diversify their portfolio in search of higher alpha.

The profitability of institutional trading by institutions with large and small customer stock ownership is calculated using the calendar time methodology used in Table 4. I partition institutional ownership in each supplier firm-quarter into two groups: 1) joint owners with above median customer stock ownership and 2) joint owners with below median customer stock ownership. For each group, I create trading portfolios and present results in an identical manner to those presented in Table 4.

Panel A of Table 5 presents institutional trading profits in supplier stock for joint owners with above median customer stock ownership. The long-short portfolio DGTW benchmark adjusted return is 1.140% per month (P-value = 0.003). In contrast to these large abnormal returns, the abnormal trading profits following institutional trading in supplier stock conditional on the institutions having below median customer stock ownership are muted (see Panel B of Table 5). The long-short portfolio alpha for this subset of institutions is 0.367% per month (P-value = 0.317). These results suggest that large ownership in the customer firm increases the profitability of the institutional trading in the supplier stock, which is inconsistent with overconfident institutions concentrating

Table 5. Supplier Abnormal Returns Following Changes in Joint Owner Holdings: Conditional on Customer Ownership Level

This table contains calendar time portfolio monthly supplier abnormal percentage returns following changes in joint owner holdings, conditional on the level of ownership in the customer firm. At the beginning of each quarter, supplier stocks are sorted into quintile portfolios based on aggregate joint owner trading over the prior quarter. Then the portfolio monthly supplier abnormal percentage returns are observed over the subsequent quarter. In Panel A the analysis is restricted to institutional trading by joint owners that have above median customer stock ownership (i.e. heavy customer ownership), and in Panel B the analysis is restricted to institutional trading by joint owners that have below median customer stock ownership (i.e. light customer ownership). The returns are measured using excess returns, Fama French three-factor returns and DGTW benchmark adjusted returns. Excess returns are calculated as the raw return less the risk-free rate. The three-factor returns are the alphas from regressing excess returns on Fama and French (1993) market, size and book-to-market risk factors. DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmarks from the returns for the stocks within each of the benchmark portfolios. The DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 portfolios based on size, book-to-market and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004). L/S is the abnormal return from a zero-cost portfolio that buys the stocks in the top quintile (Q5) and sells short the stocks in the bottom quintile (Q1). P-values for the L/S portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Heavy Customer Ownership

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.06993	-0.51168	-0.53454	0.23523	-0.49287	-0.40984
Q2	0.52539	0.13373	0.10016	0.60543	-0.10175	-0.06247
Q3	0.99894	0.54745	0.28258	0.71896	0.01395	0.07998
Q4	0.77205	0.28581	0.25543	0.66586	-0.05674	0.01095
Q5	1.16961	0.63908	0.60551	1.30058	0.58851	0.57940
L/S	1.09968***	1.15076***	1.14005***	1.06535***	1.08138***	0.98924***
P-value	(0.00711)	(0.00494)	(0.00345)	(0.00036)	(0.0003)	(0.00065)

Panel B: Light Customer Ownership

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.51766	-0.02731	-0.18014	0.5811	-0.10499	-0.06818
Q2	0.15391	-0.34957	-0.38979	0.52939	-0.17974	-0.1202
Q3	0.77365	0.29686	0.45005	0.82415**	0.11515	0.20713
Q4	0.74656	0.26210	0.12214	0.71564	-0.00110	0.09158
Q5	0.83185	0.30862	0.18660	0.83817*	0.11151	0.09659
L/S	0.31419	0.33593	0.36674	0.25707	0.2165	0.31419
P-value	(0.43414)	(0.40786)	(0.31711)	(0.35324)	(0.43161)	(0.43414)

their ownership into customer firms. Moreover, it is inconsistent with the null hypothesis, that information gathering along the supply chain does not generate abnormal institutional trading profits. The results provide evidence that large institutional ownership in the customer firm could encourage closer analysis of the customer-supplier relationship, and subsequently, institutions might be able to extract information from the nature of the customer-supplier relationship that enhances the profitability of their trades in the supplier stock.[16]

If some institutions benefit from information extracted from customer-supplier relationships, then does the strength of the customer-supplier relationship also impact the institutional trading profits in supplier stock? The value of customer information on a corresponding supplier is amplified or dampened based on the extent to which the supplier is dependent on its major customers for revenues. I would expect that institutional trading profits would be more common in supplier firms with concentrated sales relationships.

The next series of tests incorporate the Patatoukas (2012) customer-base concentration measure into the trading portfolio analysis in order to identify how variations in the density of the customer base across supplier firms impacts joint owner trading profits. The Patatoukas (2012) customer-base concentration measure (*CC*) is a variation of the Herfindahl-Hirschman index that produces a normalized measure of the

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[16] One possible explanation of these results is that larger institutions are more skilled and also more likely to own customer stock. Actually, the correlation between joint ownership and institution size is 0.143, indicating that largest institutions do not drive joint ownership. In multivariate regressions, I control for the joint owner institution size and I find that joint owner trading profits are not significantly impacted by institutions size.

diversity of supplier's customer base. The customer-base concentration measure is calculated for each supplier firm across the firm's *J* principle customers, as presented below:

$$CC_{it} = \sum_{j=1}^{J} \left(\frac{Sales_{ijt}}{Sales_{it}}\right)^2, \quad (1)$$

where $Sales_{ijt}$ is supplier firm *i*'s sales to customer *j* in year *t* and $Sales_{it}$ is the supplier firm *i*'s total sales in year *t*.

Institutional trading profits by joint owners at suppliers with high and low customer-base concentration are calculated using the same calendar time methodology as that used in Panel B of Table 4, while partitioning the sample of suppliers to those with above median customer-base concentration and those with below median customer-base concentration. Long-short portfolio returns of joint owner trading in the partitioned sample are presented in Table 4. When analyzing the institutional trading by joint owners at suppliers with high customer-base concentration, the long-short portfolio from the value-weighted three factor model has an alpha of 1.493% (P-value = 0.001). On the other hand, the long-short portfolio abnormal returns for the joint owners at suppliers with a low customer-base concentration are 0.855% (P-value = 0.075). I find that the information advantage attained by institutions that own customer-supplier linked pairs is amplified when the supplier is dependent on a small customer base for sales revenue. These results agree with my hypothesis that supply chain information is more value relevant to future supplier performance if the supplier is more tightly linked to customer firms down the supply chain. Suppliers with concentrated customer bases appear to be a fertile environment for joint owners to obtain profitable information.

Table 6. Supplier Abnormal Returns Following Changes in Joint Owner Holdings: Conditional on Customer-base Concentration

This table contains calendar time portfolio monthly supplier abnormal percentage returns following changes in joint owner holdings, conditional on customer-base concentration. At the beginning of each quarter, supplier stocks are sorted into quintile portfolios based on aggregate institutional trading over the prior quarter. Then the portfolio monthly supplier abnormal percentage returns are observed over the subsequent quarter. The results in Panel A (Panel B) are reported for stocks that have above median (below median) customer-base concentration, using the Patatoukas (2012) customer-base concentration measure (*CC*). The returns are measured using excess returns, Fama French three-factor returns and DGTW benchmark adjusted returns. Excess returns are calculated as the raw return less the risk-free rate. The three-factor returns are the alphas from regressing excess returns on Fama and French (1993) market, size and book-to-market risk factors. DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmarks from the returns for the stocks within each of the benchmark portfolios. The DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 portfolios based on size, book-to-market and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004). L/S is the abnormal return from a zero-cost portfolio that buys the stocks in the top quintile (Q5) and sells short the stocks in the bottom quintile (Q1). P-values for the L/S portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: High Customer-Base Concentration

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	-0.20534	-0.77054	-0.83719	0.08087	-0.54930	-0.61185
Q2	-0.14794	-0.66318	-0.26000	0.53525	-0.21547	-0.03172
Q3	0.88718	0.39534	-0.00098	0.81235	0.06881	0.11919
Q4	0.56598	0.12468	0.06535	0.55403	-0.12311	-0.11727
Q5	1.34545	0.82422	0.65568	1.05106	0.38186	0.31026
L/S	1.55078***	1.59476***	1.49287***	0.9702***	0.93116**	0.92211**
P-value	(0.00072)	(0.00057)	(0.00118)	(0.00792)	(0.01023)	(0.01146)

Panel B: Low Customer-Base Concentration

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.01939	-0.53391	-0.41594	0.50558	-0.26225	-0.03457
Q2	0.50626	-0.03443	0.02462	0.78414	0.03778	0.04766
Q3	0.61503	0.15824	-0.07452	0.42553	-0.22586	-0.19853
Q4	0.66732	0.14278	0.17741	1.09879	0.36673	0.49764
Q5	1.02541	0.42237	0.43907	1.08044	0.31919	0.38581
L/S	1.00602**	0.95628*	0.85501*	0.57486	0.58144	0.42038
P-value	(0.04297)	(0.05791)	(0.07465)	(0.12893)	(0.13151)	(0.25559)

Possible Mechanisms Driving Joint Owner Trading Profits

In this section of the paper I explore some of the possible mechanisms used by institutions to attain abnormal trading profits. One potential source of joint owner trading profits is industry-level information (Huang and Kale, 2013 and Kacperczyk, Sialm, and Zheng, 2005). Joint owners might trade in customer and supplier linked firms in order to profit from return predictability across customer and supplier industries (Menzly and Ozbas, 2010).

To test whether related industry level information is driving joint owner trading profits I investigate institutional trading in industry peers of supplier firms (i.e. pseudo-suppliers). A pseudo-supplier is a firm that is within the same industry (4 digit SIC) as the supplier and is most similar in size (within 50% of supplier market capitalization). I identify institutions that own customer stock and pseudo-supplier stock and analyze trades by these institutions in the pseudo-supplier. For each quarter, I aggregate changes in quarterly holdings in the pseudo-supplier to create trading portfolios. Institutional trading profits in pseudo-supplier stock are calculated using the calendar time methodology implemented in previous tables.

In Table 7 I present the long-short portfolio alphas following institutional trading at pseudo-suppliers. Superior trading profits at pseudo-supplier firms would be evidence that industry-level information is the source of joint owner trading profits, on the other hand, poor trading profits at pseudo-supplier firms would suggest that joint owner trading profits are independent of the Menzly and Ozbas (2010) customer-supplier industry cross-predictability. I find that the average abnormal returns from the long-short

Table 7. Pseudo-supplier Abnormal Returns Following Change in Institutional Holdings
This table contains calendar time portfolio monthly pseudo-supplier abnormal percentage returns, following changes in institutional trading. A pseudo-supplier is a firm that is within the same industry (4 digit SIC code) as the supplier and most similar in size (within 50% of market capitalization). At the beginning of each quarter, pseudo-supplier stocks are sorted into quintile portfolios based on aggregate institutional trading over the prior quarter. Then the portfolio monthly pseudo-supplier abnormal percentage returns are observed over the subsequent quarter. For this analysis I only observe trades by institutions that own the customer stock and own the pseudo-supplier stock. The returns are measured using excess returns, Fama French three-factor returns and DGTW benchmark adjusted returns. Excess returns are calculated as the raw return less the risk-free rate. The three-factor returns are the alphas from regressing excess returns on Fama and French (1993) market, size and book-to-market risk factors. DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmarks from the returns for the stocks within each of the benchmark portfolios. The DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 portfolios based on size, book-to-market and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004). L/S is the abnormal return from a zero-cost portfolio that buys the stocks in the top quintile (Q5) and sells short the stocks in the bottom quintile (Q1). P-values for the L/S portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

	Value Weighted Returns			Equal Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1	0.44018	-0.15404	-0.18578	0.61107	-0.06581	0.06775
Q2	0.59740	0.13125	0.05845	0.77971	0.14119	0.10724
Q3	0.55895	0.01975	-0.01630	0.69046	-0.01842	-0.03232
Q4	0.64137	0.17875	-0.08649	1.02427	0.31720	0.21444
Q5	0.81195	0.28637	0.08990	0.99140	0.27793	0.25984
L/S	0.37178	0.44041	0.27567	0.38033	0.34373	0.19209
P-value	(0.40226)	(0.32571)	(0.51657)	(0.25365)	(0.30889)	(0.54165)

portfolio analysis are an insignificant 0.276% per month (P-value= 0.517). These results suggest that related industry concentration and customer-supplier industry cross-predictability are not the mechanism that drives joint owner trading profits. Therefore, joint owners appear to gain from the information gathered from customer and supplier linked pairs, not broad information from customer and supplier industries.

An alternative explanation for institutional trading profits in the supplier firm is that institutional investors have the ability to identify the direction of future supplier earnings. Baker, Litov, Wachter and Wurgler (2010) suggest that mutual fund manager skill is in part a function of their ability to forecast earnings fundamentals. They find that stocks bought by mutual funds tend to have higher subsequent earnings announcement returns than the stocks sold by mutual funds, which indicates that the average mutual fund demonstrates stock-picking skill. In my study, I explore whether institutional investor trades predict future supplier earnings news to determine whether institutional trading profits in the supply chain are generated by their ability to forecast earnings fundamentals.

The supply chain is a unique setting from which to investigate whether institutions are able to predict future earnings, because economic relationships are a potentially valuable source of information that might be used to forecast supplier earnings news. According to Pandit, Wasley and Zach (2011) customer earnings news has an information externality on supplier earnings. Further, information from customer earnings reduces the uncertainty of future supplier earnings. If joint owners closely monitor customer behavior and revealed information about the customer-supplier relationship and adjust their positions in supplier stock based on expectations about future supplier earnings, then I would expect changes in institutional holdings prior to supplier earnings announcements to be informed. Otherwise, joint owner institutional trading profits are not a function of attentiveness to the impact of revealed information about economically linked firms on future supplier earnings.

I construct a test to explore whether the institutional trading profits are derived by a superior ability of joint owners to predict the upcoming earnings surprises of supplier firms. Following the methodology of Yan and Zhang (2009), I use institutional trading portfolios to calculate earnings announcement abnormal returns and earnings surprises. Each quarter, I divide stocks into quintiles based on changes in joint owner or non-joint owner institutional holdings, where Q5 (Q1) contains stocks with the largest increase (decrease) in joint ownership or non-joint ownership. Three-day market adjusted returns are calculated as the cumulative abnormal return (CAR) from day t-1 to t+1 around each supplier earnings announcement day t. The earnings surprise is the raw difference between actual earnings and consensus analyst forecast divided by the stock price. The mean earnings announcement CAR and earnings surprise are calculated for each quintile portfolio over the subsequent four quarterly earnings announcements.

In Panel A of Table 8 I report the earnings announcement CARs following changes in joint ownership and non-joint ownership in supplier stock. The average three-day CAR (-1, 1) around supplier earnings announcements in the quarter following large decreases in joint owner holdings (Portfolio Q1) is -0.377% (P-value = 0.041). On the other hand, the average CAR around supplier earnings announcements in the quarter following large increases in joint owner holdings (Portfolio Q5) is 0.509% (P-value = 0.012). The difference in earnings announcement CARs in Q5 and Q1 is a significant 0.886% (P-value= 0.001). It appears that changes in joint owner holdings have a direct impact on subsequent supplier earnings announcement CARs. These results are in agreement with my hypothesis that institutions study how economically linked firm

Table 8. Institutional Trading Prior to Earnings Announcements
This table contains the earnings announcement abnormal returns and earnings surprises in the four quarters following quarterly institutional trading portfolios. Following the methodology of Yan and Zhang (2009), I use institutional trading portfolios to calculate earnings announcement abnormal returns and earnings surprises. Each quarter, I divide stocks into quintiles based on changes in joint owner or non-joint owner institutional holdings, where Q5 (Q1) contains stocks with the largest increase (decrease) in joint ownership or non-joint ownership. Three-day market adjusted returns are calculated as the cumulative abnormal return (CAR) from day *t*-1 to *t*+1 around each supplier earnings announcement day *t.* The earnings surprise is the raw difference between actual earning and consensus analyst forecasts divided by the stock price. The mean earnings announcement CAR and earnings surprise are calculated for each quintile portfolio over the subsequent four quarterly earnings announcements. The difference between the top and bottom quintile (Q5-Q1) is reported. P-values for the differences are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Earnings Announcement Abnormal Returns (%)				
	t+1	*t+2*	*t+3*	*t+4*
Joint Owners				
Q1	-0.377	0.048	0.076	0.18
Q2	-0.044	-0.024	0.157	-0.169
Q3	-0.203	-0.149	-0.016	-0.32
Q4	0.115	-0.022	-0.252	-0.054
Q5	0.509	-0.025	0.003	0.375
Q5-Q1	0.886***	-0.072	-0.073	0.195
P-value	(0.001)	(0.807)	(0.842)	(0.542)
Non-Joint Owners				
Q1	-0.149	-0.358	0.056	-0.129
Q2	-0.257	0.051	-0.005	-0.211
Q3	-0.067	-0.160	-0.209	0.110
Q4	-0.178	0.196	-0.233	-0.124
Q5	0.090	-0.153	-0.090	-0.238
Q5-Q1	0.239	0.205	-0.146	-0.109
P-value	(0.327)	(0.347)	(0.516)	(0.645)

Panel B: Earnings Surprises (%)				
	t+1	*t+2*	*t+3*	*t+4*
Joint Owners				
Q1	-0.306	0.188	-0.097	0.033
Q2	0.037	0.022	0.036	-0.026
Q3	-0.009	0.034	-0.015	0.011
Q4	0.041	-0.047	-0.013	-0.013
Q5	0.104	0.077	0.088	-0.029
Q5-Q1	0.410**	-0.111	0.185*	-0.062
P-value	(0.018)	(0.521)	(0.075)	(0.560)
Non-Joint Owners				
Q1	-0.017	-0.118	0.016	0.038
Q2	0.023	0.034	0.000	-0.018
Q3	0.036	-0.025	0.012	-0.003
Q4	0.026	-0.001	-0.004	0.006
Q5	0.053	0.068	0.033	0.044
Q5-Q1	0.070*	0.186	0.016	0.006
P-value	(0.089)	(0.190)	(0.649)	(0.796)

behavior and customer-supplier contracts impact future supplier earnings to profitably trade in supplier stock.

The link between changes in joint owner holdings in the supplier stock and future earnings announcement CARs dissipates beyond the adjoining quarter. The difference between earnings announcement CARs in Q5 and Q1 are insignificant in quarters *t*+2, *t*+3 and *t*+4. This indicates that while joint owner trading in supplier stock is predictive of future supplier earnings news, the information advantage gained by joint owners is short lived.

Non-joint owners trading in supplier stock do not appear to predict future supplier earnings news. The difference in supplier earnings announcement CARs following large increases in non-joint owner holdings (Q5) and large decreases in non-joint owner holdings (Q1) is an insignificant 0.239% (P-value = 0.327). The difference in earnings announcement CARs in Q5 and Q1 are also insignificant in quarters *t*+2, *t*+3 and *t*+4. This result is consistent with non-joint owners' inability to incorporate information about the customer-supplier relationship into trades in supplier stock. In particular, it shows a mechanism through which joint owners, not non-joint owners, attain trading profits in supplier stock. Joint owners successfully extract valuable information about future earnings news from customer-supplier relationships to profitably trading in supplier stock.

Next, I explore whether changes in institutional holdings predict earnings surprises. To the extent that earnings surprises are correlated with abnormal returns around earnings announcements I expect the same result. In Panel B of Table 8 I

document the price adjusted earnings surprises by joint owners and non-joint owners. The average earnings surprise in the quarter following large decreases (increases) in joint owner holdings of supplier stock is -0.306% (0.104%), resulting in a difference between Q5 and Q1 of 0.410% (P-value = 0.018). However, joint owner trading has a weaker impact on more distant future supplier earnings surprises. Consistent with the previous results that demonstrate the relationship between changes in joint owner holdings and future earnings announcement CARs I find that changes in joint owner holdings predict subsequent supplier earnings surprises.

Changes in non-joint owner holdings in supplier stock only very weakly predict future supplier earnings surprises. The difference in supplier earnings surprises following large increases in non-joint owner holdings (Q5) and large decreases in non-joint owner holdings (Q1) is 0.070% (P-value = 0.089). The difference in earnings surprises in Q5 and Q1 are insignificant in quarters t+2, t+3 and t+4. The result suggests that institutional trading prior to supplier earnings is a mechanism driving joint owner trading profits, and the institutional trading profits documented in this study are potentially derived by an ability to predict future supplier earnings by studying customer-supplier relationships and identifying how changes in customer contracts, economically linked firm fundamentals, and revealed information about supply chain nuances will impact supplier fundamentals. Therefore, the informational advantage along the supply chain obtained by institutions with joint ownership is potentially due to joint owners' ability to more accurately forecast

future supplier earnings based on information attained from analyzing the supplier's economic relationships.[17]

Multivariate Analyses

The calendar time portfolio methodology is a practical strategy for identifying the returns to each institution trading in supplier stock; however a multivariate approach provides the opportunity to control for other factors that have been linked to abnormal performance. Using a multivariate analysis I find that my prior analysis is robust to other determinants of stock returns. For each institution-firm-quarter observation, I implement Fama-MacBeth cross-sectional regressions of quarterly abnormal returns following quarterly changes in individual joint owner holdings in each particular stock. The abnormal returns are calculated by subtracting DGTW benchmarks from raw returns in each DGTW benchmark portfolio and aggregating over three months. The cross-sectional regressions are run for each quarter from the first quarter of 1986 to the last quarter of 2010. The variables of interest, *Change* and *Discrete Change*, are variables that represent the quarterly change in institutional holdings in the stock. *Change* is the quarterly percentage change in institutional holdings and *Discrete Change* is the discrete quintile rank (1 to 5) of the quarterly percentage change in institutional holdings in the stock.

The institutional trading profits associated with joint ownership of customer-supplier linked firms are robust to the multivariate analysis reported in Table 9. As

[17] These results might also suggest that superior supplier forecasts by analysts that cover customer and supplier linked pairs identified by Guan, Wong, and Zhang (2014) is a function of attention to information externalities from customers to suppliers, and is evidence of familiarity with the supply chain relationships, which provides analysts with superior information about how suppliers are impacted by fluctuations in demand for their goods or services.

Table 9. Multivariate Test of Institutional Trading and Supplier Abnormal Returns
This table shows Fama-MacBeth regressions of quarterly DGTW benchmark adjusted supplier returns following quarterly changes in joint owner institutional holdings. Cross-section regressions are run for each quarter from Q1 of 1986 to Q4 of 2010. The results reflect the full sample of quarterly changes in joint owner institutional holdings. *Change* represents the quarterly percentage change in institutional holdings in the stock and *Discrete Change* is the discrete quintile rank (1 to 5) of the quarterly percentage change in institutional holdings in the stock. *Age* is the log of the number of months since the firm is listed in CRSP. *Price* is the log of the stock price at the end of month *t*. *Dividend Yield* is the log of the cash dividend for the fiscal year ended before the most recent June 30 divided by the market capitalization as of December 31 in that fiscal year. *Volatility* is the log of the variance of monthly returns over months *t*-23 to *t*. *Turnover* is log of the total trading volume divided by shares outstanding. *Institution Size* is the log of the dollar value of equity under management by the institution. P-values are in parentheses and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Change	0.4349***		0.4450***		0.3407**	
	(0.002)		(0.003)		(0.012)	
Discrete Change		0.0013***		0.0014***		0.0060**
		(0.001)		(0.001)		(0.014)
Price	-0.0012	-0.0012	-0.0018	-0.0018	-0.0057	-0.0029
	(0.841)	(0.842)	(0.768)	(0.765)	(0.361)	(0.634)
Dividend Yield	0.0980	0.0971	0.1075	0.1070	0.1439	0.1751
	(0.697)	(0.700)	(0.662)	(0.663)	(0.657)	(0.594)
Volatility	0.1072	0.1082	0.0942	0.0952	-0.0616	-0.0373
	(0.284)	(0.280)	(0.331)	(0.326)	(0.646)	(0.792)
Turnover	0.0463	0.0460	0.0472	0.0470	0.0350	0.0451
	(0.302)	(0.305)	(0.293)	(0.296)	(0.552)	(0.494)
Institution Size	0.0001	-0.0005	-0.0113	-0.0100		
	(0.905)	(0.898)	(0.601)	(0.657)		
Constant	-0.0136	-0.0175	0.1726	0.1446	0.0167	-0.0124
	(0.591)	(0.493)	(0.651)	(0.710)	(0.537)	(0.666)
Obs Level	Institution-Firm-Quarter	Institution-Firm-Quarter	Institution-Firm-Quarter	Institution-Firm-Quarter	Firm-Quarter	Firm-Quarter
Institution Fixed Effects	no	no	yes	yes	no	no
Observations	640,972	640,972	640,972	640,972	7,450	7,450

reported in Column (1) of Table 9, on average, a 1% change in joint owner holdings yields a 0.435% (P-value = 0.002) DGTW benchmark adjusted return in the supplier stock over the subsequent quarter. This result is not driven by the tails of the distribution of the *Change* variable, because the coefficient on *Discrete Change* in Column (2) is also positive and significant. The *Discrete Change* variable controls for the outliers in the *Change* variable, because *Discrete Change* is the discrete quintile rank of the *Change* variable. Moreover, the positive relation between the change in joint owner holdings and future returns is not clustered in a subset of institutions. The return predictability of a change in institutional holdings is robust to controlling for institution fixed effects and aggregating the change in joint owner holdings at the firm-quarter level. These results are consistent with the previously identified profitability of joint owner trading in supplier stock.

Table 10 present the final test of this study in which I partition the sample of quarterly institutional trading observations into two groups: Transient joint owners and dedicated joint owners. I identify transient and dedicated institutions according to the Bushee (2001) classifications. Transient institutions have diversified portfolios with low portfolio turnover and are characterized as institutions with short investment horizons. Dedicated institutions have concentrated portfolio holdings with relatively low turnover and are characterized as institutions with long investment horizons. Since joint owner trading predicts abnormal stock returns and earnings news at supplier firms over the subsequent quarter, but the predictability does not persist over the long-run I would

Table 10. Multivariate Test of Transient and Dedicated Joint Owner Trading and Supplier Abnormal Returns
This table shows Fama-MacBeth regressions of quarterly DGTW benchmark adjusted supplier returns following quarterly changes in joint owner holdings. Cross-section regressions are run for each quarter from Q1 of 1986 to Q4 of 2010. The results in Panel A (Panel B) are limited to quarterly changes in transient (dedicated) joint owner institutional holdings according to the Bushee (2001) classifications. *Change* represents the quarterly percentage change in institutional holdings in the stock and *Discrete Change* is the discrete quintile rank (1 to 5) of the quarterly percentage change in institutional holdings in the stock. *Age* is the log of the number of months since the firm is listed in CRSP. *Price* is the log of the stock price at the end of month *t*. *Dividend Yield* is the log of the cash dividend for the fiscal year ended before the most recent June 30 divided by the market capitalization as of December 31 in that fiscal year. *Volatility* is the log of the variance of monthly returns over months *t*-23 to *t*. *Turnover* is log of the total trading volume divided by shares outstanding. *Institution Size* is the log of the dollar value of equity under management by the institution. P-values are in parentheses and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Transient Institutions				
	(1)	(2)	(3)	(4)
Change	0.5252***		0.5832***	
	(0.004)		(0.002)	
Discrete Change		0.0014***		0.0016***
		(0.001)		(0.000)
Price	-0.0005	-0.0004	-0.0008	-0.0008
	(0.938)	(0.944)	(0.896)	(0.892)
Dividend Yield	0.1256	0.1233	0.1296	0.1276
	(0.630)	(0.636)	(0.608)	(0.614)
Volatility	0.1122	0.1143	0.1051	0.1065
	(0.279)	(0.272)	(0.292)	(0.287)
Turnover	0.0528	0.0523	0.0513	0.0511
	(0.250)	(0.255)	(0.259)	(0.262)
Institution Size	0.0001	0.0001	-0.0126	-0.0075
	(0.775)	(0.800)	(0.886)	(0.932)
Constant	-0.0211	-0.0253	0.3568	0.2652
	(0.434)	(0.352)	(0.815)	(0.863)
Institution Fixed Effects	no	no	yes	yes
Observations	601,620	601,620	601,620	601,620

Table 10. Continued.

Panel B: Dedicated Institutions				
	(1)	(2)	(3)	(4)
Change	2.5083		-1.0720	
	(0.395)		(0.880)	
Discrete Change		0.0001		0.0004
		(0.978)		(0.811)
Price	-0.0027	-0.0039	-0.0029	-0.0047
	(0.656)	(0.499)	(0.623)	(0.428)
Dividend Yield	-0.1581	-0.2322	-0.1335	-0.0879
	(0.551)	(0.444)	(0.688)	(0.777)
Volatility	-0.0512	-0.0786	-0.1013	-0.0889
	(0.719)	(0.610)	(0.525)	(0.568)
Turnover	0.0619	0.0598	0.0773	0.0822
	(0.265)	(0.266)	(0.173)	(0.151)
Institution Size	0.0003	0.0002	-0.0912	-0.0001
	(0.868)	(0.911)	(0.203)	(0.989)
Constant	0.0014	0.0116	1.7224	0.0372
	(0.971)	(0.759)	(0.203)	(0.852)
Institution Fixed Effects	no	no	yes	yes
Observations	39,352	39,352	39,352	39,352

expect that the results of this study are driven by transient joint owner trades more than dedicated joint owner trades.

Following the same Fama-MacBeth regression methodology I explore the disproportional effect of joint owner trading on future returns, by transient and dedicated institutions. I find that joint owner trades by transient institutions are much more profitable than joint owner trades by dedicated institutions. A 1% change in holdings by transient institutions yields a 0.525% (P-value = 0.004) abnormal return in supplier stock

over the subsequent quarter. In contrast, a 1% change in holdings by dedicated institutions yields an insignificant 0.2.508% (P-value = 0.395). Transient investors' strong performance in trading across the supply chain is consistent with the Yan and Zhang (2009) findings that short-term institutional trading is more predictive of future stock returns and earnings surprises than long-term institutional trading. The supply chain appears to be a productive environment from which short-term institutions can exert effort in information gathering across economic relationships to attain superior trading returns.

In summary, joint owner trading profits are robust to the scrutiny of multivariate analysis. By following changes in joint owner holdings over the subsequent quarter I observe a direct relationship between joint owner trading and future returns. It seems as though joint owners look to extract information from complex customer-supplier relationships that provides them with an informational advantage over other market participants.

Chapter 4

Conclusion

Several papers have shown that shocks to a firm have impacts on economically connected firms (Menzly and Ozbas, 2010; Cohen and Fazzini, 2008; Pandit, Wasley and Zach, 2011). In particular, the ripple effect from shocks to customer firms impacts linked supplier firms with a lag. The prevailing explanation for this short-term price inefficiency is investor limited attention. Recently research has suggested that attentive corporate insiders and sell-side analysts who cover both customer and supplier firms incorporate information about the customer-supplier relationship into their supplier trades and estimates more rapidly than their peers (Alldredge and Cicero, 2014; Guan, Wong, and Zhang, 2014). The focus of this study is to investigate whether institutional managers are able to see through the complex customer-supplier relationships and exploit supply-chain information through trading.

In aggregate, institutions modestly profit from trade in supplier stock. However, institutional trading profits are not uniform across all institutions. I find a stark contrast between institutional supplier trading profits for institutions that own customer stock (i.e. joint owners) and those that do not own customer stock. Joint owners attain sizable supplier stock trading profits (1.13% per month), especially when their ownership in the customer stock is large (1.14% per month). I identify that joint owner trading profits are driven by trading in supplier firms with high customer-base concentration (1.59% per month). Further, I find that the joint owner trading profits are not due to related industry concentration, but are attributable, at least in part, to superior information gathering about

supplier earnings based on captured information from the supply chain. Therefore, information gathered from the customer-supplier relationship helps joint owners identify changes in future supplier revenues which benefits joint owner trading decisions.

This paper provides a new look into the determinants of institutional ownership and informed institutional trading. I reveal the propensity for institutions to own a customer or supplier if they already own a stake in the corresponding linked supplier or customer. Ownership of a corresponding linked firm is an otherwise undocumented determinant of institutional ownership. Moreover, I provide evidence of how economies of scale in information gathering along the supply chain leads to profitable institutional trading. This paper shows that the extraction of information about customer-base concentration from complex customer-supplier relationships generates an opportunity for institutions to anticipate changes in supplier earnings and profitably trade on their superior information.

List of References

Ahern, K., & Harford, J., 2014, The importance of industry links in merger waves. *Journal of Finance* 69(2), 527-576.

Alexander, G. J., Cici, G., & Gibson, S., 2007, Does motivation matter when assessing trade performance? An analysis of mutual funds. *Review of Financial Studies*, 20(1), 125-150.

Ali, A., Durtschi, C., Lev, B., & Trombley, M. (2004). Changes in institutional ownership and subsequent earnings announcement abnormal returns. *Journal of Accounting, Auditing & Finance*, *19*(3), 221-248.

Alldredge, D. M., & Cicero, D. C. 2014. Attentive Insider Trading. *Journal of Financial Economics (JFE), Forthcoming*.

Baker, M., Litov, L., Wachter, J. A., & Wurgler, J., 2010., Can mutual fund managers pick stocks? Evidence from their trades prior to earnings announcements. *Journal of Financial and Quantitative Analysis 45*(5), 1111-1131.

Boehmer, E., Jones, C. M., & Zhang, X., 2008, Which shorts are informed?, *Journal of Finance*, 63(2), 491-527.

Bushee, B. J. 2001. Do institutional investors prefer near-term earnings over long-run value?, *Contemporary Accounting Research*, 18(2), 207-246.

Campello, M., & Gao, J., 2014, Customer concentration and loan contract terms. Working paper, *Available at SSRN*.

Carhart, M. M., 1997, On persistence in mutual fund performance, *Journal of Finance*, 52(1), 57-82.

Chan, L. K., & Lakonishok, J., 1993, Institutional trades and intraday stock price behavior, *Journal of Financial Economics*, 33(2), 173-199.

Chen, H. L., Jegadeesh, N., & Wermers, R., 2000, The value of active mutual fund management: An examination of the stockholdings and trades of fund managers, *Journal of Financial and Quantitative Analysis*, 35(03), 343-368.

Cohen, L., & Frazzini, A., 2008, Economic links and predictable returns, *Journal of Finance*, 63(4), 1977-2011.

Daniel, K., Grinblatt, M., Titman, S., & Wermers, R., 1997, Measuring mutual fund performance with characteristic-based benchmarks, *Journal of Finance*, 52(3), 1035-1058.

Demsetz, H., & Lehn, K., 1985, The structure of corporate ownership: Causes and consequences, *Journal of Political Economy*, 1155-1177.

Dhaliwal, D. S., Judd, J. S., Serfling, M. A., & Shaikh, S., 2014, Customer concentration risk and the cost of equity capital, Working paper, *Available at SSRN 2391935*.

Diether, K. B., Lee, K. H., & Werner, I. M., 2009, Short-sale strategies and return predictability, *Review of Financial Studies*, 22(2), 575-607.

Easley, D., & O'hara, M., 1987, Price, trade size, and information in securities markets, *Journal of Financial Economics*, 19(1), 69-90.

Fama, E. F., & French, K. R., 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics*, 33(1), 3-56.

Glosten, L. R., 1987, Components of the bid-ask spread and the statistical properties of transaction prices, *Journal of Finance*, 42(5), 1293-1307.

Gompers, P. A., & Metrick, A. 2001. Institutional investors and equity prices. *Quarterly journal of economics*, *116*, 229-59.

Guan, Y., Wong, M. H., & Zhang, Y., 2014, Analyst following along the supply chain and forecast accuracy, INSEAD Working paper No. 2014/21/ACC, *Available at SSRN*.

Hertzel, M. G., Li, Z., Officer, M. S., & Rodgers, K. J., 2008, Inter-firm linkages and the wealth effects of financial distress along the supply chain. *Journal of Financial Economics*, 87(2), 374-387.

Huang, L., & Kale, J. R., 2013, Product market linkages, manager quality, and mutual fund performance, *Review of Finance*, 17(6), 1895-1946.

Huang, R. D., & Stoll, H. R., 1997, The components of the bid-ask spread: A general approach, *Review of Financial Studies*, 10(4), 995-1034.

Irvine, P., Park, S. S., & Yildizhan, C., 2013, Customer-base concentration, profitability and distress across the corporate life cycle, Working paper, *Available at SSRN*.

Kacperczyk, M., Sialm, C., & Zheng, L., 2005, On the industry concentration of actively managed equity mutual funds, *Journal of Finance*, 60(4), 1983-2011.

Keim, D. B., & Madhavan, A., 1996, The upstairs market for large-block transactions: Analysis and measurement of price effects, *Review of Financial Studies*, 9(1), 1-36.

Kelly, B., Lustig, H., & Van Nieuwerburgh, S., 2013, *Firm Volatility in Granular Networks* (No. w19466). National Bureau of Economic Research.

Kyle, A. S., 1985, Continuous auctions and insider trading, *Econometrica: Journal of the Econometric Society*, 1315-1335.

Menzly, L., & Ozbas, O., 2010, Market segmentation and cross-predictability of returns, *Journal of Finance*, *65*(4), 1555-1580.

Mihov, A., & Naranjo, A., 2014, Customer-base concentration and the transmission of idiosyncratic volatility along the vertical chain. Working paper, *Available at SSRN 2401973*.

Pandit, S., Wasley, C. E., & Zach, T., 2011, The effect of research and development (R&D) inputs and outputs on the relation between the uncertainty of future operating performance and R&D expenditures, *Journal of Accounting, Auditing & Finance*, 26(1), 121-144.

Patatoukas, P. N. 2012. Customer-base concentration: Implications for firm performance and capital markets, *The Accounting Review*, 87(2), 363-392.

Puckett, A., & Yan, X. S., 2011, The interim trading skills of institutional investors. *Journal of Finance*, 66(2), 601-633.

Sias, R. W., (2004), Institutional herding, *Review of Financial Studies*, 17(1), 165-206.

Stambaugh, R. F., 2003, Liquidity risk and expected stock returns. *Journal of Political Economy*, 111(3).

Wermers, R., 2004, Is money really "smart"? New evidence on the relation between mutual fund flows, manager behavior, and performance persistence, Working Paper, *SSRN eLibrary*.

Yan, X. S., & Zhang, Z., 2009, Institutional investors and equity returns: Are short-term institutions better informed?, *Review of Financial Studies*, 22(2), 893-924.

Vita

Dallin Alldredge was born and raised in Mesa, Arizona. He received his undergraduate education under the presidential scholarship at Arizona State University. In May of 2009 he obtained his Bachelors of Science degree from Arizona State University in Mechanical Engineering with an emphasis in Computational and Mathematical Mechanics. He shifted his field of study to economics when he accepted a graduate research assistantship at Utah State University. He completed his Masters of Science degree in Economics at Utah State University in December of 2010. In July of 2011 Dallin began his pursuit of a doctoral degree in finance at the University of Tennessee. He has had the privilege of learning from the excellent faculty group in the Haslam College of Business throughout his four year doctoral program. In particular he worked closely with Dr. David C. Cicero and Dr. Andy Puckett in developing his research capability. Dallin graduated with a Ph.D. in Business Administration with a concentration in finance in May of 2015. He is currently employed as an Assistant Professor of Finance at Washington State University where he hopes to achieve his research and teaching goals.