The Performance of Institutional Investor Trades Across the Supply Chain

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ABSTRACT

In this study, we investigate the significance of supply-chain relationships for institutional investors. We find that supply-chain relationships are an important determinant of institutional ownership – an institution that owns a customer firm is five times more likely than other institutions to also have an ownership stake in the firm's supplier. Further, institutions experience abnormal trading profits in supplier firms. Trading profits are concentrated in small suppliers with negative future abnormal performance, consistent with institutional investors trading on negative information shocks across the supply chain. Robustness tests help to support a conclusion that supply-chain relationships provide a rich source of information through which institutions realize abnormal trading profits.

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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. The interconnected nature of such relationships also exposes customer and supplier firms to common economic shocks (Menzly and Ozbas, 2010; Cohen and Fazzini, 2008; Pandit, Wasley and Zach, 2011), and leaves smaller suppliers particularly vulnerable to disruptions in the trading relationship (Irvine, Park, and Yildizhan, 2015). While the importance of such relationships has 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 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 improve the accuracy of their earnings forecasts significantly more than analysts who only cover the supplier. The implications of these findings are that attention constraints prevent market participants from fully impounding value-relevant information into the supplier. We extend this line of analysis to consider whether

[1]For example, following news concerning the demand for Apple's new iPhone 6, stock prices of Apple's 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

another category of market participants – institutional investors – capitalize on supply-chain information through their trading activity.[2]

Although institutional investors are often viewed as informed market participants, recent research suggests that behavioral biases influence institutional trading decisions in a manner that exacerbates several well-known pricing anomalies (Edelen, Ince, and Kadlec, 2015). Our investigation seeks to add to this dialogue by specifically investigating institutional investors' ownership and trading decisions in supply-chain linked firms. As such, our paper contributes to several strands of extant finance research. First, we 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 we refer to ownership by a single institution in a customer-supplier linked pair as *joint ownership*). Second, we 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; Puckett and Yan, 2011; Edelen, Ince, and Kadlec, 2015) by showing that institutional trading in supply firm stocks forecasts economically large abnormal returns. The return predictability that we document is concentrated in small suppliers that are most heavily sold by institutions. Conditioning on small suppliers, we find that supplier firms most heavily sold by institutions underperform supplier stocks most heavily purchased by institutions by approximately 0.80% per month in the quarter following portfolio formation.

[2] Huang and Kale (2013) find some evidence that mutual funds investing in customer and supplier linked industries have superior performance, consistent with an industry-level informational advantage identified by Kacperczyk, Sialm and Zheng (2005). In Section III. C. 3., we test whether institutional trading profits in this study can be attributed to industry-level information, and provide evidence inconsistent with this alternative hypothesis.

Our results are most consistent with institutional investors obtaining and trading on negative information shocks across the supply chain; however, it is also possible that predictability of future abnormal returns is mechanically driven by microstructure effects. Multiple supplemental tests support the conclusion that our result is attributable to an information advantage captured by institutional traders. In particular, we find that institutional trading predicts both earnings surprises and abnormal returns around earnings announcements in the quarter following portfolio formation. We also document that the portfolio of suppliers most heavily sold by institutions are significantly more likely to be delisted from their exchange within the year following portfolio formation. Our finding is consistent with prior studies that provide evidence of informed trading by institutional investors prior to earnings announcements (Baker, Litov, Wachter and Wurgler, 2010; Yan and Zhang, 2009; and Ali, Durtschi, Lev and Trombley, 2004) and identifies a particular channel (i.e. supply-chain information) through which institutions might attain this information advantage.

We collect information on customer-supplier relationships over the period from 1986 to 2012 from the Compustat Customer Segments database and institutional ownership from 13F filings obtained by Thompson Financial. Given that Cohen and Frazzini (2008) attribute predictability in supplier returns to investor inattention (i.e. a market friction), we attempt to operationalize the concept of investor attention. We recognize that investor inattention is a multi-faceted construct – one possibility is that inattention varies across distinct subsets of market participants, while another possibility is that inattention varies across certain types of firms. As such, we operationalize the concept of investor attention in two distinct ways. First, we look separately at joint-owner institutions (i.e. those that own both the customer and supplier stock) and non-joint owners. Our metric is consistent with that employed by Guan, Wong, and Zhang

(2014) and relies on the supposition that institutions that own a stock are more intimately familiar with the nuances of its business than those that do not. Second, we investigate smaller suppliers and suppliers that rely more heavily on a small group of major customers. Our second metric builds from research documenting institutional investors' preference for larger and more liquid stocks (Gompers and Metrick, 2001). To the extent that some institutions avoid gathering information on smaller supplier stocks, we expect institutions keen on information gathering across the supply chain would profit from the relative inattention to small supplier stock.

Our first tests focus on the determinants of institutional ownership. Given economies of scale and scope in information acquisition, we posit that institutions owning shares in a customer firm are significantly more likely to own shares in that firm's supplier. Our 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 five times more likely to also own stock in the corresponding supplier. While untabulated multivariate analyses confirm these findings, we also employ a difference-in-differences framework in order to alleviate endogeneity concerns. Specifically, we explore changes in both the breadth and depth of institutional ownership around the initiation of a new customer-supplier relationship. Around these events, our tests confirm that institutions that own a customer firm: 1) are more likely to purchase a linked supplier they do not already own, and 2) expand their holdings of a linked supplier for which they already have an ownership stake. Our results are consistent with institutions efficiently leveraging information complementarities across the supply chain when making their investment decisions.

Our next tests focus on 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 return pattern, one would not expect attentive institutional investors to capitalize on the documented anomaly.

Our analysis begins using calendar-time portfolios. Specifically, in each quarter of the sample we aggregate changes in institutional holdings (i.e. institutional trades) for each supplier firm and group the cross-section of supply firms into quintiles based on this measure. We then calculate the equal- and value-weighted performance of quintile portfolios over the adjacent quarter. Our tests reveal modest evidence that the quartile of suppliers most heavily bought outperform the portfolio of suppliers most heavily sold during the subsequent quarter.

While such findings are consistent with at least some institutions capitalizing on supply-chain information, a more rigorous test of the inattention hypothesis is possible. To identify variation in supply chain attention across subgroups of institutions, we divide institutional investors in each quarter into two groups: 1) institutions that own the corresponding customer stock, and 2) institutions that do not own the corresponding customer 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 0.458% (0.154%) per month using equal-weighted (value-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. In contrast to inference obtained by Guan, Wong, and Zhang (2014), we find almost identical outperformance among institutions that do not own the customer stock.

While variation in investor attention across different institutional investor cohorts fails to explain our primary result, our second test exploits potential variation in investor attention that is driven by firm characteristics. In particular, we divide supplier firms into groups based both on firm size and the concentration of supply-chain relationships, and again repeat the trading experiment. Our results show that abnormal trading performance is concentrated in small supplier stocks that institutional investors heavily sell. For small suppliers, the portfolio of stocks most heavily sold underperforms the portfolio of stocks most heavily purchased by 0.801% (0.882%) per month when using equal- (value-) weighted averages. Our findings are consistent with the premise that attentive institutions extract information from the complex economic relationship between customer and supplier firms and capitalize on this information advantage by trading in suppliers. However, given that supplier firms are significantly smaller than customers, an alternative explanation of our findings is that the price impact of autocorrelated institutional trade is responsible for the documented return predictability. To help disentangle these completing explanations we perform a series of supplemental tests.

We address the possibility that microstructure effects spuriously influence our conclusions by investigating whether institutional trade predicts suppliers' future fundamentals: earnings surprises or supplier delistings. As such, our tests are divorced from potential contamination by microstructure effects, since autocorrelated trade (and its subsequent price impact) have no relationship with future innovations in supplier fundamentals. We find that institutional trading predicts both earnings surprises and abnormal returns around earnings announcements over the next quarter. The quintile of suppler stocks most heavily bought by institutions has 0.711% higher earnings announcement returns (0.101% higher earnings surprise) around the subsequent quarter's earnings announcement than the quintile of supplier stock most heavily sold by institutions. In addition, we find that the quintile of suppliers most heavily sold by institutions are almost twice as likely to be delisted from their trading exchange when compared to the quintile of suppliers heavily purchased by institutions. These findings support other studies that document institutional trading skill is a function of institutions' ability to forecast future firm fundamentals (Baker, Litov, Wachter and Wurgler, 2010; Yan and Zhang, 2009; and Ali, Durtschi, Lev and Trombley, 2004). More importantly, our 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 for future firm performance.

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.

II. Data & Sample Selection

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-

[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

Reuters Institutional Holdings (13F) Database is used to extract the quarterly institutional holdings.[4] We 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. We 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 our analysis.[6]

After restricting the sample to firms with corresponding institutional holdings data, stock returns and financial statement data[7], our sample includes 3,482 unique customer-supplier pairs. Each paired relationship lasts an average of 2.56 years resulting in a sample of 8,686 supplier firm years and 6,833 customer firm years over the 1986 to 2012 sample period.[8] The average supplier has 1.31 principle customers, each of which account for at least 10% of the supplier's total sales; and the average customer has 3.18 suppliers, which is consistent with the statistics reported in Cohen and Frazzini (2009).

Corporation), which complicates comparisons to the full company name listed in Compustat. In an effort to match the customer names conservatively we are careful to check company websites and the Business Week company profiles. We only retain customer-supplier relationships where the percentage of sales from supplier to customer is not missing and is greater than 10%.

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

[7] We also require that each supplier firm in our sample can be matched to a corresponding DGTW benchmark portfolio in order to calculate abnormal returns.

[8] 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, when customer characteristics are needed in their analysis.

Summary statistics presented in Table I show that supplier firms are fundamentally different from customer firms. Consistent with prior literature (Pandit, Wasley and Zach, 2011), we find that customer firms are older and larger than supplier firms. Customer firms have an average market capitalization of $10.5 billion compared to $2.2 billion for supplier firms, and the average age of customer firms is approximately 3 years older than suppliers. Moreover, customer firms experience more than twice as much monthly trading volume, while the average supplier has greater volatility.

Most 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 fiscal year 1990. 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., Fifth & Pacific Companies Inc., Estee Lauder Companies Inc., Joes Jeans Inc., etc.). The illustration underscores the interdependent nature of U.S. publically traded companies. In this study we explore potential information that is extracted from such relationships by institutional investors.

III. Empirical Results

We investigate institutional ownership along the supply chain and institutional trading in supplier firms to determine whether institutions incorporate supply chain information in their ownership and trading decisions. We first investigate whether supply chain linkages are a significant determinant of institutional ownership. We then explore the impact supply chain linkages have on institutional trading profits.

III. A. Determinants of Institutional Ownership – Supply-Chain Linkages

Our investigation begins by examining whether supply-chain linkages are an important determinant of institutional ownership. In a univariate setting, we first 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 II, Panel A show that 15.5% of institutions that own stock in the customer firm also own stock in the linked supplier. Alternatively, only 2.8% of institutions that do not own stock in the customer firm have an ownership stake in the linked supplier. Taken together, our results suggest that an institution is five times more likely to own a supplier if it also owns the customer.

In Panel B of Table II, we reverse our 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 the institutions that own stock in the supplier, 68.4% also have an ownership stake in the linked customer. For institutions that do not own stock in the supplier, only 25.1% have an ownership stake in the linked customer. These conditional probabilities are consistent with institutions demonstrating a preference for joint ownership in customer-supplier linked pairs.

Univariate tests presented in Table II are instructive 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, we perform two separate multivariate tests. In the first (untabulated) test, we explore the determinants of institutional ownership using a methodology similar in spirit to that of Yan and Zhang (2009).[9] We augment the methodology of Yan and Zhang (2009) by creating a unique observation for each potential institution-stock ownership pairing and include independent variables that identify individual stock and institution characteristics. Our independent variable of interest is an indicator variable that captures whether an institution has an ownership stake in a linked customer firm. We run Fama-MacBeth style cross-sectional regressions in each quarter and find that the coefficients on linked-customer ownership are positive and statistically significant in all 100 quarterly regressions. While such an 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 potential endogeneity concerns and more clearly identify the tendency of institutions to own both customer and supplier linked stocks, our second multivariate test employs a difference-in-differences design. We identify the first year of each unique customer-supplier relationship (year *t*) and sort institutions into treatment and control groups in the year before a customer-supplier relationship begins (year *t*-1). The treatment group includes institutions that own the customer stock, while the control group includes institutions that do not own the customer stock. For each group we calculate two variables of interest: 1) the change in the number of unique institutions that own the supplier stock from the year preceding the

[9] Our 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 we investigate determinants of ownership at the institution-stock level. For each potential institution-stock pairing, we include a separate observation. This innovation allows us to control for institution-specific features – including prior ownership of the customer firm.

initiation of a customer-supplier relationship until the year following this event, and 2) the change in the percentage ownership of the supplier firm across the same time horizon. Our research design produces two observations for each customer-supplier relationship commencement – one observation aggregated across the treatment group and one observation aggregated across the control group.

The independent variable of interest, *Customer Owner Dummy*, is an indicator variable that is set to one for treatment group observations. Other independent variables are consistent with those used in extant literature investigating the determinants of institutional ownership (Gompers and Metrick, 2001; Yan and Zhang, 2009) and can broadly be categorized as proxies for investor prudence, liquidity or return predictability.[10] *Age* (number of months since the firm is listed in CRSP), *S&P 500* (indicator equal to one for S&P 500 member firms), *Volatility* (two year variance of monthly returns), and *Dividend yield* (cash dividend divided by the market capitalization) proxy for investor prudence. *Price, Size* (market capitalization), and *Turnover* (trading volume divided by shares outstanding) proxy for liquidity and transactions costs. *B/M* (book to market ratio), *Long Momentum* (cumulative return over the nine months starting at the beginning of year *t*-1), and *Short Momentum* (cumulative return over the last three months of year *t*-1) measure firm characteristics that have been linked to institutional ownership and expected future returns. 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), we also control for the composition of institutional ownership in year *t*-1. *Customer Inst Ownership* is the level of aggregate treatment or control group institutional ownership as of the end of year *t*-1.

[10] All independent variables are expressed as of year *t*-1.

The difference-in-difference regressions are presented in Table III. We employ a pooled cross-sectional regression where the dependent variable is either: *% Change in Supplier Institutions* (change in unique institutions that own a supplier) or *% Change in Supplier Inst Own* (change in institutional ownership of a supplier). The first regression specification, where our dependent variable is *% Change in Supplier Institutions,* effectively measures changes in the breadth of institutional ownership. The coefficient on the *Customer Owner Dummy* is 0.011 (*p-value*=0.002), indicating that treatment group institutions (i.e. institutions that own the customer) are 1.10% more likely than control group institutions to initiate a position in the supplier during the year following the commencement of a customer-supplier relationship. Given that the unconditional probability for institutions that do not own the customer initiate an ownership stake in the supplier is 1.13%, our coefficient estimate suggests that institutions that own the customer stock are almost twice as likely to initiate a position in the supplier following the commencement of a new customer-supplier relationship[11]

We further explore changes in the depth of institutional ownership around new customer-supplier relationships by using *% Change in Supplier Inst Own* as our dependent variable in the second regression specification. The coefficient on the *Customer Owner Dummy* is 0.0129 (*p-value*<0.001) in Column 2 indicating that, on average, treatment group institutions increase ownership in a supplier stock 1.29% more than control group institutions in the year following a new customer-supplier relationship. Results from both regression specifications support the contention that customer-supplier relationships affect both the breadth and depth of institutional ownership for institutions with existing holdings in the linked customer.

III. B. Profitability of Supply Firm Institutional Trading

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

If institutional investors demonstrate an increased propensity to hold both a customer and supplier firm when there is an existing sales relationship, one might reasonably conclude that there are potential economic benefits that drive such preferences. One channel through which economic benefits might accrue to a joint-owner institution is through trading activity in the supplier firm.

Extant literature establishes that 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. However, one must recognize that the construct of investor attention is multi-dimensional. If return predictability across the supply chain can be captured by simply observing abnormal return shocks in customer firms, one should expect that any astute investor (i.e. institutional investors) can profitably trade in the corresponding supplier. Alternatively, if supply-chain information is more nuanced than this simple relationship (consistent with Guan, Wong, and Zhang, 2014) one might expect that only investors with an intimate understanding of both the customer and supplier firm are able to capitalize on this documented return predictability. In this section, we explore whether the trades of institutional investors, or a subset of institutional investors, predict subsequent abnormal returns in supplier stocks.

III. B. 1. All Institutional Trading

Our first tests examine whether aggregate institutional trading activity predicts abnormal supplier returns. For each supplier firm-quarter, we aggregate changes in quarterly holdings across all institutions and separate supplier firms into quintiles based on aggregate quarterly changes. We then form calendar-time portfolios and calculate the equal- and value-weighted excess return, Fama-French three-factor alphas, and DGTW benchmark adjusted returns for each portfolio over the subsequent three-month period.[12] Excess returns are the raw return less the risk-free rate, Fama-French three-factor alphas are the intercept from regressions of excess returns on Fama-French (1993) zero-investment factor-mimicking portfolios, and DGTW benchmark adjusted returns are calculated by subtracting DGTW benchmark returns.[13] Inference for our tests is obtained from abnormal returns for the zero-investment portfolio that purchases the quintile portfolio most heavily bought by institutions and sells short the quintile portfolio most heavily sold by institutions.

Results presented in Table IV provide some evidence of abnormal trading profits. The equal-weighted long-short DGTW benchmark adjusted abnormal return is 0.583% per month (*p-value*=0.003), suggesting that institutional investors obtain an information advantage in trading across the supply chain. We also note that abnormal returns accrue disproportionately to the short side of the zero-investment portfolio, which is consistent with institutions incorporating negative future information about suppliers in their trading decisions. However, evidence consistent with abnormal trading performance in the value-weighted portfolio is more limited. Specifically, the DGTW abnormal return for the long-short portfolio is 0.288% per month (*p-value*=0.252).

As expressed earlier, it is possible that aggregating trading across all institutional investors masks important heterogeneity in the informativenesss of different institutional investor groups or across suppliers with different characteristics. Given that customer and supplier firms

[12] 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).

[13] DGTW benchmarks are characteristic-based benchmarks established by dividing all firms into 125 fractile portfolios based on size, book-to-market, and momentum quintiles (Daniel, Grinblatt, Titman and Wermers, 1997; Wermers, 2004). The DGTW benchmarks are available here http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm

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 a superior understanding about how customer firm behavior translates into the future health of supplier firms. In subsequent tests, we exploit cross-institutional differences in customer ownership in order to test this conjecture.

III. B. 2. Joint Owner and Non-joint Owner Trading

We begin by partitioning changes in institutional ownership for each supplier firm-quarter into two groups: 1) institutions with an ownership stake in the customer (i.e. joint owners), and 2) institutions without an ownership stake in the customer (i.e. non-joint owners). For joint owner and non-joint owner groups, we separately repeat the calendar time analysis presented in Table IV.

Our results for joint owner institutions are presented in Panel A of Table V. Results for joint owners are similar in both magnitude and significance to results obtained for the full sample. In particular, DGTW abnormal returns for the long-short portfolio are 0.458% per month, *p-value*=0.001 (0.154% per month, *p-value*=0.531) when using equal-weighted (value-weighted) averages. Somewhat surprisingly, we find qualitatively consistent results when investigating supplier trades for non-joint owners in Panel B of Table V. On average, long-short portfolio abnormal returns for non-joint owners are 0.374% per month (*p-value*=0.025) when using equal-weighted averages and 0.04% per month (*p-value*=0.861) when using value-weighted averages.[14]

[14] We test whether abnormal returns for the long-short portfolio are statistically different for the samples of joint owners and non-joint owners and find no statistical difference between the two time series. In untabulated results

Overall, our results suggest that institutional trades predict future abnormal returns only when we investigate equal-weighted portfolios, and are consistent in both significance and magnitude across joint owner and non-joint owner institution sub-samples. Our results are surprising given findings by Cohen and Frazzini (2008) and Guan, Wong, and Zhang (2014) suggesting that joint ownership by mutual funds or joint-coverage by analysts are important channels for supplier information. However, there are several interesting features of our calendar-time portfolio results that may help to shed light on the source of trading information. First, future abnormal performance appears to be driven by the sell side. In the full sample, the DGTW abnormal performance of suppliers heavily sold by institutions is -0.458% per month versus 0.126% per month for the portfolio most heavily purchased. The asymmetry in abnormal performance is interesting and contrasts with much of the institutional trading literature that finds evidence that institutional buys are significantly more informative than institutional sells (e.g. Keim and Madhavan, 1995; Puckett and Yan, 2011). Second, the fact that abnormal trading performance is evident in equal-weighted portfolios but not value-weighted portfolios is consistent with the premise that informed trading is concentrated in smaller suppliers.

Taken together, the above empirical regularities are consistent with institutional investors forecasting supply chain disruptions for smaller suppliers (Irvine, Park, and Yildizhan, 2015). In order to uncover the precise mechanism that facilitates profitable trading in supplier firms, we investigate the profitability of institutional trade for subsamples of supplier firms separated by size and customer base concentration. We then investigate whether industry or microstructure effects (i.e. price impact of institutional trade) are driving a spurious inference.

III. B. 3. Supplier Size

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we make similar inferences from regression output using one-factor alphas, four-factor alphas and five-factor alphas.

Irvine, Park, and Yildizhan (2015) find that younger and smaller supplier firms are particularly exposed to disruptions in the supply chain with major customers. Our results thus far are consistent with the conjecture that institutional investors are able to forecast negative shocks to small suppliers. In order to test our supposition more directly, we engage in the following empirical exercise.

We partition supplier firm-quarters into two groups: 1) suppliers that are larger than the median supplier size, and 2) suppliers that are smaller than the median size.[15] For each group, we separately repeat the calendar time analysis presented in Table IV. Panel A of Table VI presents institutional trading profits in large suppliers (i.e. above median size). The long-short portfolio DGTW benchmark adjusted return is 0.173% per month (*p-value*=0.448) using equal-weighted averages and 0.105% (*p-value*=0.690) using value-weighted averages. In stark contrast to the insignificant abnormal performance following institutional trades in large suppliers, abnormal institutional trading profits in small suppliers are economically large in magnitude, are present for both equal-and value-weighted portfolios, and are concentrated in the sell side portfolios. Panel B of Table VI presents evidence that the long-short portfolio for the small supplier subsample is 0.801%; *p-value*=0.003 (0.882%; *p-value*=0.002) using equal-weighted (value-weighted) averages. Furthermore, the abnormal performance is concentrated in the portfolio of stocks that institutions heavily sell, where we find abnormal returns in excess of -0.65% per month. Our results suggest that the ability of institutions to profitably trade in supplier stocks is concentrated in small suppliers with negative future abnormal performance.

III. B. 4. Strength of the Customer-Supplier Bond

If institutional investors possess a superior ability to forecast material disruptions in the supply chain, we might expect this effect to be most evident for cases where a supply chain

[15] The median supplier size across all supplier firm-quarters in our sample is approximately $475 million.

shock will have the largest economic impact on a supplier. Clearly, this is the case for small suppliers. However, we might also expect the affect to be more acute for suppliers that are more heavily dependent on major customers for their revenues.

Our next series of tests incorporate the Patatoukas (2012) customer-base concentration measure into the trading portfolio analysis. Customer-base concentration (*CC*) is a variation of the Herfindahl-Hirschman index that produces a normalized measure of the 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.*

We repeat the trading experiment in Table IV for institutional trade in supplier firms with: 1) above-median customer base concentration, and 2) below-median customer base concentration, and present our results in Table VII. When analyzing institutional trading in suppliers with high customer-base concentration, the long-short portfolio for the equal-weighted DGTW model has an abnormal return of 0.561% (*p-value*=0.021). For value-weighted portfolios, abnormal returns for the long-short portfolio are significant in two of the three specifications, but fall just outside of traditional significance levels when using DGTW benchmarks (0.439%; *p-value*=0.157). On the other hand, the long-short portfolio abnormal returns for suppliers with a low customer-base concentration are 0.503% (*p-value*=0.028) for the equal-weighted portfolio and are insignificantly different from zero in all value-weighted tests.

It appears that the information advantage for institutions is amplified when the supplier is small or is dependent on a concentrated customer base for sales revenue. These results are consistent with the information hypothesis, however, it is also possible that our results thus far can be attributed to microstructure or industry effects. For example, if institutional trading decisions are autocorrelated across adjacent quarters, it is possible that our tests are simply picking up the price impact of an institution's own future trading decisions. In the next section, we explore the robustness of our results and address concerns related to industry and microstructure effects.

III. C. Sources of Profitable Trading in Supply Firms

III. C. 1. Earnings Information

While our test support the hypothesis that institutions extract information from the supply chain and trade profitably in supplier firm stocks, one might still argue that our results are an artifact of microstructure effects. In particular, Table I reports that supplier firms are significantly smaller than their corresponding customers. Since institutional investors might take longer (i.e. multiple quarters) to fully implement trading decisions in small firms, and the price impact of institutional trade is larger for small firms (Anand, Irvine, Puckett, and Venkataraman, 2012), it is possible that return predictability documented in Table IV, V, VI, and VII is an artifact of autocorrelated implementation of institutional trading decisions.

In order to address this potential concern, we investigate whether institutional investors have the ability to identify suppliers' future earnings surprises. As such, our tests are divorced from potential contamination by microstructure effects, since autocorrelated trade (and its subsequent price impact) have no relationship with future earnings surprises. In addition, our test might help to uncover the specific type of information that institutions use when making profitable trading decisions. If institutional trading predicts suppliers' future earnings surprises, this suggest that institutional trading profits are at least partially driven by institutions' ability to forecast earnings fundamentals (Baker, Litov, Wachter and Wurgler, 2010).

The supply chain is a unique setting in 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 institutional investors 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 we would expect changes in institutional holdings prior to supplier earnings announcements to be informed.

We construct a test to explore whether institutional trading profits are derived (at least partially) by a superior ability of institutions to predict the upcoming earnings surprises of supplier firms. Following the methodology of Yan and Zhang (2009), we construct institutional trading portfolios (in a manner identical to Table IV) for all suppliers, and for large and small suppliers separately. In this setting, Q5 (Q1) contains stocks with the largest increase (decrease) in institutional ownership. We then calculate abnormal returns around future earnings announcement dates and earnings surprises for each portfolio over the subsequent four quarters. Abnormal returns around future earnings announcement dates are constructed by calculating the market-adjusted 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 each of the subsequent four quarterly earnings announcements.

Panel A of Table VIII reports the earnings announcement CARs following changes in institutional ownership in supplier stocks. The average three-day CAR (-1, 1) around supplier earnings announcements in the quarter following large decreases in institutional holdings (Portfolio Q1) is -0.497%. On the other hand, the average CAR around supplier earnings announcements in the quarter following large increases in institutional holdings (Portfolio Q5) is 0.214%. The difference in earnings announcement CARs in Q5 and Q1 is a significant 0.711% (*p-value*<0.001). It appears that changes in institutional holdings are predictive of subsequent supplier earnings announcement CARs. This result is consistent with institutions trading in supplier stock based on information gathered from the supply chain that directly impacts future firm fundamentals.

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

We separate supply firms into large and small cohorts and find corroborating evidence that the information advantage possessed by institutional traders is concentrated in smaller suppliers. Concentrating on the adjacent quarter (t+1), the difference in large supplier earnings announcement CARs following large increases in institutional holdings (Q5) and large decreases in institutional holdings (Q1) is an insignificant 0.267% (*p-value*=0.240). In contrast, the difference between quintile 5 and quintile 1 for small suppliers is 0.970% (*p-value*=0.001). Our results confirm prior findings that the information advantage of institutional investors is concentrated in small firm stocks.

Next, we explore whether changes in institutional holdings predict earnings surprises. To the extent that earnings surprises are correlated with abnormal returns around earnings announcements we expect the same result. In Panel B of Table VIII we document the price adjusted earnings surprises for all suppliers, and for large and small supplier subsamples. The average earnings surprise in the quarter following large decreases (increases) in institutional holdings of supplier stock is -0.026% (0.075%), resulting in a difference between Q5 and Q1 of 0.101% (*p-value*=0.008). In addition, we continue to find that this predictability is significantly stronger for small suppliers. The Q5 minus Q1 difference in earnings surprises for large suppliers is 0.065% (*p-value*=0.035) in quarter *t+1* versus a difference of 0.127% (*p-value*=0.006) for small suppliers. It appears that the informational advantage along the supply chain obtained by institutions is potentially due to institutional investors' ability to more accurately forecast future supplier earnings based on information attained from analyzing the supplier's economic relationships.

III. C. 2. Supplier Delistings

Given that the abnormal performance of institutional trading is concentrated in small suppliers with negative future abnormal returns, we next turn our focus to whether institutional trading predicts large negative fundamental events for supplier stocks. One such event is the delisting of a supplier firm from its primary trading exchange. Shumway (1997) documents that firms experiencing a delisting from their primary exchange often experience abnormal returns in excess of -30%.

To investigate whether institutional trade predicts future delistings in supplier stocks, we again construct institutional trading portfolios (in a manner identical to Table IV) for all suppliers, and for large and small suppliers separately. We then calculate the cumulative probability of supplier delistings for each portfolio across the subsequent four quarters. Table IX reports delisting probabilities for all portfolios and we find no statistical difference between Q5 and Q1 suppliers for the full sample of supplier firms. The cumulative probability of delisting in quarter *t+4* for the quintile of suppliers most heavily sold by institutions is 0.493% versus 0.33% for the portfolio most heavily purchased (difference of -0.16%; *p-value*=0.188). In fact, the only significant difference in delisting probability that we document is for small suppliers in quarter *t+4*. In this case, we find that the delisting probability for Q1 stocks is 0.811% versus 0.423% for Q5 stocks (difference of -0.388%; *p-value*=0.06). Our results provide limited evidence that institutional trading predicts small supplier delistings in the year following portfolio formation.

III. C. 3. Industry information

A potential variant of the information hypothesis is that institutional trading profits result from industry-level information (Huang and Kale, 2013 and Kacperczyk, Sialm, and Zheng, 2005). Institutions might trade in customer and supplier linked firms in order to profit from return predictability across customer and supplier industries (Menzly and Ozbas, 2010). If industry-level information is responsible for our primary result, this does not make our findings less interesting. However, it does have significant implications for our inference regarding the underlying mechanism.

To test whether related industry-level information is driving institutional trading profits, we run the following experiment: For each supplier firm in our sample we find a matched "pseudo supplier" in the same industry (4 digit SIC) that is most similar in size (within 50% of supplier market capitalization). We then identify institutions that own pseudo-supplier stock and analyze trades by these institutions in the pseudo-supplier. Our calendar time tests are constructed in an identical manner to tests reported in Table IV. If cross industry-level information contributes to our trading profitability results, we should expect institutional trade in pseudo suppliers to predict future abnormal performance.

In Table X we 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 institutional trading profits, on the other hand, poor trading profits at pseudo-supplier firms would suggest that institutional trading profits are independent of the Menzly and Ozbas (2010) customer-supplier industry cross-predictability. We find that the average abnormal returns from the long-short portfolio analysis are an insignificant 0.349% per month (*p-value*=0.133). These results suggest that related industry concentration and customer-supplier industry cross-predictability are not the mechanism that drives institutional trading profits. Therefore, institutions appear to gain from the information gathered from customer and supplier linked pairs, not broad information from customer and supplier industries.

III. D. Multivariate Analyses

The calendar time portfolio methodology is a practical strategy for identifying the subsequent abnormal returns associated with different institutional trading portfolios, however a multivariate approach provides the opportunity to control for other important cross-sectional factors. For example, if larger institutions tend to make more informed trading decisions, then controlling for institution size is important for our analysis.

To implement this multivariate approach we define our unit of observation at the firm-quarter level (subsequent analysis is also performed at the institution-firm-quarter level in order to control for institutional characteristics). The dependent variable is the abnormal DGTW return for each supplier stock over the *t+1* quarter. Independent control variables include stock-specific controls for *Short Momentum, Size (MVE)*, *Price*, *Dividend Yield*, *Volatility*, and *Turnover*. The independent variables of interest, *Change* and *Discrete Change*, measure changes in institutional holdings for the supplier stock over quarter *t*. *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.

We implement Fama-MacBeth cross-sectional regressions in each quarter of our sample and present the average quarterly regression coefficients in Panel A of Table XI. Institutional trading profits associated with supplier firms are robust to our multivariate analysis. As reported in Column (1) of Table XI (Panel A), on average, a 1% change in institutional ownership yields a 0.166% (*p-value*=0.000) DGTW benchmark adjusted return in the supplier stock over the subsequent quarter. This result is not driven by the tails of the distribution in the *Change* variable, because the coefficient on *Discrete Change* in Column (2) is also positive and significant (coefficient=0.387; *p-value*=0.001). The *Discrete Change* variable controls for the outliers in the *Change* variable.

Regression specifications (3) and (4) perform analogous tests at the institution-firm-quarter level and allow us to control for institution-specific characteristics. In particular, we include the institution size (aggregate value of an institution's portfolio holdings) and institution fixed effects. Results reveal consistent inference when compared to columns (1) and (2). We find the coefficient on *Change* is 0.153 (*p-value*=0.001) and the coefficient on *Discrete Change* is 0.107 (*p-value*=0.000). Overall, our findings confirm that the positive relation between the change in institutional holdings and future returns is robust to multivariate analysis and is not clustered in a subset of institutions.

Our final empirical test addresses the potential concern that institutional trade predicts future abnormal returns for all stocks (Gompers and Metrick, 2001; Yan and Zhang, 2009) and that supplier firm trading profits are an artifact of this larger result.[16] In order to address this potential concern, we augment our multivariate analysis in the following way: we pool all firms (both suppliers and non-suppliers) and run Fama-MacBeth style regressions in each quarter of our sample period. Further, we introduce a dummy variable, *Link*, that is equal to one for supplier firms, and interact *Link* with our two independent variables of interest: *Change* and *Discrete Change.* If the profitability of institutional trade is driven by institutions extracting material information from supply chain relationships, we expect the coefficients on *Link*Change* and *Link*Discrete Change* to be positive and significant.

Results presented in Panel B of Table XI confirm and strengthen our primary findings. In particular, we find that the coefficient on the interaction *Link*Change* is 0.099 (*p-value*=0.018) in regression column (1), and the coefficient on the interaction term *Link*Discrete Change* is 0.179 (*p-value*=0.080) in regression column (2).

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

[16] We would like to point out that the positive relation between changes in quarterly institutional holdings and subsequent abnormal returns is debated in extant literature. For example, Cai and Zheng (2004) actually find that changes in institutional holdings are *negatively* related to next quarter's returns.

IV. Conclusion

Several papers have shown that shocks to a firm impact 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 suggests 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 supply chain relationships are important to institutional managers' ownership and trading decisions.

This paper provides a new look into the determinants of institutional ownership and informed institutional trading. We reveal an increased propensity for institutions to own a supplier if they already own a stake in the corresponding linked customer. Ownership of a corresponding linked firm is an otherwise undocumented determinant of institutional ownership.

Our paper contributes to the literature on the informativeness of institutional trade by showing that institutional trading in supply firm stocks forecasts economically large abnormal returns. The return predictability that we document is concentrated in small suppliers that are most heavily sold by institutions. Conditioning on small suppliers, we find that supplier stocks most heavily sold by institutions underperform supplier stocks most heavily purchased by institutions by approximately 0.80% per month in the quarter following portfolio formation. Furthermore, we document that the abnormal performance of institutional trade in supplier firms can be attributed to an information advantage captured by institutional traders. In particular, institutional trading predicts future abnormal returns around earnings announcements and there is limited evidence that the portfolio of suppliers most heavily sold by institutions are significantly more likely to be delisted from their exchange. Overall, it appears that institutional investors extract valuable information from customer-supplier relationships and are able to exploit this information advantage through their trading activities.

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Table I
Summary Statistics

This table presents summary statistics for a sample of customer and supplier firm-year observations for the sample period 1986 to 2012. Customer firms are responsible for at least 10% of a given supplier's sales. The sample includes only common stocks (sharecode=10 or 11), firms with non-zero institutional ownership, and excludes financial firms. Panel A presents a comparison of firm characteristic averages for three groups: customer firms, supplier firms and all Compustat firms. Characteristics include *Size* (market capitalization at the end of the fiscal year), *Volume* (average monthly trading volume during the fiscal year), *B/M* (book to market), *Total IO* (aggregate institutional ownership at the end of the fiscal year), *Dividend yield* (cash dividend for the fiscal year ended before the most recent June 30 divided by the market capitalization), *Price* (stock price at the end of the fiscal year), *Turnover* (total trading volume divided by shares outstanding), *Age* (number of months since the firm is listed in CRSP), *Leverage* (total liabilities divided by the total liabilities plus the market capitalization), and *Volatility* (variance of monthly returns over the previous two years). Panel B presents customer-supplier relationship characteristics: the average number of suppliers linked to each customer, the average number of customers linked to each supplier, average institutional percentage ownership in the customer and supplier, the average change in supplier ownership, 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). 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.

Panel A: Firm Characteristics

	Customer Firms	Supplier Firms	Difference (Customer-Supplier)	All Compustat
Size ($millions)	10,510	2,234	8,276***	2,555
Volume (million)	37.91	15.78	22.13***	12.92
B/M	0.478	0.473	0.005	0.498
Total IO (%)	54.38	49.94	4.44***	48.35
Dividend yield (%)	1.72	0.88	0.84***	1.34
Stock price	37.69	23.08	14.61***	25.68
Turnover (%)	15.82	18.40	-2.58***	15.12
Age (months)	142.7	109.7	33.0***	117.6
Leverage (%)	38.63	28.03	10.60***	32.99
Volatility (%)	11.42	15.66	-4.24***	13.93
Number of firm years	6,833	8,686		59,428

Panel B: Customer Supplier Relationship Characteristics

	Mean	Median	Std Dev
Number of Suppliers linked to Customer	3.176	1.000	6.735
Number of Customers linked to Supplier	1.306	1.000	0.577
Avg ownership of customer (in %)	0.167	0.009	0.828
Avg ownership of supplier (in %)	0.337	0.021	1.258
Avg change in supplier ownership (in abs %)	0.145	0.007	0.622
Length of link	2.562	2.000	2.459
% of supplier total sales to customer	0.238	0.174	0.170
Customer-base Concentration (CC)	0.111	0.044	0.171

Table II
Univariate Statistics: Joint Ownership of Customer and Supplier Firms

This table presents probabilities of customer and supplier firm ownership conditional on ownership in the linked customer or supplier firm. Panel A presents the probability of an institution owning supplier stock conditional on that institution owning or not owning customer stock. Panel B presents the probability of an institution owning customer stock conditional on that institution owning or not owning supplier stock.

Panel A: Suppliers (firm-manager-years observations)

	Owns customer (yes) (*N=2,402,566*)	Owns customer (no) (*N=6,214,459*)
Owns supplier (yes)	15.5%	2.8%
Owns supplier (no)	84.5%	97.2%

Panel B: Customers (firm-manager-year observations)

	Owns supplier (yes) (*N=545,656*)	Owns supplier (no) (*N=8,071,369*)
Owns customer (yes)	68.4%	25.1%
Owns customer (no)	31.6%	74.9%

Table III
Difference-in-Difference: Joint Ownership of Customer and Supplier Firms

This table presents difference-in-differences regressions around the commencement of a new customer-supplier relationship (year *t*). Around each new customer-supplier relationship, we construct two observations: one for the treatment group of instiutions and one of the control group of institutions. The treatment group includes institutions that own the customer stock as of year *t*-1 and the control group includes institutions that do not own the customer stock as of year *t*-1. The dependent variable(s) are *% Change in Supplier Institutions* (percentage change in the number of treatment or control institutions that own the supplier stock from year *t*-1 to year *t*+1) and *% Change in Supplier Inst Own* (percentage change in aggregate ownership for treatment or control institutions from year *t*-1 to year *t*+1). The dependent variable of interest, *Customer Owner Dummy*, is an indicator equal to one for the treatment group and zero for the control group. *Customer Inst Ownership* is the level of aggregate institutional ownership for each group. *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. *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. *Size* is the log of the market capitalization. *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 divided by the market capitalization. All independent variables are expressed as of 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.

	% Change in Supplier Institutions	*% Change in Supplier Inst Own*
Customer Owner Dummy	0.0110***	0.0129***
	(0.0018)	(<0.001)
Customer Institutional Ownership	-0.117***	-0.497***
	(<0.001)	(0.000)
B/M	-0.0184***	-0.0002
	(<0.001)	(0.968)
Size	-0.00002	-0.0015
	(0.994)	(0.322)
Short Momentum	0.0295***	0.0025
	(<0.001)	(0.592)
Long Momentum	0.0037	0.0017
	(0.115)	(0.502)
Price	0.0102***	0.0058**
	(<0.001)	(0.0188)
Dividend Yield	0.120	-0.101
	(0.222)	(0.146)
Volatility	-0.0616**	-0.0082
	(0.0202)	(0.737)
Turnover	-0.0918***	-0.0157
	(<0.001)	(0.178)
Age	0.009***	0.0017
	(<0.001)	(0.359)
S&P 500	-0.0173**	-0.0016
	(0.0204)	(0.755)
Constant	-0.0116	0.0417***
	(0.453)	(0.00217)
Observations	4,944	4,944
R-squared	0.050	0.273

Table IV
Supplier Abnormal Returns

This table contains monthly abnormal returns obtained from calendar-time portfolios of supplier stocks during the period 1986 to 2012. Each quarter, supplier stocks are sorted into quintile portfolios based on aggregate changes in institutional ownership over the prior three months. Portfolios are held for three month after formation. The return for each portfolio is 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). *Q5 – Q1* 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 *Q5 – Q1* portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.086	-0.677	-0.458	0.326	-0.296	-0.200
Q2	0.413	-0.357	-0.156	0.576	0.062	-0.071
Q3	0.513	-0.201	-0.043	0.536	0.082	0.083
Q4	0.514	-0.178	-0.090	0.363	-0.122	-0.083
Q5 (buy)	0.774	0.014	0.126	0.729	0.171	0.087
Q5 – Q1	0.688***	0.691***	0.583***	0.403	0.467	0.288
P-value	(0.001)	(0.001)	(0.003)	(0.166)	(0.105)	(0.252)

Table V
Supplier Abnormal Returns: Joint Owners and Non-Joint Owners

This table contains monthly abnormal returns obtained from calendar-time portfolios of supplier stocks. We calculate calendar-time portfolio returns for two different groups: Panel A presents calendar-time portfolio returns following changes in joint-owner institutional holding (i.e., institutions that own both the customer and supplier stock), and Panel B presents calendar-timer portfolio returns following changes in non-joint-owner institutional holdings (i.e., institutions that own the supplier stock but do not own the customer stock). Each quarter, supplier stocks are sorted into quintile portfolios based on joint-owner (or non-joint-owner) changes in institutional ownership over the prior three months. Portfolios are held for three month after formation. The return for each portfolio is 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. *Q5 – Q1* 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 *Q5 – Q1* portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Joint Owner Trades

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.167	-0.588	-0.363	0.307	-0.314	-0.237
Q2	0.396	-0.372	-0.141	0.395	-0.091	-0.154
Q3	0.506	-0.213	-0.082	0.419	-0.023	-0.081
Q4	0.417	-0.307	-0.201	0.742	0.264	0.142
Q5 (buy)	0.754	0.015	0.096	0.488	-0.040	-0.083
Q5 – Q1	0.587***	0.603***	0.458***	0.180	0.274	0.154
P-value	(0.004)	(0.003)	(0.001)	(0.534)	(0.335)	(0.531)

Panel B: Non-Joint Owner Trades

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.151	-0.630	-0.422	0.376	-0.305	-0.073
Q2	0.584	-0.130	-0.028	0.509	0.035	-0.113
Q3	0.285	-0.420	-0.269	0.543	0.142	0.057
Q4	0.753	0.019	0.200	0.636	0.117	0.090
Q5 (buy)	0.573	-0.200	-0.047	0.661	0.029	-0.033
Q5 – Q1	0.422**	0.430**	0.374**	0.285	0.334	0.040
P-value	(0.014)	(0.014)	(0.025)	(0.255)	(0.185)	(0.861)

Table VI
Supplier Abnormal Returns: Supplier Size

This table contains monthly abnormal returns obtained from calendar-time portfolios of supplier stocks. We calculate calendar-time portfolio returns for two different groups: Panel A presents calendar-time portfolio returns for supplier stocks whose market capitalization is above the median level for our sample of suppliers, and Panel B presents calendar-timer portfolio returns for supplier stocks whose market capitalization is below the median level for our sample of suppliers. Each quarter, we separate supplier stocks into those above or below the median size. We then sort each size subgroup into quintile portfolios based on changes in institutional ownership over the prior three months. Portfolios are held for three month after formation. The return for each portfolio is 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. *Q5 – Q1* 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 *Q5 – Q1* portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Large Supplier Trades

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.391	-0.352	-0.172	0.449	-0.162	-0.098
Q2	0.464	-0.226	-0.106	0.469	0.017	-0.073
Q3	0.581	-0.076	-0.002	0.588	0.108	0.026
Q4	0.638	-0.020	0.053	0.432	-0.008	0.010
Q5 (buy)	0.705	0.005	0.001	0.681	0.166	0.007
Q5 – Q1	0.314	0.357	0.173	0.232	0.329	0.105
P-value	(0.200)	(0.151)	(0.448)	(0.427)	(0.259)	(0.690)

Panel B: Small Supplier Trades

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	-0.114	-0.931	-0.675	-0.097	-0.926	-0.651
Q2	0.365	-0.515	-0.152	0.313	-0.591	-0.204
Q3	0.429	-0.356	-0.155	0.509	-0.306	-0.089
Q4	0.534	-0.243	-0.056	0.530	-0.253	-0.042
Q5 (buy)	0.753	-0.040	0.126	0.847	0.048	0.232
Q5 – Q1	0.867***	0.891***	0.801***	0.944***	0.974***	0.882***
P-value	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)

Table VII
Supplier Abnormal Returns: Customer-base Concentration

This table contains monthly abnormal returns obtained from calendar-time portfolios of supplier stocks. We calculate calendar-time portfolio returns for two different groups: Panel A presents calendar-time portfolio returns for supplier stocks whose customer-base concentration is above the median level for our sample of suppliers, and Panel B presents calendar-timer portfolio returns for supplier stocks whose customer-base concentration is below the median level for our sample of suppliers. Customer-base concentration (*CC*) is calculated as in Patatoukas (2012).Each quarter, we separate supplier stocks into those above or below the median customer-base concentration. We then sort each customer-base concentration subgroup into quintile portfolios based on changes in institutional ownership over the prior three months. Portfolios are held for three month after formation. The return for each portfolio is 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. *Q5 – Q1* 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 *Q5 – Q1* portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: High Customer-Base Concentration

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	-0.045	-0.788	-0.564	0.181	-0.457	-0.311
Q2	0.360	-0.356	-0.134	0.570	0.077	0.084
Q3	0.272	-0.452	-0.247	0.776	0.282	0.230
Q4	0.458	-0.219	-0.117	0.302	-0.178	-0.194
Q5 (buy)	0.615	-0.115	-0.003	0.840	0.256	0.128
Q5 – Q1	0.660**	0.673**	0.561**	0.659**	0.714**	0.439
P-value	(0.012)	(0.010)	(0.021)	(0.049)	(0.031)	(0.157)

Panel B: Low Customer-Base Concentration

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.258	-0.788	-0.317	0.266	-0.399	-0.165
Q2	0.478	-0.309	-0.159	0.538	0.027	-0.139
Q3	0.632	-0.092	0.042	0.469	-0.021	0.001
Q4	0.735	0.029	0.125	0.708	0.174	0.262
Q5 (buy)	0.864	0.079	0.186	0.559	-0.017	-0.065
Q5 – Q1	0.606**	0.626**	0.503**	0.294	0.382	0.100
P-value	(0.016)	(0.014)	(0.028)	(0.3822)	(0.256)	(0.725)

Table VIII
Institutional Trading Prior to Earnings Announcements

This table contains monthly earnings announcement abnormal returns and earnings surprises in the four quarters following quarterly institutional trading. Each quarter, we separate supplier stocks into quintile portfolios based on changes in institutional ownership over the prior three months. Portfolios are held for four quarters after formation. Following the methodology of Yan and Zhang (2009), we calculate earnings announcement abnormal returns and earnings surprises around earnings announcements for each trading portfolio over the four quarter observation period. Panel A presents *Earnings Announcement Abnormal Returns*, calculated as the three-day market adjusted cumulative abnormal return (CAR) from day *t*-1 to *t*+1 around each supplier earnings announcement day *t*. Panel B presents *Earnings Surprises*, calculated as the raw difference between actual earning and consensus analyst forecasts divided by the stock price. 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*
All Suppliers				
Q1 (sell)	-0.497	-0.494	-0.173	-0.093
Q2	-0.351	-0.249	-0.223	-0.235
Q3	-0.212	0.102	-0.033	-0.029
Q4	-0.209	-0.188	-0.286	-0.231
Q5 (buy)	0.214	-0.185	-0.056	-0.107
Q5 – Q1	0.711***	0.309*	0.117	-0.014
P-value	(0.000)	(0.092)	(0.554)	(0.944)
Large Suppliers				
Q1 (sell)	-0.109	-0.457	-0.096	0.100
Q2	-0.218	-0.023	-0.004	-0.016
Q3	-0.094	0.075	-0.032	-0.134
Q4	0.120	0.140	-0.198	0.086
Q5 (buy)	0.158	0.069	0.078	0.025
Q5 – Q1	0.267	0.526**	0.174	0.075
P-value	(0.240)	(0.044)	(0.520)	(0.773)
Small Suppliers				
Q1 (sell)	-0.778	-0.487	-0.560	-0.579
Q2	-0.442	-0.411	-0.327	-0.073
Q3	-0.337	0.056	-0.322	-0.220
Q4	-0.522	-0.479	-0.459	-0.587
Q5 (buy)	0.192	-0.338	-0.319	-0.167
Q5 – Q1	0.970***	0.149	0.241	0.412
P-value	(0.001)	(0.649)	(0.421)	(0.190)

Panel B: Earnings Surprises (%)				
	t+1	*t+2*	*t+3*	*t+4*
All Suppliers				
Q1 (sell)	-0.026	-0.012	0.013	0.013
Q2	0.000	0.009	0.021	0.022
Q3	0.002	0.029	0.016	0.012
Q4	0.023	0.019	0.021	0.009
Q5 (buy)	0.075	0.042	0.036	0.045
Q5 – Q1	0.101***	0.054**	0.023	0.032
P-value	(0.008)	(0.037)	(0.230)	(0.125)
Large Suppliers				
Q1 (sell)	0.002	0.018	0.030	0.000
Q2	0.020	0.014	0.028	0.051
Q3	-0.002	0.012	0.011	0.017
Q4	0.026	-0.002	0.037	0.027
Q5 (buy)	0.067	0.015	0.059	0.060
Q5 – Q1	0.065**	0.003	0.029	0.060*
P-value	(0.035)	(0.959)	(0.344)	(0.064)
Small Suppliers				
Q1 (sell)	-0.078	-0.075	-0.039	-0.042
Q2	-0.008	-0.033	-0.022	0.017
Q3	-0.024	-0.006	-0.046	-0.063
Q4	0.050	0.010	0.001	-0.039
Q5 (buy)	0.049	0.020	0.008	0.035
Q5 – Q1	0.127***	0.095**	0.047	0.076*
P-value	(0.006)	(0.044)	(0.269)	(0.076)

Table IX
Institutional Trading Prior to Delistings

This table contains delisting activity for supplier stocks in the four quarters following quarterly institutional trading. Each quarter, we separate supplier stocks into quintile portfolios based on changes in institutional ownership over the prior three months. Portfolios are held for four quarters after formation. We calculate the cumulative percent of supplier stocks delisting from their primary exchange over the four quarter observation period. We calculate statistics for the full sample, and separately for large suppliers (above median size) and small suppliers (below median size). 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.

Cumulative probability of Delisting				
	t+1	*t+2*	*t+3*	*t+4*
All Suppliers				
Q1 (sell)	0.041	0.135	0.282	0.493
Q2	0.041	0.105	0.208	0.431
Q3	0.000	0.112	0.250	0.502
Q4	0.012	0.049	0.170	0.294
Q5 (buy)	0.022	0.094	0.226	0.333
Q5 – Q1	-0.019	-0.041	-0.055	-0.160
P-value	(0.522)	(0.480)	(0.525)	(0.188)
Large Suppliers				
Q1 (sell)	0.044	0.090	0.190	0.249
Q2	0.000	0.020	0.072	0.215
Q3	0.000	0.112	0.167	0.302
Q4	0.000	0.000	0.046	0.110
Q5 (buy)	0.020	0.059	0.138	0.249
Q5 – Q1	-0.024	-0.031	-0.052	0.000
P-value	(0.510)	(0.579)	(0.557)	(0.997)
Small Suppliers				
Q1 (sell)	0.028	0.216	0.415	0.811
Q2	0.065	0.179	0.357	0.743
Q3	0.021	0.153	0.387	0.675
Q4	0.059	0.119	0.286	0.489
Q5 (buy)	0.000	0.110	0.311	0.423
Q5 – Q1	-0.028	-0.106	-0.104	-0.388*
P-value	(0.318)	(0.276)	(0.467)	(0.060)

Table X
Pseudo-supplier Abnormal Returns

This table contains monthly abnormal returns obtained from calendar-time portfolios of pseudo-supplier stocks. For each supplier firm, we choose a pseudo-supplier that does not have a significant customer (10% customer) in our database, is in the same industry as the supplier (4 digit SIC code), and is the closest in size (within 50% of market capitalization). Each quarter, pseudo-supplier stocks are sorted into quintile portfolios based on aggregate changes in institutional ownership over the prior three months. Portfolios are held for three month after formation. The return for each portfolio is 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). *Q5 – Q1* 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 *Q5 – Q1* portfolio are in parentheses, and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

	Equal Weighted Returns			Value Weighted Returns		
	Excess Returns	3 Factor Returns	DGTW Returns	Excess Returns	3 Factor Returns	DGTW Returns
Q1 (sell)	0.596	-0.165	-0.239	0.856	0.218	-0.062
Q2	0.282	-0.442	-0.577	0.599	0.087	-0.305
Q3	0.833	0.162	-0.113	1.117	0.637	0.217
Q4	1.116	0.360	0.216	0.955	0.371	0.18
Q5 (buy)	1.066	0.353	0.110	1.234	0.701	0.251
Q5 – Q1	0.470*	0.518**	0.349	0.378	0.483	0.313
P-value	(0.059)	(0.040)	(0.133)	(0.259)	(0.153)	(0.284)

Table XI
Multivariate Test of Joint Owner Trading and Supplier Abnormal Returns

This table contains Fama-MacBeth regressions run each quarter during the period 1986 to 2012 for all supplier firms in our sample. The dependent variable is the quarterly DGTW benchmark adjusted supplier return over quarter t+1. The independent variables of interest, *Change* and *Discrete Change*, is the aggregate change in institutional ownership over quarter t and the discrete quintile rank (1 to 5) of the quarterly percentage change in institutional holdings, respectively. *Short Momentum, Size, Price, Turnover, Volatility* and *Dividend Yield* are calculated as in Table 3. *Panel A* presents our primary regression model. Columns (1) and (2) are calculated where the unit of observation is the supplier firm-quarter. Columns (3) and (4) are calculated where the unit of observation is the institution-firm-quarter. *Institution Size* is the log of the dollar value of equity under management by the institution. Panel B presents identical Fama-MacBeth regressions that include both supplier firms and non-supplier firms. We include the variable Link, which is set to 1 for supplier firm, and interact the variable Link with our independent variables of interest: *Change* and *Discrete Change.* P-values are in parentheses and significance at the 1%, 5%, and 10% level are indicated by ***, **, and *, respectively.

Panel A: Multivariate Regression

Variables	(1)	(2)	(3)	(4)
Change	0.166***		0.153***	
	(0.000)		(0.001)	
Discrete Change		0.387***		0.107***
		(0.001)		(0.000)
Institution Size			-9.983	-10.201
			(0.451)	(0.444)
Short Momentum	-0.279	0.189	0.747	0.734
	(0.801)	(0.863)	(0.549)	(0.556)
Size	0.399***	0.369**	0.106	0.108
	(0.009)	(0.015)	(0.493)	(0.485)
Price	-0.272	-0.218	-0.536	-0.529
	(0.552)	(0.634)	(0.264)	(0.262)
Turnover	-1.546	-1.383	-0.438	-0.437
	(0.566)	(0.608)	(0.879)	(0.880)
Volatility	-9.666**	-9.451**	-5.217	-5.193
	(0.040)	(0.042)	(0.332)	(0.334)
Dividend Yield	-15.883**	-15.222*	-15.276	-15.220
	(0.049)	(0.060)	(0.129)	(0.130)
Constant	-0.883	-1.605	215.16	219.364
	(0.523)	(0.238)	(0.445)	(0.439)
Institution Fixed Effects	no	no	yes	yes
Unit of Obs.	Firm/Quarter	Firm/Quarter	Inst./Firm/Quarter	Inst./Firm/Quarter
Observations	28,155	28,155	2,106,495	2,106,495

Panel B: Multivariate Regression with Link Interaction				
	(1)	(2)	(3)	(4)
Change	0.069***		0.080***	
	(0.000)		(0.000)	
Discrete Change		0.217***		0.077***
		(0.000)		(0.000)
*Link*Change*	0.0985**		0.093*	
	(0.018)		(0.054)	
*Link*Discrete*		0.179*		0.028
		(0.080)		(0.134)
Link	-0.095	-0.441*	0.019	-0.037
	(0.549)	(0.055)	(0.911)	(0.823)
Institution Size			4.495	5.045
			(0.288)	(0.232)
Short Momentum	-0.856	-0.804	-0.327	-0.344
	(0.317)	(0.347)	(0.727)	(0.712)
Size	-0.006	-0.009	-0.151**	-0.150**
	(0.944)	(0.924)	(0.034)	(0.035)
Price	0.276	0.286	-0.003	-0.005
	(0.307)	(0.287)	(0.989)	(0.984)
Turnover	-2.186	-2.160	-1.775	-1.773
	(0.197)	(0.201)	(0.303)	(0.303)
Volatility	-9.713***	-9.593***	-5.130*	-5.130*
	(0.000)	(0.001)	(0.090)	(0.090)
Dividend Yield	-4.420	-4.394	-0.580	-0.578
	(0.239)	(0.243)	(0.908)	(0.909)
Constant	-0.100	-0.524	-93.550	-105.196
	(0.885)	(0.463)	(0.298)	(0.241)
Institution Fixed	no	no	yes	yes
Unit of Obs.	Firm/Quarter	Firm/Quarter	Inst./Firm/Quarter	Inst./Firm/Quarter
Observations	198,067	198,067	14,458,888	14,458,888

Figure 1: Map of Customer-Supplier Linked Network