Shadow Trading

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July 28, 2020

ABSTRACT

We investigate whether corporate insiders attempt to circumvent insider trading restrictions by using their private information to facilitate trading in economically-linked firms, a phenomenon we call "shadow trading." Using measures of informed trading to proxy for shadow trading, we find increased levels of informed trading among business partners and competitors before a firm releases private information. To rule out alternative explanations, we examine two shocks to insiders' incentives to engage in shadow trading: high-profile regulatory enforcement against conventional insider trading and staggered changes to their outside employment opportunities. Finally, we document attenuated levels of informed trading among business partners and competitors when firms prohibit shadow trading. Overall, we provide evidence that shadow trading is an undocumented and widespread mechanism that insiders use to avoid regulatory scrutiny.

Keywords: Business Partners; Informed Trading; Private Information; Supply Chain
JEL Classifications: D4, G14, K22

I. INTRODUCTION

Illegal insider trading undermines investor confidence in capital markets. Given the economic importance of well-functioning capital markets, insider trading violations are an enforcement priority for the U.S. Securities and Exchange Commission (SEC). Commensurate with this priority, there is a significant amount of cross-disciplinary research that examines insider trading. We contribute to this body of work by presenting evidence of "shadow trading," a novel, undocumented phenomenon that corporate insiders can use to circumvent insider trading regulations and SEC scrutiny. The premise of shadow trading is straightforward: private information held by insiders can also be relevant for economically-linked firms and exploited to facilitate profitable trading in those firms. The legality of shadow trading appears to be relatively untested due to the lack of a clear breach of fiduciary responsibility by insiders who use private information to facilitate trading in other firms.[1] Indeed, in the U.S., prosecutions for shadow trading are virtually non-existent.[2]

We first document the existence of shadow trading. Throughout, we refer to a company from which private information emerges as a "source firm" and a stakeholder for which the private information could be price-relevant as a "linked firm". In other words, source firms are either business partners or competitors of linked firms. Using multiple proxies of informed trading from the literature to measure shadow trading, we find robust evidence that informed trading in linked firms is associated with the magnitude of subsequent information shocks from source firms. These

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[1] Legal definitions provide limited guidance on the boundaries of the firm and the legality with which employees can use and interpret private information about their firm. Consequently, insider trading includes both direct trades by employees in their own firm or by tipping others who then profitably trade on this information. Similarly, shadow trading also includes both direct and tip-based trading.

[2] In 2011, in a rare case against shadow trading, the SEC brought an action against Flextronics employees for leaking information about business partner component orders. In a related case, the SEC and the Department of Justice initiated enforcement actions against mid-level managers for leaking information about their business partners to Primary Global Research LLC, a competitive intelligence firm.

results hold across multiple proxies for informed trading, and for several types of news events, including earnings announcements, merger and acquisition (M&A) announcements, and new product announcements. The effect is economically material. For example, a one standard deviation increase in the source firm's earnings announcement news is associated with a 6.4%-19.2% increase in the linked firm's informed trading before the source firm's earnings announcement.[3] We estimate that the profit from a *single* shadow trading event ranges from $139,400 to $678,000. As a point of comparison, Perino (2019) reviews 465 insider-trading cases brought by the SEC and finds that half of the defendants made less than $60,000, and the average profit was approximately $1 million.

Next, we examine alternate explanations for our findings. We posit that informed trading in linked firms is attributable to source firm insiders. These employees trade in or leak private information (that is relevant for linked firms) to outside parties such as professional investors or competitive intelligence firms who compile and sell this information. However, there are also other explanations. For instance, we may merely be capturing trading activity by sophisticated investors who use proprietary (and legal) methods to acquire private information about firms in anticipation of information events (e.g., McNichols and Trueman 1994; Kim and Verrecchia 1997; Bushee and Goodman 2007; Drake et al. 2012). Alternatively, we may be measuring the effects of unobserved market structure characteristics, such as short-selling constraints (e.g., Khan and Lu 2013; Akbas et al. 2015).

To rule out these alternative explanations, we conduct two sets of analyses. First, we examine shadow trading changes around unanticipated, high-profile, SEC enforcement events

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[3] The economic significance is also material for other news events. For instance, a one standard deviation increase in the magnitude of the news around a source firm's M&A (new product) announcement is associated with a 3.1%-12% (4%-10.5%) increase in business partner linked firms' trading activity in the 30 days prior to the source firm's M&A (new product) announcement.

against conventional insider trading. Following perceived increases in regulatory scrutiny, source firm insiders have incentives to switch from traditional insider trading to shadow trading to reduce concerns about detection and enforcement. Bobelian (2012) argues that extensive media coverage and prosecutions against inside traders are an effective deterrent against insider trading. In contrast, it is unlikely that high-profit insider trading enforcement events affect sophisticated investors' legitimate information gathering efforts or market frictions.

Our findings are consistent with informed trading being attributable to information leakage by source firm insiders. In particular, we document a magnified relation between informed trading in linked firms before information shocks from source firms after high-profile SEC enforcement actions against insider trading. The change is economically significant. We document a 5.1%-36.1% increase in informed trading in the three-month window following high profile SEC enforcement actions (relative to the prior three-month window). We also document a parallel decrease in conventional insider trading.

Second, we examine changes in shadow trading around state-level adoptions or rejections of a legal doctrine known as the inevitable disclosure doctrine (IDD). The IDD affects in-state firms' ability to legally prevent employees that are privy to trade secrets from obtaining employment with competitor firms. A shift in state-level interpretations of the IDD is likely to affect source firm employee incentives to engage in shadow trading due to changes in their ability to obtain lucrative employment with competitors. However, it is unlikely to affect sophisticated investors' legitimate information gathering efforts or market frictions. Our findings from difference-in-differences tests indicate that in the year after source firms encounter an IDD shock, treated linked firms experience an 8.6%-20% incremental change in informed trading relative to linked firms in the control group. In sum, our evidence provides support for the argument that

source firm insiders facilitate informed trading in linked firms.

Our next set of tests focuses on whether firms play a role in policing shadow trading. Firms have incentives to prohibit employees from using their private information to facilitate shadow trading as the public revelation of such activities could adversely affect their business relationships and thus, their operations and profits. A manual examination of corporate policy rules for a subset of sample source firms that publicly disclose their employee trading policies shows that there is significant heterogeneity in the prevalence of corporate prohibitions against shadow trading. However, firm-mandated prohibitions appear to be effective. Our results show that shadow trading is significantly higher when source firms do not prohibit employees from engaging in shadow trading relative to when they prohibit shadow trading.[4] Although mostly untested in the U.S. judicial system, such company regulations arguably create a fiduciary responsibility for employees not to exploit their private information in economically-linked firms.

Overall, our evidence shows that employees circumvent insider trading regulations that are designed to limit their ability to exploit private information by trading in their firm's business partners and competitors. Our findings are relevant to lawmakers and regulators because investor confidence in the integrity of capital markets is a critical factor in the design of prohibitions and enforcement against insider trading (e.g., see Bushman et al. 2005). Similar to insider trading, shadow trading potentially includes both tipping and trading activity. Most insider trading prosecution efforts focus on illegal trading by managers or finance professionals. Our results suggest a need for further evaluation of the completeness of insider trading regulations and the allocation of enforcement resources.

Our study is also relevant to two streams in the literature. First, our research contributes to

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[4] As the decision to have a rule prohibiting shadow trading stems from a choice made by a firm, this test does not allow us to speak to whether a mandated requirement to include the prohibition would be effective.

a sizeable cross-disciplinary literature on insider trading. One stream of the insider trading literature focuses on how or when insiders with private information opportunistically leak or use it to trade in their firms.[5] Our study complements the literature by documenting that insiders with private information can facilitate trading in other firms. How insider trading affects price discovery is examined in another stream of the literature (e.g., Fishman and Haggarty 1992; Huddard et al. 2001). Our research and findings suggest that shadow trading is an unexamined mechanism that increases the speed and depth at which linked firms' stock prices impound value-relevant information.

Second, we contribute to the literature on the mechanisms used to facilitate information transfer across firms. We find evidence that firm insiders are a channel through which information transfers occur *before* a firm publicly discloses information. In this vein, our study complements previous research that focuses on information transfers *following* the release of private information (see Section 2 for more details). Furthermore, our findings also highlight the importance of considering private communication channels when examining information transfers.

The paper proceeds as follows. In Section II, we present a summary of the literature on information transfers. In Section III, we outline the sample, methodology, and descriptive statistics. In Section IV, we present the multivariate results and in Section V we examine the mechanism for shadow trading. In Section VI, we consider how shadow trading is affected by firms' corporate policies. We discuss policy implications and conclude in Section VII.

II. LITERATURE REVIEW ON INFORMATION TRANSFERS

There is growing cross-disciplinary literature on information transfers across firms. Our

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[5] The list includes Aboody and Lev (2000), Bettis et al. (2000), Ke et al. (2003), Roulstone (2003), Piotroski and Roulstone (2005), Cheng and Lo (2006), Huddart et al. (2007), Jagolinzer (2009), Jagolinzer et al. (2011), Khan and Lu (2013), and Kacperczyk and Pagnotta (2019).

study is especially relevant to research that examines the sources of information or events that result in information transfers and factors that affect the speed of information transfers.

Early research examining information transfers focuses on the spillover effects of expected and unexpected earnings announcements on the stock prices of other firms in the same industry (e.g., Foster 1981; Clinch and Sinclair 1987; Han and Wild 1990), management forecasts on industry firm stock prices (Baginski 1987; Pyo and Lungarten 1990), and the effects of sales announcements on vertically connected firms (Olsen and Dietrich 1985). Recent studies examine whether other sources or events result in information spillovers. Hertzel et al. (2008) find that suppliers of firms that file for bankruptcy experience large negative stock price effects. Gleason et al. (2008) and Kravet and Shevlin (2010) examine the spillover effects of accounting restatement announcements. They find evidence of intra-industry information transfers following accounting restatements. Wang (2014) finds that accounting statement harmonization and increased comparability across firms improves cross-country information transfers and Benveniste et al. (2003) find evidence of information transfers between banks around contemporaneous IPO offerings. Slovin et al. (1991) show that going-private bid announcements result in positive stock returns for industry rivals. Pandit et al. (2011) examine the economic determinants of supplier stock price reactions to their customers' news announcements. A common thread among these studies is that they focus on the ex post effects of the public release of private information. Our study complements these studies by examining the effect of information transfers that occur *prior* to the public disclosure of private information.

Another stream of research examines factors that create frictions or facilitate information transfers. Pownall and Waymire (1989) find that firms enjoy the benefits of information transfers from other firms' earnings announcements only when the former do not provide their own earnings

forecasts. Research suggests that the extent of cross-industry information transfers is affected by the centrality of an industry's location within an economy (Ahern 2013; Aobdia et al. 2014). Ramnath (2002) finds that investors do not immediately process the information relevance from the first announcers in an industry for the other industry members based on the predictability of short window stock returns. In contrast, Hilary and Shen (2013) find analyst coverage of firms that issue management forecasts result in faster information transfers to other non-issuing firms in the same industry. In related work, studies find that limited investor attention (Cohen and Frazzini 2008; Menzly and Ozbas 2010) and firm complexity (Cohen and Lou 2012) also affect the speed of information transfers across firms. In contrast, Akbas et al. (2016) document that private information leakage from connected insiders (i.e., directors) increases abnormal trading in those insiders' firms. Our study contributes to this literature by examining how information leakage of private information from a given firm affects trading in other economically-linked firms, with the goal of such trading being to circumvent regulatory scrutiny.

III. SAMPLE, METHODOLOGY, AND DESCRIPTIVE STATISTICS

3.1 Sample Selection

We begin by using Compustat to obtain data on all non-utility, non-financial U.S. stock exchange listed firm observations (i.e., source firms) for which we can also collect data about publicly listed U.S. stakeholders with U.S. headquarter locations (linked firms). We link competitors based on Hoberg and Phillips' (2010, 2016) methodology and suppliers and customers using Ellis et al.'s (2012) methodology, which relies on the financial statement disclosures of material customers from the Compustat Segment files.

Next, we obtain short sale data from the NYSE, NASDAQ, and FINRA, option trading volume data from OptionMetrics, order imbalance data from Ancerno, institutional holdings data

from Thomson Reuters 13F filings, institutional investor classification from Brian Bushee's website (http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html), and reported insider trades from Thomson Reuters Insider Filings. We also obtain stock price data from the Center for Research in Security Prices (CRSP), firm-specific financial data from Compustat, board information from the RiskMetrics and BoardEx databases, and firm proxy statements from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. We obtain M&A data from Thomson Reuters' SDC database and new product announcements from LexisNexis using the approach in Reeb and Zhao (2020). Finally, we procure insider ownership data from firm proxy statement disclosures, ExecuComp, RiskMetrics, Capital IQ, and BoardEx. We delete observations for which we cannot obtain all required data.

We use earnings news announcements to identify information shocks for source firms. In robustness tests, we also consider two other news events to identify information shocks: M&A announcements and new product announcements. The sample sizes for our empirical tests vary across each of these information shocks. The sample for earnings announcement tests range between 1,129 and 5,228 observations.[6] The sample for the M&A (product announcement) tests range between 1,694 and 12,164 observations (215,601 - 1,300,637 observations). Our sample period is from 1997 to 2011.[7] We present additional details about the sample selection process in

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[6] For tests using short sales, the sample consists of 745 unique linked firms and 598 unique source firms, which represents 3,111 source firm-linked firm quarter observations. Of those observations 1,129 represent earnings news with negative CARs and 1,982 represent earnings news with positive CARs. For tests using the option/stock ratio, the sample consists of 1,472 unique linked firms and 1,185 unique source firms, which represents 7,794 source firm-linked firm quarter observations. Of those cases, 2,882 represent earnings news with negative CARs and 4,912 represent earnings news with positive CARs. Finally, for tests using order imbalance, the sample consists of 1,555 unique linked firms and 1,258 unique source firms, which represents 8,454 source firm-linked firm quarter observations. Of those cases, 3,226 represent earnings news with negative CARs and 5,228 represent earnings news with positive CARs.

[7] Our sample period is primarily constrained by data availability for our three primary dependent variables: *Abnormal Short Sales, Option/Stock Ratio,* and *Order Imbalance*. We conduct tests using *Abnormal Short Sales* for the period from 2005 to 2011, and tests using *Option/Stock Ratio* and *Order Imbalance* for the period from 1997 to 2011. We find that our results are qualitatively and statistically similar if the tests using *Option/Stock Ratio* or *Order Imbalance* are restricted to the 2005 to 2011 period for which we can calculate *Abnormal Short Sales*.

the Online Appendix

For tests using earnings announcements, we require that for each source firm's earnings announcement at day t, none of the affiliated linked firm's other stakeholders release an earnings announcement during the 30-day window around the source firm's earnings announcement (i.e., from t-30 to t+30 days). This restriction alleviates the possibility that abnormal trading in linked firms occurs for reasons unrelated to information from the source firm's earnings announcement.[8] We also require that a linked firm's earnings announcement does not also occur within the same t-30 to t+30 window. This requirement allows us to isolate the informed trading in the linked firm from trading due to the linked firm's own informational leakage.[9] We also note that approximately 12% of our sample represents cases in which source firms also appear in the dataset as linked firms. The inferences from the empirical tests are unchanged if we exclude these observations (untabulated). Figure 1 provides a graphical illustration of the timeline and these two conditions. In sensitivity tests discussed below, we consider the possibility that a source firm's news can have either positive or negative implications for competitors.

For tests using M&A announcements, we obtain M&A details from Thomson Reuters. We include all announced M&A transactions during the sample period and remove cases where 1) the acquirer does not obtain 100% ownership of the target following the merger; 2) either the acquirer or target are not publicly traded; 3) the merger attempt is dropped prior to the completion of an antitrust review; and 4) either the acquirer or target is a non-U.S. firm. We also exclude recapitalizations, self-tender offers, exchange offers, repurchases, acquisitions of remaining

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[8] A possible concern with this restriction is that we may lose observations if earnings announcements are typically clustered by industry and around the same calendar dates. To alleviate this concern, we repeat our tests using an alternate methodology that relies on non-earnings announcement related stock price shocks (discussed in Section 4). The primary empirical results are robust to this alternate methodology.

[9] While these restrictions improve the identification between source firm news annoucements and linked firm insider trading activities, it affects the power and generalizability of our findings. In untabulated analyses, we drop the two restrictions and perform tests on the full sample. The results yield similar inference with the larger sample.

interest, and privatizations.

For tests using new product announcements, we search LexisNexis for new product announcements by sample source firms. We search for corporate news releases that are tagged under the subject "new products" and the headlines of which contain any keywords, or roots of words, of "launch," "product," "introduce," "begin," or "unveil".

3.2 Methodology

We examine whether shadow trading in linked firms is associated with subsequent source firm informational shocks using the following specification:

$$ShadowTrading = \beta_1 * Business\ Partner\ CAR + \beta_2 * Competitor\ CAR + \beta_x * Controls_x + \varepsilon. \quad (1)$$

ShadowTrading is measured using one of three proxies for abnormal trading: *Abnormal Short Sales*, *Option/Stock Ratio,* or *Order Imbalance*. Our primary independent variables are *Business Partner CAR* and *Competitor CAR*. We discuss each of these variables in the following subsections.

3.2.1 Abnormal Short Sales

We measure *Abnormal Short Sales* following prior work (e.g. Desai et al. 2002; Christophe et al. 2004; Diether et al. 2009; Anderson et al. 2012). For tests using earnings announcements as the informational event, we calculate *Abnormal Short Sales* for linked firms as follows: ([linked firm *i*'s average daily short sales for the 30-day window prior to source firm A's quarterly earnings announcement and divided by linked firm *i*'s average daily short sales for the year outside of source firm A's earnings announcement windows] − 1).[10] Daily short sales are measured as daily short sale volume divided by daily share trading volume.

For tests using M&A and new product announcements as the information events, we

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[10] Untabulated results are qualitatively similar if we use linked firm *i*'s earnings announcement dates to determine the non-event window.

calculate *Abnormal Short Sales* for linked firms as follows: ([linked firm i's average daily short sales for the 30-day window prior to source firm A's M&A (new product) announcement at t and divided by linked firm i's average daily short sales for the t-365 to t-30 day window] − 1).

3.2.2 Option/Stock Ratio

The *Option/Stock Ratio* is based on the ratio of option trading volume relative to stock trading volume (Roll et al. 2010). Johnson and So (2012) document that the measure contains significant information about decreases in future stock prices. For each information event, the *Option/Stock Ratio* is calculated as the average of a linked firm's daily option trading volume scaled by the stock trading volume, measured over the 30-day window prior to the source firm's news announcement date.

3.2.3 Order Imbalance

Studies document that institutional trading activity predicts future stock returns (Griffin et al. 2003; Campbell et al. 2009; Puckett and Yan 2011). For each of our information events, *Order Imbalance* is the average of the linked firm's daily order imbalance for the 30-day window prior to the source firm's news announcement. Daily order imbalance is calculated as buyer-initiated institutional trading minus seller-initiated institutional trading, scaled by the total number of shares traded by institutions (Puckett and Yan 2011).

3.2.4 Business Partner CAR and Competitor CAR

Our primary independent variables, *Business Partner CAR* and *Competitor CAR,* measure a source firm's three-day (t-1 to t+1) absolute cumulative abnormal return (CAR) around a news announcement at day t, when the source firm is a linked firm's business partner or competitor, respectively.[11] Abnormal return is the raw return minus the equally-weighted market return. For

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[11] The results are very similar when we use alternative CAR windows (e.g., t-5 to t+5, t-3 to t+3, t to t+1, t to t+3, or t to t+5), or value-weighted market returns.

the tests using earnings announcement news events, we use a market-based measure rather than an earnings surprise model because the former allows us to precisely capture the extent to which the earnings announcement is informative to market participants.[12]

For example, consider a case in which The Ford Motor Company is a linked firm. A paired source firm making an earnings announcement could be Bridgestone Corporation (i.e., a business partner) or General Motors (i.e., a competitor). Thus, for each source firm – linked firm pair that constitutes an observation, we obtain a value for either *Business Partner CAR* or *Competitor CAR*, but not for both. In the specification, we use the pooled set of source firm – linked firm pairs; thus we are able to estimate coefficients for both *Business Partner CAR* and *Competitor CAR*.

3.2.5 Controls

The variable *Controls* captures both linked firm and source firm characteristics that could explain informed trading in the linked firm prior to the source firm news announcement. Following Drake et al. (2011), we control for firm size (*Firm Size*), book-to-market ratio (*Book-to-Market*), changes in analyst forecasts/recommendations (*FREV*), past stock returns (*Past Return*), total accruals (*TACC*), earnings price ratio (*E/P*), stock turnover (*Turnover*), growth in sales (*Sales Growth*), long-term earnings (*LTG*), and momentum (*Momentum*). In addition, we include *MISP* for both the source firm and the linked firm as documented by Stambaugh, Yu, and Yuan (2015) to capture the degree of the stock being mispriced. To differentiate between control variables for source and linked firm characteristics, we add the suffix "Source" to variable names to indicate these are controls for the source firm. We cluster standard errors by firm and year and also include

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[12] Regardless, we find that our results are qualitatively similar if we instead use the residual from an earnings surprise-based model: $EPS_{A,q} = \alpha + \beta_1 EPS_{A,q-1} + \beta_2 EPS_{A,q-4} + \beta_3 EPS_{A,q-8} + \varepsilon_{A,q}$, where $EPS_{A,q}$ is reported earnings per share (EPS) in announcement quarter q, and historical EPS is reported earnings per share in the prior quarter (q-1), four quarters ago (q-4), and eight quarters ago (q-8) using quarterly earnings announcements from I/B/E/S. We also find similar results if we use the difference between the consensus analyst quarterly earnings forecast and the corresponding reported quarterly earnings value. These results are available from the authors upon request.

year and Fama-French 48 industry fixed effects. We define all variables in the Appendix.

3.3 Descriptive Statistics

Table 1 presents summary statistics for the variables used in the earnings announcement test sample. We present details for source firms (linked firms) in Panel A (Panel B). Panel C presents industry membership for both source and linked firms. We present summary statistics for the M&A and new product announcement samples in the Online Appendix.

In Panel A, business partner source firms experience average negative (positive) CARs of -3.5% (2.1%) in the 3-day window around their negative (positive) earnings announcements. Competitor source firms report average negative (positive) CARs of -3.3% (2.3%) over the 3-day window around negative (positive) earnings announcements. *T*-test results indicate that both positive and negative CARs are significantly different from zero, which suggests that earnings announcements provide market participants with information.

Panel B in Table 1 documents that in the 30-day window before source firm earnings announcements with negative CARs (positive CARs), linked firms experience abnormal short sales of 0.079 (-0.036). In other words, linked firms experience a 7.9% increase (3.6% decrease) in short selling activity prior to negative CAR (positive CAR) source firm earnings announcements relative to the average short-selling activity during nonevent windows. The option/stock ratio is 2.336 in the 30-day window before a source firm negative CAR earnings announcement and 1.496 before a positive CAR earnings announcement CAR. Because a higher ratio indicates negative news, the evidence is consistent with shadow trading. The mean order imbalance is -0.032 (0.025) in the 30-day window leading up negative CAR (positive CAR) source firm earnings announcements. This finding suggests that shadow trading is not solely attributable to trading by insider individuals. *T*-test results of differences in means show that the values of all three measures

are significantly different from zero.

Panel C in Table 1 presents the top 10 Fama-French 48 industries represented in the linked and source firm samples. Both samples represent a broad distribution of industries, with no single industry representing more than 9%-10% of the total sample. These top ten industries represent about 55% of the entire sample.

IV. MULTIVARIATE RESULTS

In Subsection 4.1, we present the findings from tests examining shadow trading activity prior to three different news event announcements: earnings, M&As, and new products. Subsection 4.2 presents the results from tests examining whether shadow trading predicts the returns of linked firms. In Subsection 4.3, we discuss cross-sectional analyses, and in Subsection 4.4, we describe additional analyses and robustness checks.

4.1 Main Findings

Table 2 presents the results from the tests of equation (1) for earnings announcements. We partition our tests based on whether the CAR around the source firm news announcement is positive or negative. The overall findings are consistent with the presence of shadow trading. In column 1 (2), when the dependent variable is *Abnormal Short Sales*, the coefficient on *Business Partner CAR* is positive (negative) and is statistically significant at the 5% level. Thus, the magnitude of a business partner source firm's negative (positive) earnings announcement CAR is associated with an increase (decrease) in abnormal short selling for linked stakeholder firms in the prior 30-day window. In column 1, the coefficient on *Business Partner CAR* is positive because we use the absolute CAR.

In economic terms, when source firms have a negative (positive) earnings announcement CAR, a one standard deviation change in the CAR is linked to a 10.7% (13.5%) increase (decrease)

in linked firm abnormal short sales during the 30-day window before the earnings announcement.[13]

Although it is not possible to estimate the profitability of shadow trading precisely because we do not have detailed trading data, our calculations suggest that the profitability from a single shadow trading event ranges from $139,400 to $678,000.[14]

We find parallel results for the coefficients on *Competitor CAR* across both positive and negative CAR earnings announcements, although the magnitudes are slightly smaller (see columns 1 and 2). A one standard deviation increase in negative (positive) CARs around competitor source firm earnings announcements is associated with a 9% (12.7%) increase (decrease) in linked firm *Abnormal Short Sales* in the 30-day window before the earnings announcement.[15]

Columns 3 and 4 in Table 2 present coefficient estimates when the *Option/Stock Ratio* is used as the dependent variable; higher values of the ratio indicate higher information asymmetry and are consistent with more severe shadow trading. The coefficients on the variables of interest (*Business Partner CAR* and *Competitor CAR*) are positive and statistically significant across

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[13] We calculate the economic significance as the coefficient divided by the mean abnormal short sales leading up to negative (positive) CARs, all multiplied by the standard deviation of positive (negative) CARs around earnings announcements. Thus, for the business partner results in column 1 in Table 2: (0.033/0.079) * 0.256 = 10.7%.

[14] This approximate calculation is based on the estimated range of the possible profits from shadow trading for source firm negative CAR earnings announcements. Our estimates incorporate several assumptions and should be evaluated accordingly. Over the 30-day window before a source firm earnings announcement, an aggregate of 2.6 million shares of linked sample firms are shorted on average. The results in Table 1 indicate that short sales are abnormally higher by 7.9% in linked firms. Thus, abnormal short sales over the 30-day window represent 205,000 shares (2.6 million shares multiplied by 7.9%). We assume that short-sellers reverse all open positions on the first day following the earnings announcement (i.e., day $t+1$). As such, the profit range for short sellers is calculated as the difference between the maximum and minimum stock price during the 30-day window before the earnings announcement and the first day after the earnings announcement ($t+1$). The average range of the price difference for linked firms in our sample is between $0.68 and $3.30. Accordingly, the profit range (excluding trading costs) from abnormal short selling in a single linked firm during the 30-day window before a source firm's earnings announcement ranges from $139,400 to $678,000 (205,000 shares multiplied by $0.68 and $3.30 respectively).

[15] A related working paper by Akbas et al. (2015) finds that a firm's short interest positively predicts the future returns of its peer firms. This conflicting finding is likely to reflect differences in sample construction choices. Their tests focus solely on (1) firm and closest competitor pairs; and (2) settings in which short selling constraints exist. In contrast, our sample focuses on firms and all material competitors and we do not restrict the sample to settings with short selling constraints. Furthermore, in sensitivity tests discussed below and in the Online Appendix, we document that depending on whether the event has a negative or positive impact for the industry, shadow trading can occur in a manner consistent with the Akbas et al. (2015) findings.

source firm positive and negative earnings announcement CAR groups. On average, when business partner source firms have a negative (positive) earnings announcement CAR, a one standard deviation change in the CAR is associated with a 7.7% (9.1%) increase in the option/stock ratio for linked firms in the previous 30-day window. The effects are similar when the source firm is a linked firm's competitor. On average, a one standard deviation increase in negative (positive) CARs around a competitor source firm earnings announcement is associated with a 6% (8.9%) increase in a linked firm's option/stock ratio in the prior 30-day window.

In columns 5 and 6, we present coefficients when the dependent variable is *Order Imbalance*. The results are consistent with those in columns 1-4. Economically, a one standard deviation increase in negative (positive) CARs around a source firm's earnings announcement is associated with a 7.9% (5.5%) increase in a linked firm's order imbalance during the prior 30-day window. Similarly, a one standard deviation change in a competitor source firm's negative (positive) earnings announcement CAR is associated with a 6.4% (7.3%) increase in the linked firm's order imbalance in the prior 30-day window.

Across all our specifications, the results of *F*-tests of the differences between coefficients indicate that there is no significant difference between the effects of shadow trading on business partners or competitors. Importantly, our results are robust to the inclusion of controls for both source and linked firm characteristics that are associated with informed trading activity.[16]

We also check whether our findings are robust to an alternative proxy for shadow trading:

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[16] We also consider whether shadow trading in competitors varies based on the nature of the source firm news announcement. Competitors of a source firm that experiences negative CARs around an earnings announcement may be positively or negatively affected by the source firm's news. The implication of this conflicting effect is that the coefficient on *Competitor CAR* in our main results is likely to be understated. To evaluate this possibility, we differentiate between source firm earnings news (negative or positive) at *t* based on whether they are expected to result in positive or negative spillover effects for competitors. We discuss the approach and findings in the Online Appendix. In brief, the results are qualitatively similar to our primary findings in Table 2 but of slightly larger economic magnitude, consistent with our expectations.

the measure of market information asymmetry (MIA) (Johnson and So, 2018). Johnson and So note that the measure is based on the idea that informed traders are more likely than uninformed traders to generate abnormal volume in option or stock markets. We obtain data for the measure from Travis Johnson's website and define the dependent variable as the 30-day cumulative MIA of the linked firm before the source firm earnings announcement date. The results are consistent with the findings using our other proxies for informed trading and are tabulated in the Online Appendix.

To verify that our findings are not attributable to some characteristics that are specific to earnings announcements, we examine two other informational events that are presumably only known to insiders: M&A announcements and new product announcements. The results, as discussed next, are mostly consistent with the findings for earnings announcement shocks presented in Table 2. In Panel A of Table 3, we find that in the 30-day window before business partner source firm M&A announcements, linked firms experience statistically significant increases in shadow trading across all three proxies for shadow trading. We also find some evidence of shadow trading when source firms are competitors of linked firms. A possible explanation for the weaker competitor results is that mergers have heterogeneous effects on competitors based on a merger's effect on market structure characteristics.

Next, the results in Panel B of Table 3 for new product announcements provide corroboratory evidence of shadow trading. For instance, for product announcement events with positive CARs, we document a negative association between the magnitude of the business partner source firm CAR and the linked firm's abnormal short sales over the 30-day window before the source firm announcement. This finding is consistent with new product announcements by source firms having positive spillover effects for linked firms that are business partners. We also

document a positive association between the magnitude of CARs for competitor source firms and abnormal short sales in linked firms during the 30-day window before the source firm announcement. However, when using the other shadow trading proxies, we only find robust effects for business partners.

In additional analyses, we consider an alternative approach to identify news events using material stock price shocks for source firms. A benefit of this approach is that we do not define the nature of the news event, but rather, identify news events based on the magnitude of the stock's reaction as a proxy for news. We discuss this approach and findings in the Online Appendix. In brief, the evidence is consistent with our primary findings in Table 2. In sum, the findings across all our analyses provide evidence consistent with the presence of shadow trading.

4.2 Does Shadow Trading Predict Future Returns for Linked Firms?

To examine the profitability of shadow trading, we examine the association between shadow trading and *linked firm* returns. We regress the future stock returns (*Future Return*) of the linked firms on each of the three measures of shadow trading. We measure future stock returns as the linked firm short window CARs between t-1 and t+5 around the source firm's earnings announcement at day t. Untabulated analyses indicate that the results are not sensitive to the choice of the window around the earnings announcement. We also include control variables for linked firm size, prior returns, book-to-market ratio, momentum, and mispricing (Drake et al. 2012; Stambaugh et al. 2015). The results in Table 4 show that returns for linked firms (around the source firms' earnings announcements) are negatively and statistically associated with *Abnormal Short Sales* and the *Option/Stock Ratio* and positively and statistically associated with *Order Imbalance*. These findings suggest that that shadow trading activity in linked firms predicts linked firm returns

around source firm news events.[17]

4.3 Cross-Sectional Tests

We conduct additional analyses to better understand the characteristics that affect the intensity of shadow trading activity. First, we examine variation in institutional investor type. While both mutual fund and pension fund investment in source firms are positively associated with shadow trading, the economic magnitude is larger for mutual funds than for pension funds. Second, we find that shadow trading is *positively* associated with the quality of source firm corporate governance, consistent with the evidence in Jagolinzer et al. (2011). One explanation for this finding is that high-quality governance reduces employees' ability to engage in insider trading. Thus, insiders engage in shadow trading to circumvent corporate restrictions. We also document a significant attenuation in shadow trading for source firms with relatively higher insider ownership levels. This finding provides insights into a potential benefit of concentrated ownership. Third, we document more pronounced shadow trading when source firms have metropolitan headquarter locations. This evidence is consistent with more significant opportunities for insiders (and tipees) to develop connections facilitating the monetization of private information for shadow trading. We discuss these tests in more detail and tabulate results in the Online Appendix.

4.4 Additional Analyses

First, we examine whether the prevalence of shadow trading is predictably and positively related to the magnitude of CARs around source firm earnings announcements. In untabulated analyses, we partition our sample into three tercile groups based on the magnitude of the source firm earnings announcement CAR. The results indicate that the sensitivity of shadow trading to

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[17] Note that the R-squared are larger than those reported for similar tests in prior studies (e.g., Thomas and Zhang 2008) because we include year and industry fixed effects instead of a Fama-MacBeth approach. In untabulated analyses, we find similar results with significantly smaller R-squared values when using a Fama-MacBeth approach.

the magnitude of the earnings announcement CAR more than doubles from the lowest to the highest tercile groups.

Second, we consider whether shadow trading varies in the strength of the economic relationship between firms and their business partners. We identify the strength of the relationship between firms and their material customers based on Compustat Segment file data. We partition our sample into two groups based on the median value of the magnitude of the relation between a source firm and a business partner linked firm. To calculate the strength of a relationship, we use the proportion of a firm's sales to each customer. In untabulated results, we find that the relation between shadow trading and source firm news announcements is more significant when linked firms are in the above-median group based on the economic relationship with the source firm.

Third, we consider that shadow trading represents information transfers through director networks. For instance, Larker et al. (2013) document that board connections are a source of information transfers, and Akbas et al. (2016) document that the magnitude of a firm's director network size is related to abnormal trading activity in that firm before news events. More connected directors have more information that can be extracted by sophisticated investors.

To address this possibility, we collect director network linkages between the source firm and linked firm-pairs. We use BoardEx to obtain director connection data and document that approximately 15% of source firm-linked firm pairs in our sample have director network connections.[18] Of these, approximately 78% represent links for business partners, and 22% represent links for competitors. We create a new variable similar to *Business Partner CAR* or *Competitor CAR* for source firm – linked firm pairs with connected directors (*Connected CAR*).

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[18] We identify source-linked firm director linkages as follows: if at least one of the directors on each board shares a common educational experience, has the same former employer, shares military service experience or has other overlapping civic activity experience.

Including this variable in our main specification allows us to evaluate whether director network links between source and linked firms are the channel through which shadow trading occurs.

Untabulated tests indicate that our primary results continue to hold at the 10% significance level or better for source firm - linked firm pairs without director networks after the inclusion of *Connected CAR* in equation (1). Furthermore, we find that the coefficient on *Connected CAR* is statistically insignificant. We also repeat our tests after removing the 15% of our sample pairs connected via director networks and find that the results are qualitatively similar to our primary results (untabulated). The cumulative evidence suggests that director networks are unlikely to be the primary channel through which information leakage occurs.[19]

V. MECHANISM FOR SHADOW TRADING

In this section, we examine the mechanism underlying shadow trading. Our theory is that shadow trading occurs because source firm insiders share their stakeholder-relevant private information with sophisticated investors or with competitive intelligence firms that sell this information to sophisticated investors. However, there are at least two other explanations for shadow trading. First, it could reflect trading by sophisticated market participants such as hedge funds that independently use proprietary methods to collect and process information about upcoming news events. Second, shadow trading could represent a manifestation of market structure characteristics such as short sale restrictions (e.g., Khan and Lu 2013). If sample source firms systematically face short-selling constraints, then short sale activity may shift to stakeholder firms (Akbas et al. 2015). Below we evaluate these alternative explanations.

5.1 Time Series Test Using Increased Attention to Conventional Illegal Insider Trading

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[19] Our results should not be interpreted as providing counter-evidence to Akbas et al. (2016). Instead, our findings suggest that the nature of information transfers across board networks may not be short-term information that can facilitate short-run profitable trading/leaking opportunities. Rather, the information transfers may reflect other types of news such as long-term, macro, or strategic information.

Our first set of analyses examines changes in insider incentives to engage in shadow trading around unexpected and high-profile regulatory enforcement against conventional insider trading. Such enforcement likely increases the perceived risk of conventional illegal insider trading. Under the assumption that shadow trading has a lower perceived detection and enforcement risk, insiders may have incentives to switch from insider trading to shadow trading to continue to monetize their private information.[20]

To identify high-profile regulatory events, we develop an "insider trading enforcement index" in the spirit of the economic policy uncertainty measure developed by Baker, Bloom, and Davis (2016). We search major U.S. newspapers during our sample period to obtain a count of the number of articles that contain the term "insider trading."[21] We then aggregate the count by month across all the major newspaper reports. Panel A in Figure 2 is a graphical illustration of the monthly count. Four spikes are visible. The first spike is in 2002 during the passage of the Sarbanes-Oxley Act. We do not include this spike in our tests due to the large number of confounding regulatory and disclosure changes occurring around this time. The second, third, and fourth spikes occur in June 2003, June 2006, and October 2009, respectively.[22]

We examine changes in informed trading for linked firms during the three-month window before and after these three spike events.[23] We identify subsamples of our source and linked firm-pairs to identify subsamples in which earnings announcements occur during these windows.

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[20] Empirical studies document reductions in illegal insider trading over time due to greater regulatory scrutiny by the SEC and Department of Justice (see Brochet 2010; Anderson et al. 2013; Del Guercio et al., 2013).

[21] The newspapers are *USA Today*, *Miami Herald*, *Chicago Tribune*, *Washington Post*, *Los Angeles Times*, Boston Globe, *San Francisco Chronicle*, *Dallas Morning News*, *The New York Times*, and *The Wall Street Journal*.

[22] The June 2003 spike is primarily related to the SEC's securities fraud charges against Martha Stewart. The June 2006 spike is primarily related to the SEC's securities fraud charges against individuals related to Blue Rhino Corp's merger and jury verdicts against Enron executives for insider trading. The October 2009 spike is primarily related to the SEC's securities fraud charges against Raj Rajaratnam and the hedge fund and advisory firm Galleon Management LP.

[23] In all cases, spikes last for several months. We use the first month of each spike to identify the spike month because insider trading incentives are likely to be curbed immediately following increased media attention.

Panels B – D in Figure 2 present graphical evidence of insider trading in source firms and informed trading in linked firms centered around the three-month window before and after these high-profile news spikes. Calculating insider trading (in source firms) is difficult because blackout period restrictions prohibit insiders from formally trading before earnings announcements. Thus, we use information leakage as a proxy for source firm insider trading (e.g., Damodaran and Liu 1993; Kaniel et al. 2012; Roh and Zarowin 2018). To measure information leakage, we follow the same approach used to calculate our proxies of shadow trading in linked firms (but calculate them for source firms rather than linked firms.) We calculate abnormal trading in the source firm between t-30 and t-1 where t represents the source firm earnings announcement date averaged over the past four quarters. We then take the average for each period across firms.

The evidence in Panels B - D shows that insider trading in source firms *decreases* after high-profile news spikes about insider trading enforcement actions. In contrast, we document *increases* in informed trading after each of the spikes. These figures are consistent with the ideas that source firm insiders perceive that insider trading is riskier after high-profile news spikes about insider trading enforcement actions and that shadow trading appears to be an avenue to at least partially substitute for the potential gains from insider trading.[24]

Next, we conduct formal tests and estimate the following equation:

$Shadow\ Trading = \beta_1 * Business\ Partner\ CAR + \beta_2 * Competitor\ CAR + \beta_3 * Post +$

$\beta_4 * Business\ Partner\ CAR * Post + \beta_5 * Competitor\ CAR * Post + \beta_x * Controls_x + \xi,$ (2)

where *Post* is an indicator variable set to one for the 3-month period following one of the three

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[24] We also examine statistical differences between source firm insider trading and linked firm shadow trading in the linked firm during the pre-shock window. We examine differences between the average change in each measure of shadow trading and source firm insider trading over the three-month window before the increased news media attention to insider trading and find no statistical differences between source firm insider trading and linked firm shadow trading in the linked firm across all three of our primary measures. These findings reduce concerns that our empirical tests examining the link between shadow trading and changes in media attention are driven by factors that lead to both the enforcement against insider trading and subsequent changes in shadow trading.

insider trading news spikes noted above, and zero for the 3-month period before the news spike. *Business Partner CAR * Post* (*Competitor CAR * Post*) captures whether the relation between the magnitude of a business partner (competitor) source firm earnings news announcement CAR affects shadow trading differentially in the three-month window following news spikes. We use the same control variables as specified in the discussion of equation (1) and include year and industry fixed effects.

We present coefficient estimates in Table 5. The results indicate that informed trading increases in the post-spike windows and the effect is increasing in the magnitude of the source firm earnings announcement CAR. The coefficients on *Business Partner CAR * Post* and *Competitor CAR * Post* across all three measures are statistically significant at the 5% level or better in 10 out of 12 cases. Informed trading in linked firms becomes approximately two times more sensitive to business partner (competitor) earnings announcement CARs in the post-spike period relative to the pre-spike period.

An alternative explanation for our results is that they capture increased investor effort to gather and process information following decreases in insiders' willingness to supply private information. To address this issue, we identify a sample of firms for which we can obtain their corporate policy manuals to determine firm-level prohibitions about shadow trading (See Section 6 for details about this sample and examples of policies.) These policies allow us to identify firms that prohibit trading in or sharing information about stakeholders and those that do not. If our results are attributable to increased investor effort to legally gather and process information, we should observe no differences between shadow trading between the two groups after high profile enforcement actions against insider trading. Figure 3 shows that following said enforcement, the increase in shadow trading across all three proxies is more pronounced when source firms do not

prohibit shadow trading relative to when source firms prohibit shadow trading. This finding is inconsistent with an increased investor effort explanation. In sum, the evidence suggests that high-profile regulatory enforcement against conventional insider trading increases the incentives for source firm employees to engage in shadow trading.

5.2 Identification Using Shocks to Employee Mobility

Next, we examine changes in shadow trading around a plausibly exogenous staggered shock to state laws restricting the ability of a firm's employees with trade secret knowledge to obtain employment with competitors. The changes in the rules, widely known as the inevitable disclosure Doctrine (IDD), occur via precedent-setting cases. A state's adoption of the IDD (or rejection following a previous adoption) affects the ability of employees of the firms headquartered in those states to profit from their firm-specific knowledge by joining competitor firms. Importantly, the IDD affects all employees, not just executives. Studies document that senior and lower-ranking employees exploit private information in their stock option exercise decisions (e.g. Huddart and Lang, 2003). Thus, the adoption (rejection) of an IDD is therefore likely to increase (decrease) the incentives of employees looking for opportunities to use their firm-specific human capital or knowledge to accrue wealth, which in turn increases (decreases) their motivations to engage in shadow trading.

We begin by identifying all U.S. states affected by an IDD shock via case precedent and relevant dates, as described in Klasa et al. (2018).[25] Our analyses rely on sample source-linked firm pairs over the 1997 to 2011 period. For each treatment source firm in a state with an IDD shock, we identify a propensity score-matched control source firm from a state that does not

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[25] These cases reflect IDD shocks for the following states: Missouri and Ohio adopt in 2000, Florida rejects in 2001, Michigan rejects in 2002, Texas rejects in 2003, and Kansas adopts in 2006. We require at least two years of data prior to and following the shock so we do not use cases that occur in 1998 and 1999.

experience an IDD shock. The matched control source firm is determined based on characteristics in the year before the treatment firm is subject to an IDD shock. The variables include industry, firm size, leverage, market-to-book ratio, volatility, ROA, firm age, analyst following, institutional ownership, number of competitors, and number of customers/suppliers, with no replacement, and a caliper of 0.1%. The process yields a sample of 508 treatment source firms and 508 matched control source firms. We estimate the following OLS specification:

$Shadow\ Trading = \beta_1 * Business\ Partner\ CAR + \beta_2 * Competitor\ CAR + \beta_3 * IDDShock +$

$\beta_4 * Business\ Partner\ CAR * IDDShock + \beta_5 * Competitor\ CAR * IDDShock + \beta_x * Controls_x +$

$\xi,$ (3)

where *Business Partner CAR* and *Competitor CAR* are as previously defined. *IDDShock* is an indicator variable. For all treatment source firms that experience the adoption (rejection) of the IDD in the past two years, we set *IDDShock* to one (zero) following the adoption (rejection), and to zero (one) for the pre-shock observation. The interaction term *Business Partner CAR * IDDShock* (*Competitor CAR * IDDShock*) captures the incremental effect of business partner (competitor) source firm earnings news on shadow trading in linked firms in the post-IDD shock windows. We use control variables as specified in the discussion of equation (1) and include year and Fama-French 48 industry fixed effects.

We first test the parallel trends assumption. We compare the change rate between treatment and control groups (Angrist and Pischke 2009; Roberts and Whited 2013) for the three quarters before an IDD shock. The results support the parallel trends assumption (untabulated). We find that the differences in shadow trading between the treatment and control firms across all three proxies of shadow trading are not statistically significant at the 10% level. [26]

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[26] We caveat that changes to employment opportunities around the IDD shocks may not arise in a vacuum and possibly

Table 6 presents the coefficients from the tests of equation 3. Because daily short sale data are only available for a very brief duration around IDD shocks, we cannot conduct tests using *Abnormal Short Sales* as the dependent variable. Thus, we only present results for *Option/Stock Ratio* and *Order Imbalance*. The coefficients on *IDDShock* bear positive signs and are statistically significant at the 10% level or better across all the specifications. In other words, the imposition (removal) of restrictions prohibiting a firm's employees from obtaining employment with competitors is positively (negatively) associated with shadow trading. Next, the coefficients on *Business Partner CAR * IDDShock* and *Competitor CAR * IDDShock* bear positive and statistically significant signs at the 5% level or better in six out of eight cases (and significant at the 10% level in the remaining two cases). In sum, the evidence indicates that the IDD's adoption (rejection) increases (decreases) shadow trading when source firms are headquartered in the state that experiences the IDD shock, relative to source firms headquartered in states that are unaffected by the IDD.

The findings are economically significant: following IDD shocks, a one standard deviation increase in a treatment source firm negative CAR earnings announcement is associated with a 3.3% (2.8%) incremental increase in a business partner (competitor) linked firm's option/stock ratio (relative to the effects for other linked firm – source firm pairs). We find similar inferences for tests using *Order Imbalance* as the dependent variable. A one standard deviation increase in a treatment source firm's negative CAR earnings announcement is associated with a 4% (2.9%) incremental increase in a business partner (competitor) linked firm's *Order Imbalance* (relative to

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also impact changes in competition across firms. For example, changes in competition among firms for employees may also affect the economic linkages across firms. To provide evidence to rule out this possibility, we examine *t*-tests of differences between the values of control variables in the year prior to and following each shock. To the extent that there are changes in economic linkages between firms, we would expect differences in the treatment firm control variable means in the year around the IDD shock. Untabulated results indicate no significant differences between any control variable values in the pre and post periods for treatment firms.

the effects for other linked firm – source firm pairs).

In sum, the evidence in Tables 5 and 6 is consistent with the argument that our proxies of shadow trading are attributable to information leaks from source firm employees rather than proprietary information gathered by sophisticated investors or due to market frictions.

VI. FIRM POLICIES AGAINST SHADOW TRADING

The possible revelation of shadow trading may create friction between source firms and supply chain partners. Such frictions may adversely affect firms' incentives to facilitate communication with supply chain partners, increasing uncertainty and transaction costs.

In this section, we examine whether firms recognize the potential costs of shadow trading and can effectively curtail it by prohibiting their employees from leaking or sharing stakeholder-relevant information. Research shows that corporate prohibitions can be effective. For instance, Bettis, Coles, and Lemmon (2000) find that firms with corporate policies to curtail insider-trading exhibit relatively fewer cases of such activity. Their findings imply that if corporate policies act as an effective deterrent, shadow trading in source-firm linked firm pairs is lower when source firms restrict employees from sharing stakeholder-relevant information.

For each source firm – linked firm pair, we manually collect each source firm's Code of Ethics statement or Employee Professional Conduct manual to determine the source firm's insider trading policy. Because it is labor-intensive to search for and review corporate policy documents, we focus our search on source firms within firm-pairs in the last two years of our sample period (i.e., 2010 and 2011). We identify policies for 267 unique source firms. We classify the firms based on whether their policy prohibits insiders from 1) trading in or sharing information about the firm and its business partners or competitors, or 2) restricts conventional own-firm trading.[27]

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[27] Other sample firms for which we cannot obtain data refer readers to a corporate intranet site or employee handbook for details.

Approximately 53% of the sample prohibits employees from using private information to trade in their firms or stakeholders. The remaining 47% only expressly prevent employees from using private information to trade in their firms. Source firms with prohibitions against shadow trading are significantly smaller in size, have higher volatility and bid-ask spreads, as well as lower institutional ownership and trading volume. We find no statistical differences between the two groups for other control variables used in equation (1).

In Figure 4, we present depict shadow trading in linked firms during the t-25 to t+5 trading-day window around business partner and competitor source firm earnings announcement dates for the subsample of 267 source firms. We present values separately for cases in which sample source firms prohibit and do not prohibit shadow trading and for each of our three primary proxies of shadow trading: *Abnormal Short Sales*, *Option/Stock Ratio,* and *Order Imbalance*. For tests using *Abnormal Short Sales*, we also present different graphs for positive and negative CAR reactions around source firm earnings announcements. Panels A and B display patterns for *Abnormal Short Sales* in linked firms for which the source firm is a competitor (business partner), when the earnings surprise is negative. Panels C and D display similar patterns when the source firms experience positive earnings surprises. Panels E and F (G and H) present parallel trading patterns in linked firms for *Option/Stock Ratio* (*Order Imbalance*). All the figures show a pronouncement in trading activity for competitor and business partner linked firms affiliated with source firms that have trading policies that *do not* prohibit insiders from trading in or sharing private information about stakeholders.

Panel A in Table 7 presents the results from multivariate tests of equation (1) after we add interaction terms to capture differences in the magnitude of shadow trading for linked firms affiliated with source firms that prohibit shadow trading and those that do not. *Prohibit* is an

indicator variable set to one if the source firm has a restriction against shadow trading, and set to zero otherwise. We also include two variables that interact *Prohibit* with *Business Partner CAR* and *Competitor CAR*.

The overall findings show attenuation in shadow trading when source firms prohibit shadow trading. The coefficient on *Prohibit* is statistically significant in all specifications and indicates a negative relation between source firm prohibitions and informed trading in linked firms. Next, the coefficients on *Business Partner CAR* and *Competitor CAR* are statistically significant at the 10% level or better across both positive and negative CAR earnings news partitions and all three shadow trading measures. The coefficients on *Competitor CAR* across both positive and negative CAR earnings announcements suggest similar inferences. We find similar results using *Option/Stock Ratio* (*Order Imbalance*) as the dependent variable in columns 3 and 4 (columns 5 and 6). Untabulated *F*-test results indicate no significant differences between coefficients on *Business Partner CAR* and *Competitor CAR* across all the specifications.

Next, we find that the interaction terms *Business Partner CAR * Prohibit* and *Competitor CAR * Prohibit* are significant across all specifications. The coefficient signs on *Business Partner CAR * Prohibit* indicate that there is an incremental attenuation in business partner informed trading when source firms prohibit shadow trading. For instance, in column 1, a one standard deviation increase in negative (positive) CARs around earnings announcements by business partner source firms with policies against shadow trading is associated with 8% (12.1%) lower (higher) abnormal short sales in linked firms in the 30-day window before the earnings announcement, relative to business partner source firms that do not have prohibition against

shadow trading.[28] However, the coefficients for *Competitor CAR * Prohibit* indicate mixed effects of prohibitions for shadow trading in source firm competitors. One explanation for this finding is that firms may impose express prohibitions against trading in business partners (as opposed to competitors). Thus, prohibitions against using private information to trade in business partners may direct insiders to trade in competitors. In sum, our findings provide evidence that firms can influence the prevalence of shadow trading (especially in business partners) by prohibiting shadow trading.

VII. POLICY IMPLICATIONS AND CONCLUDING REMARKS

We document that employees facilitate trading in economically-linked firms to circumvent restrictions against insider trading. We label this activity as "shadow trading." Our estimates suggest that the dollar value profit from a single shadow trading event ranges from $139,400 to $678,000, a materially more substantial amount than an estimate of the average profits earned by individuals prosecuted for insider trading by the SEC in recent years.

Our findings from a series of additional tests examining changes in linked firm informed trading around shocks to insiders' incentives to engage in shadow trading help to rule out that our evidence is attributable to other explanations, such as market structure constraints or trading by sophisticated investors from other information sources. In addition, we also find evidence that shadow trading activity is lower when firms have prohibitions against it, suggesting firms may be able to self-police shadow trading.

In sum, our paper highlights a novel unexamined wealth transfer effect of private information with spillover effects. Our findings have an important policy implication. The vast

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[28] We calculate the difference in shadow trading in column 1 as: (-0.025/0.069) * 0.221 = 8%, where -0.025 is the coefficient, 0.069 is the mean abnormal short sales prior to negative CAR earnings news, and 0.221 is the standard deviation of Business Partner CAR (negative CAR earnings announcements sample). Note that these statistics are different from the main sample statistics described in Table 1.

majority of regulatory (and academic) attention on insider trading has centered on insiders who use private information to trade in *their* firms as opposed to other firms. Our findings suggest a need for increased legislative and regulatory attention towards insiders' ability to exploit their private information to facilitate trading in their firm's business partners and competitors. Future avenues for research include understanding the magnitude and sources of payment to source firm employees for their information and examining whether firm insiders directly undertake shadow trading or leak information about economically-linked firms.

REFERENCES

Aboody, D., and Lev, B., 2000. Information asymmetry, R&D, and insider gains, Journal of Finance 55, 2747-2766.

Acharya, V. V., and Johnson, T. C., 2010. More insiders, more insider trading: Evidence from private-equity buyouts, Journal of Financial Economics 98, 500-523.

Ahern, Kenneth R., 2013. Network centrality and the cross section of stock returns, Available at SSRN: https://ssrn.com/abstract=2197370.

Akbas, F., Boehmer, E., and Genc, E., 2015. Peer stock short interest and future returns, Available at SSRN: http://ssrn.com/abstract=2495068.

Akbas, F., Meschke, F., and Wintoki, M. B., 2016. Director networks and informed traders, Journal of Accounting and Economics 62, 1-23.

Alldredge, D. M., and Cicero, D. C., 2015. Attentive insider trading, Journal of Financial Economics 115, 84-101.

Anderson, R. C., Reeb, D. M., and Zhao, W., 2012. Family-controlled firms and insider trading: Evidence from short sales, Journal of Finance 67, 351-386.

Anderson, R. C., Reeb, D. M., Zhang, Y., and Zhao, W., 2013. The efficacy of regulatory intervention: Evidence from the distribution of informed option trading, Journal of Banking & Finance 37, 4337-4352.

Angrist, J. D., and Pischke, J-S., 2009. Mostly Harmless Econometrics: An Empiricists Companion. Princeton: Princeton University Press.

Aobdia, D., Caskey, J. and Ozel, N. B., 2014. Inter-industry network structure and the cross-predictability of earnings and stock returns, Review of Accounting Studies 19, 1191-1224.

Baginski, S., 1987. Intra-industry information transfers associated with management forecasts of earnings, Journal of Accounting Research 25, 196-216.

Baker, S. R., Bloom, N., and Davis, S. J., 2016. Measuring economic policy uncertainty, Quarterly Journal of Economics 131, 1593-1636.

Benveniste, L. M., Ljungqvist, A., Wilhelm Jr., W. J., and Yu, X., 2003. Evidence of information spillovers in the production of investment banking services, Journal of Finance 58, 577-608.

Bettis, J. C., Coles, J. L., and Lemmon, M. L., 2000. Corporate policies restricting trading by insiders, Journal of Financial Economics 57, 191-220.

Bobelian, M., 2012. Can The Government Stop Insider Trading? Forbes, December 10, 2012.

Brochet, F., 2010. Information content of insider trades before and after the Sarbanes-Oxley Act, The Accounting Review 85, 419-446.

Bushee, B. J., and Goodman, T. H., 2007. Which institutional investors trade based on private information about earnings and returns? Journal of Accounting Research 45, 289-321.

Bushman, R. M., Piotroski J. D., and Smith, A. J., 2005. Insider trading restrictions and analysts' incentives to follow firms, Journal of Finance 60, 35-66.

Campbell, J. Y., Ramadorai, T., and Schwartz, A., 2009. Caught on tape: Institutional trading,

stock returns, and earnings announcements, Journal of Financial Economics 92, 66-91.

Chen, Q., 2007. Discussion of "Which institutional investors trade based on private information about earnings and returns?", Journal of Accounting Research 45, 323-331.

Cheng, Q., and Lo, K., 2006. Insider trading and voluntary disclosures, Journal of Accounting Research 44, 815-848.

Christophe, S. E., Ferri, M. G., and Angel, J. J., 2004. Short-selling prior to earnings announcements, Journal of Finance 59, 1845-1875.

Clinch, G., and Sinclair, N., 1987. Intra-industry information releases: A recursive systems approach, Journal of Accounting and Economics 9, 89-106.

Cohen, L., and Frazzini, A., 2008. Economic links and predictable returns, Journal of Finance 63, 1977-2011.

Cohen, L., and Lou, D., 2012. Complicated firms, Journal of Financial Economics 104, 383-400.

Damodaran, A., and Liu, C. H., 1993. Insider trading as a signal of private information, Review of Financial Studies 6, 79-119.

Del Guercio, D., Odders-White, E. R., and Ready, M. J., 2013. The effect of SEC enforcement intensity on illegal insider trading, Working Paper, University of Wisconsin at Madison.

Desai, H., Ramesh, K., Thiagarajan, S. R., and Balachandran, B. V., 2002. An investigation of the informational role of short interest in the Nasdaq market, Journal of Finance 57, 2263-2287.

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

Drake, M. S., Rees, L., and Swanson, E. P., 2011. Should investors follow the prophets or the bears? Evidence on the use of public information by analysts and short sellers, The Accounting Review 86, 101-130.

Drake, M. S., Roulstone, D. T., and Thornock, J. R., 2012. Investor information demand: Evidence from Google searches around earnings announcements. Journal of Accounting Research 50, 1001-1040.

Ellis, J. A., Fee, C. E., and Thomas, S. E., 2012. Proprietary costs and the disclosure of information about customers, Journal of Accounting Research 50, 685-727.

Fishman, M.J. and Hagerty, K.M., 1992. Insider trading and the efficiency of stock prices. The RAND Journal of Economics, 106-122.

Foster, G., 1981. Intra-industry information transfers associated with earnings releases, Journal of Accounting and Economics 3, 201-232.

Gleason, C. A., Jenkins, N. T., and Johnson, W. B., 2008. The contagion effects of accounting restatements, The Accounting Review 83, 83-110.

Griffin, J. M., Harris, J. H., and Topaloglu, S., 2003. The dynamics of institutional and individual trading, Journal of Finance 58, 2285-2320.

Han, J., and Wild. J., 1990. Unexpected earnings and intra-industry information transfers: Further evidence, Journal of Accounting Research 28, 211-219.

Hertzel, M., Li, Z., Officer, M., and Rodgers, K., 2008. Inter-firm linkages and the wealth effects of financial distress along the supply chain, Journal of Financial Economics 87, 374-387.

Hilary, G., and Shen, R., 2013. The role of analysts in intra-industry information transfer, The Accounting Review 88, 1265-1287.

Hoberg, G., and Phillips, G., 2010. Product market synergies and competition in mergers and acquisitions: A text-based analysis, Review of Financial Studies 23, 3773-3811.

Hoberg, G., and Phillips, G., 2016. Text-based network industries and endogenous product differentiation, Journal of Political Economy 124, 1423-1465.

Huddart, S., Hughes, J.S. and Levine, C.B., 2001. Public disclosure and dissimulation of insider trades. Econometrica, 69(3), pp.665-681.

Huddart, S., and Lang, M., 2003. Information distribution within firms: evidence from stock option exercises, Journal of Accounting and Economics 34, 3-31.

Huddart, S. J., Ke, B., and Shi, C., 2007. Jeopardy, non-public information, and insider trading SEC 10-K and 10-Q filings, Journal of Accounting and Economics 43, 3-36.

Jagolinzer, A D., 2009. SEC Rule 10b5-1 and insiders' strategic trade, Management Science 55, 224-239.

Jagolinzer, A. D., Larker, D. F., and Taylor D. J., 2011. Corporate governance and the information content of insider trades, Journal of Accounting Research 49, 1249-1274.

Johnson, T., and So, E., 2012. The option to stock volume ratio and future returns, Journal of Financial Economics 106, 262-286.

Johnson, T., and So, E., 2018. A simple multimarket measure of information asymmetry, Management Science 64, 1055-1080.

Kacperczyk, M. and Pagnotta, E.S., 2019. Chasing private information. The Review of Financial Studies, 32, pp.4997-5047.

Kaniel, R., Liu, S., Saar, G., and Titman, S., 2012. Individual investor trading and return patterns around earnings announcements, Journal of Finance 67, 639-680.

Ke, B., Huddart, S. J., and Petroni, K., 2003. What insiders know about future earnings and how they use it: Evidence from insider trades, Journal of Accounting and Economics 35, 315-46.

Khan, M., and Lu, H., 2013. Do short sellers front-run insider sales? The Accounting Review 88, 1743-1768.

Kim, O., and Verrecchia, R., 1997. Pre-announcement and event-period private information, Journal of Accounting and Economics 24, 395-419.

Klasa, S., Ortiz-Molina, H., Serfling, M. A., and Srinivasan, S., 2018. Protection of trade secrets and capital structure decisions, Journal of Financial Economics 128, 266-286.

Kravet, T., and Shevlin, T., 2010. Accounting restatements and information risk, Review of Accounting Studies 15, 264-294.

Larcker, D. F., So, E. C., and Wang, C. C., 2013. Boardroom centrality and firm performance, Journal of Accounting and Economics 55, 225-250.

Levitt, A., 1998. A question of integrity: Promoting investor confidence by fighting insider trading, Vital Speeches of the Day 64, 354-357.

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

McNichols, M., and Trueman, B., 1994. Public disclosure, private information collection, and short-term trading, Journal of Accounting and Economics 17, 69-94.

Olsen, C., and Dietrich, J. R., 1985. Vertical information transfers: The association between retailers' sales announcements and suppliers' security returns, Journal of Accounting Research 23 (Supplement), 144-166.

Pandit, S., Wasley, C. E. and Zach, T., 2011. Information externalities along the supply chain: The economic determinants of suppliers' stock price reaction to their customers' earnings announcements, Contemporary Accounting Research 28, 1304-1343.

Perino, M., 2019. Real Insider Trading, Working Paper, Available at: https://ssrn.com/abstract=3338536

Piotroski, J.D. and Roulstone, D.T., 2005. Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations? Journal of Accounting and Economics, 39, 55-81.

Pownall, G., and Waymire, G., 1989. Voluntary disclosure choice and earnings information transfer, Journal of Accounting Research 27, 85-105.

Pritchard, A., 2016. The SEC, administrative usurpation, and insider trading, Stanford Law Review Online 69, 55-63.

Puckett, A., and Yan, X. S., 2011. The interim trading skills of institutional investors, Journal of Finance 66, 601-633.

Pyo, Y., and Lustgarten, S., 1990. Differential intra-industry information transfer associated with management earnings forecasts, Journal of Accounting and Economics 13, 365-379.

Ramnath, S., 2002. Investor and analyst reactions to earnings announcements of related firms: An empirical analysis, Journal of Accounting Research 40, 1351-1376.

Reeb, David M., and Zhao, W., 2020. Patents do not measure innovation success, Critical Finance Review 9, 157-199.

Roberts, M. R., and Whited, T., 2013. Endogeneity in empirical corporate finance, Handbook of the Economics of Finance 2, 493-572.

Roh, Y., and Zarowin, P., 2019. Disclosure of financial statement line items and insider trading around earnings announcements (working paper), Available at SSRN: https://ssrn.com/abstract=3365212.

Roll, R., Schwartz, E., and Subrahmanyam, A., 2010. O/S: The relative trading activity in options and stock, Journal of Financial Economics 96, 1-17.

Roulstone, D. T., 2003. The relation between insider-trading restrictions and executive compensation, Journal of Accounting Research 41, 525-551.

Slovin, M., Sushka, M., and Bendeck, Y., 1991. The intra-industry effects of going-private

transactions, Journal of Finance 46, 1537-1550.

Stambaugh, R. F., Yu, J., and Yuan, Y., 2015. Arbitrage asymmetry and the idiosyncratic volatility puzzle, Journal of Finance 70, 1903-1948.

Thomas, J., and Zhang, F., 2008. Overreaction to intra-industry information transfers? Journal of Accounting Research 46, 909-940.

Wang, C., 2014. Accounting standards harmonization and financial statement comparability: Evidence from transnational information transfer, Journal of Accounting Research 52, 955-992.

Figure 1. Timeline of Events for News Announcement Tests

Panel A (Panel B) presents a timeline of the event window used to determine earnings (M&A and new product) news announcements.

Panel A: Earnings News Announcements

Sample restrictions (30-day window around source firm earnings announcement):
1) The linked firm does not have any other source firm that makes an earnings announcement during this window;
2) The linked firm does not make an earnings announcement.

Source firm information release via earnings announcement at t.

t-365 t-30 t t+30

Non-Event Window (excluding other quarterly earnings announcement periods)

Event Window (source firm insiders use stakeholder relevant private information to trade in the linked firm)

Panel B: M&A and New Product News Announcements

Source firm information release via earnings announcement at t.

t-365

t-30

t

Non-Event Window

Event Window (source firm insiders use stakeholder relevant private information to trade in the linked firm)
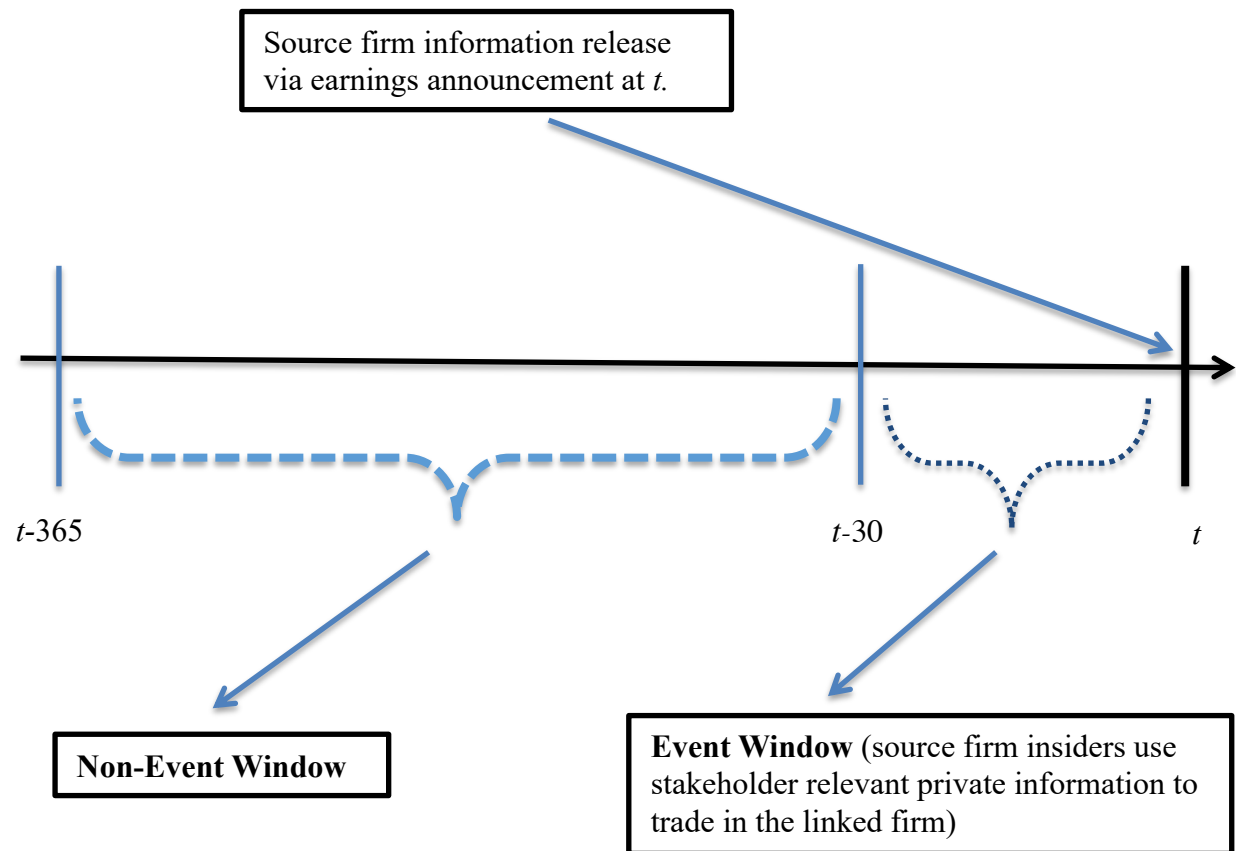
Figure 2. Media Attention On Insider Trading

Panel A shows the time series of the insider trading index via media attention on insider trading. The first month and year of the four spikes is June 2002, June 2003, June 2006, and October 2009. Panel B, C, and D present graphical time series of linked firm *Abnormal Short Sales*, *Option/Stock Ratio*, and *Order Imbalance* respectively around the spikes in the insider trading index, respectively. The changes in values are presented separately for competitor and business partner linked firms. Panels B, C, and D also present changes in source firm conventional insider trading during the same period.

Panel A: Insider Trading Index
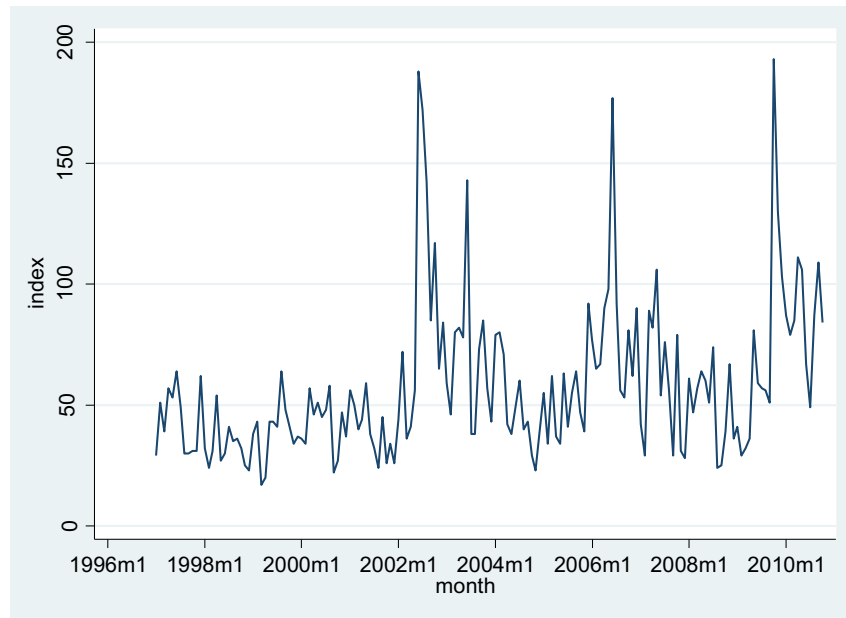
Panel B: Abnormal Short Sales
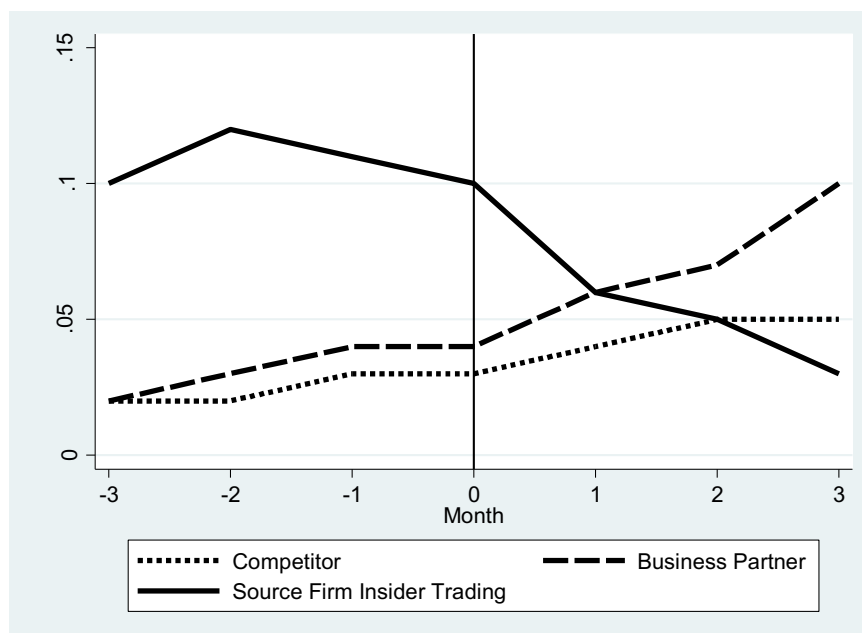
Panel C: Option/Stock Ratio
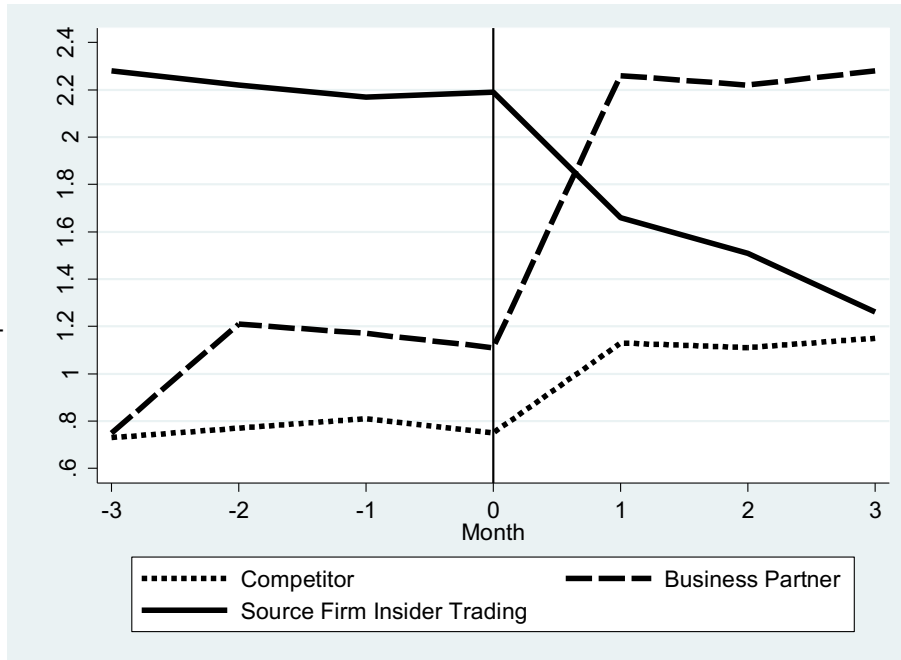
Panel D: Order Imbalance
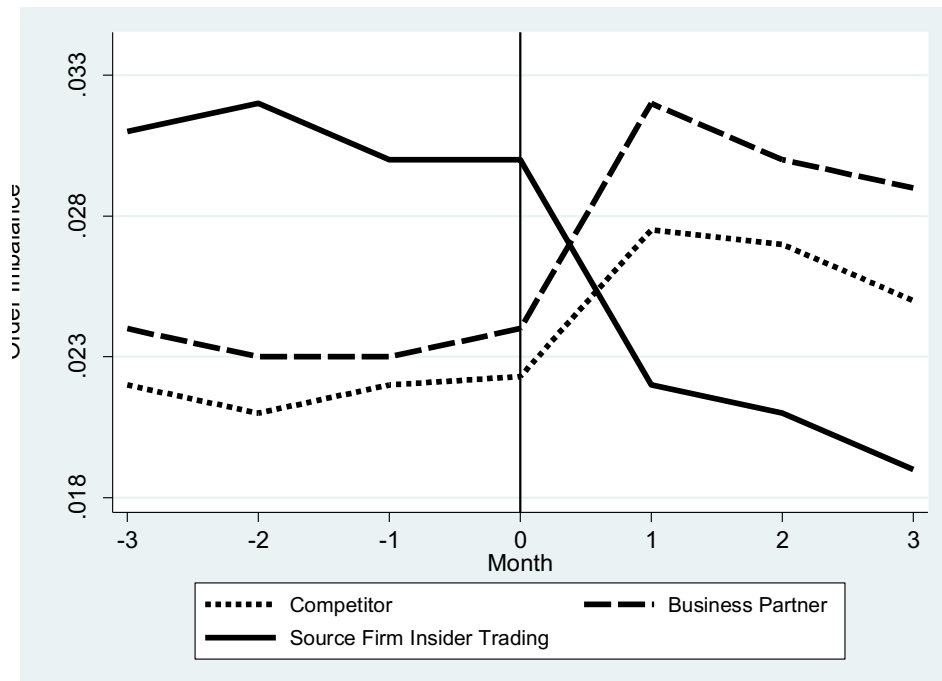
Figure 3. Insider Trading Index Shock: Source Firms With and Without Shadow Trading Policies

Panels A to C presents a graphical time series of informed trading in linked firms before a sample of source firm earnings announcements centered in the six-month window around high-profile enforcement against insider trading (Month = 0.) Panel A (Panel B) [Panel C] displays a time series of linked firm informed trading based on abnormal short sales (option/stock ratio) [order imbalance].

Panel A: Abnormal Short Sales in Source Firm Stakeholders
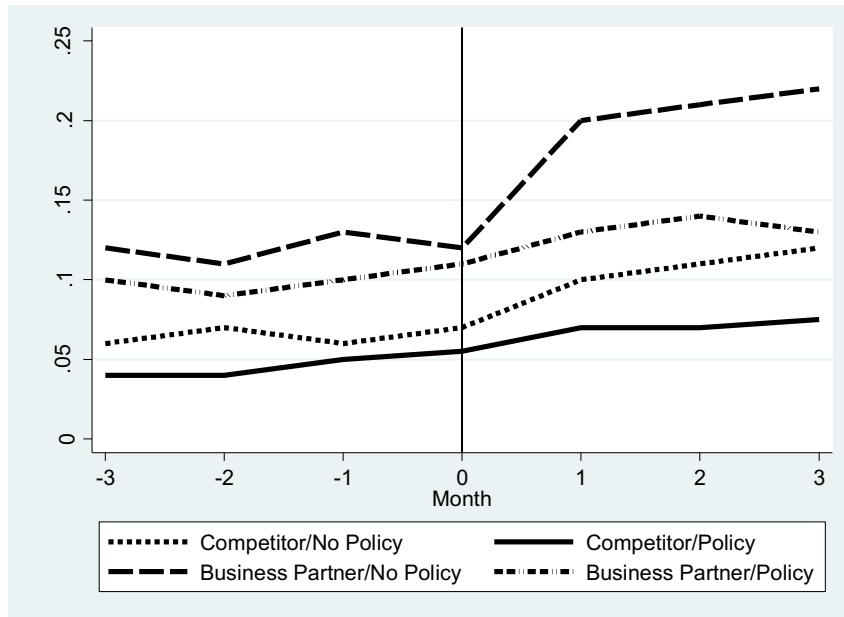
Panel B: Option/Stock Ratio in Source Firm Stakeholders
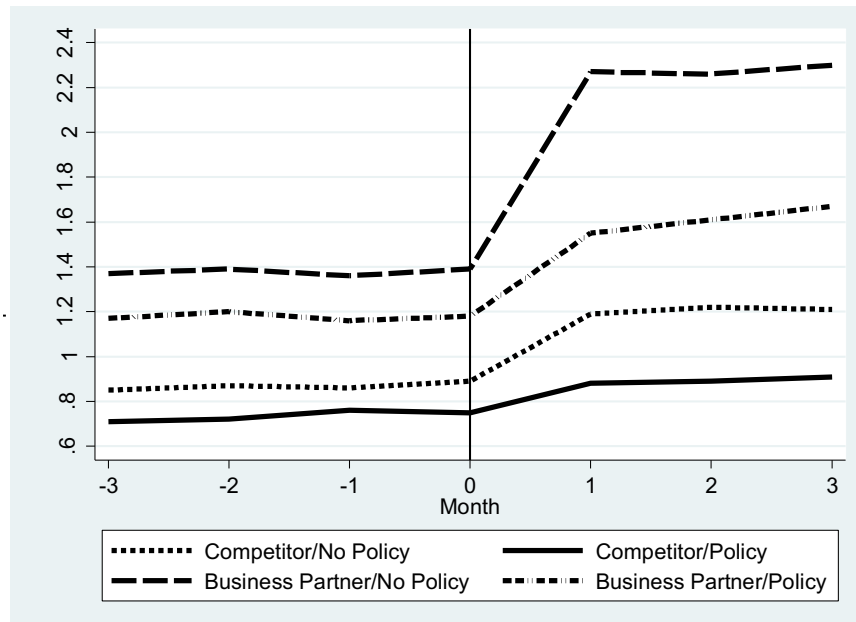
Panel C: Order Imbalance in Source Firm Stakeholders
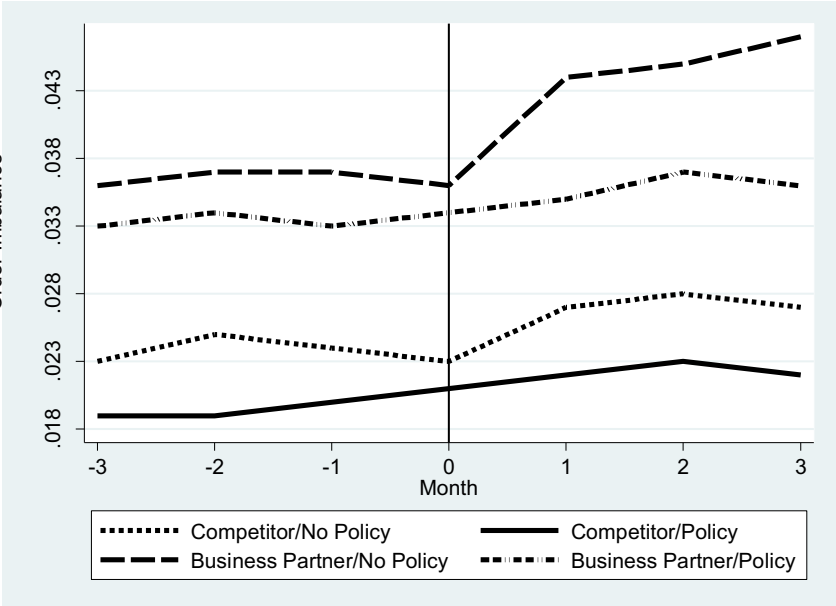
Figure 4. Source Firms With vs. Without Shadow Trading Policies

Panels A-G presents a graphical time series of informed trading in linked firms around source firm earnings announcements. Each panel presents informed trading for partitions of linked firms based on whether the paired source firm prohibits or does not prohibit shadow trading. Day = 0 on the x-axis represents the date of the source firm earnings announcement. Panels A to D display results for abnormal short sales; Panels E and F display results for option/stock ratio; and Panels G and H display results for order imbalance.

Panel A: Abnormal Short Sales
for Source Firm Competitors
(Negative CAR Earnings Announcement sample)
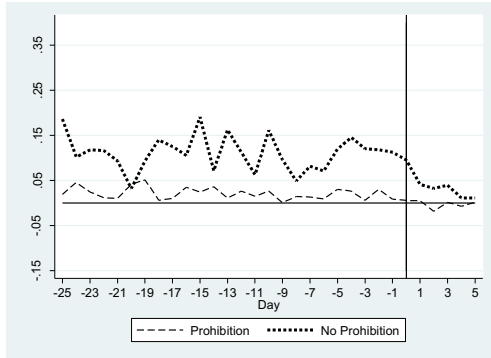
Panel B: Abnormal Short Sales
for Source Firm Business Partners
(Negative CAR Earnings Announcement sample)
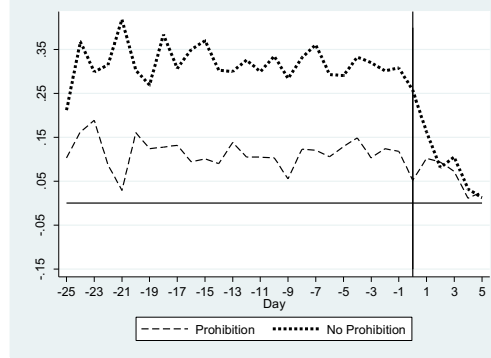
Panel C: Abnormal Short Sales
for Source Firm Competitors
(Positive CAR Earnings Announcement sample)
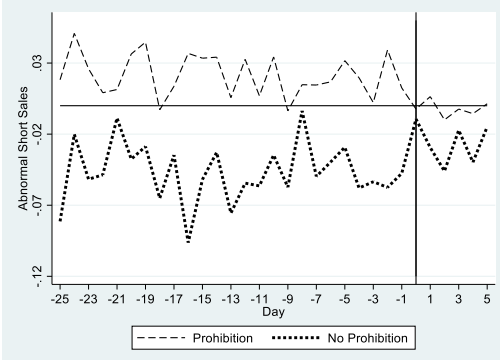
Panel D: Abnormal Short Sales
for Source Firm Business Partners
(Positive CAR Earnings Announcement sample)
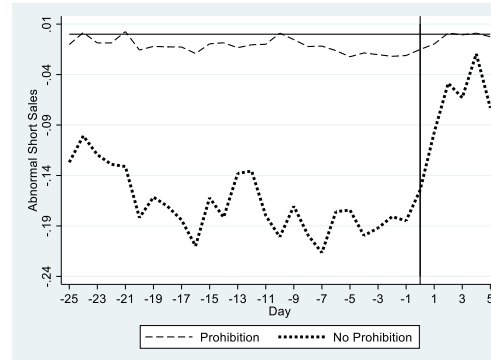
Panel E: Option/Stock Ratio
for Source Firm Competitors
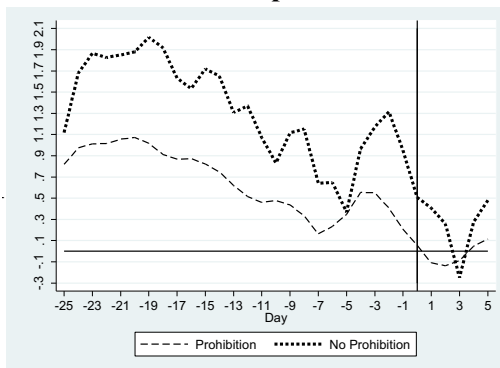
Panel F: Option/Stock Ratio
for Source Firm Business Partners
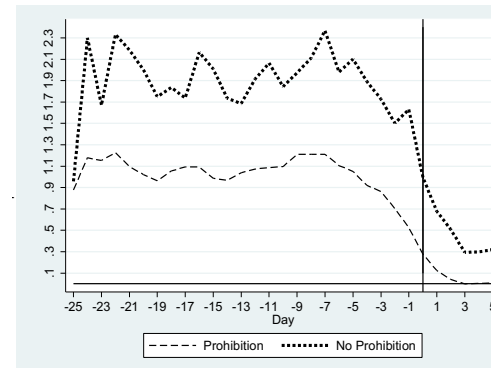
**Panel G: Order Imbalance
In Source Firm Competitors**
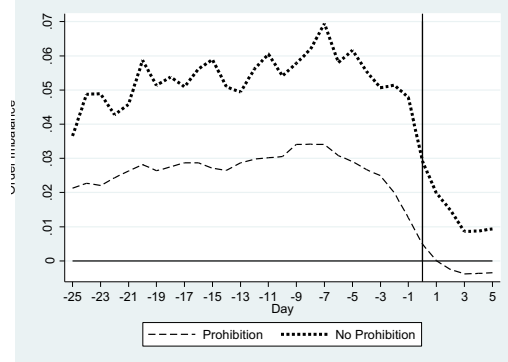
**Panel H: Order Imbalance
In Source Firm Business Partners**
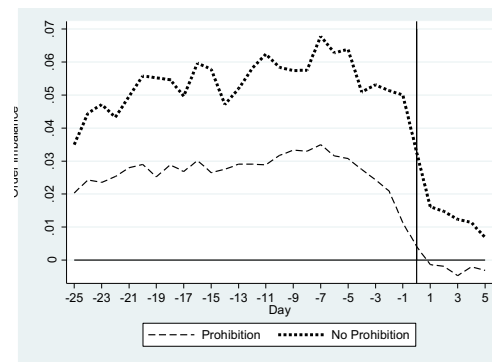
Appendix. Variable Definitions

Dependent Variables

Short Sales	The daily short sale volume divided by the daily total stock trading volume.
Abnormal Short Sales	A linked firm's average daily short sales from day t-30 to t-1 before a source firm's quarterly earnings announcement at day t divided by the linked firm's average daily short sales for the prior year excluding the 30-day windows immediately prior to the source firm's earnings announcement dates, and all multiplied by negative one.
Option/Stock Ratio	Average daily option/stock trading volume for linked firm i during the 30 days before source firm A's quarterly earnings announcement date.
Order Imbalance	Daily institutional buys minus institutional sales scaled by total trading volume for linked firm i during the 30 days before source firm A's quarterly earnings announcement date.

Primary Independent Variables

CAR	Cumulative abnormal return, calculated as the sum of the daily abnormal returns. Daily abnormal return is the raw return minus the market return.
Business Partner CAR	Business partner source firm absolute cumulative abnormal return (CAR) from day t-1 to t+1 where t is the earnings announcement date.
Competitor CAR	Competitor source firm absolute cumulative abnormal return (CAR) from day t-1 to t+1 where t is the earnings announcement date.
Post	An indicator variable set to one if the year is after 2002 and set to zero otherwise.
Prohibit	An indicator variable set to one if the source firm has a policy prohibiting its employees from engaging in shadow trading, and set to zero otherwise.
IDDShock	This variable is an indicator variable. For source firms headquartered in states that adopt (reject) the IDD, the variable is set to zero (one) before the IDD shock and set to one (zero) following the adoption (rejection) of the IDD.

Source Firm Control Variables

Firm Size Source	Log of total assets.
Book-to-Market Source	Log of book value of common equity plus deferred taxes scaled by market value of common equity at the end of fiscal quarter.
FREV Source	Rolling sum of the preceding 30-day earnings forecast revisions scaled by stock price.
TACC Source	Total accruals scaled by average assets measured at the end of quarter.

Past Return Source	Market-adjusted return during the 30-day window prior to earnings announcement.
E/P Source	Ratio of the rolling sum of earnings over the preceding four quarters to price at the end of quarter.
Turnover Source	Average daily volume turnover ratio measured as the exchange-specific, percentile rank, based on the six-month period prior to calendar quarter.
Sales Growth Source	Rolling sum of sales growth over the preceding four fiscal quarters.
LTG Source	Mean consensus long-term earnings growth forecast at the end of calendar quarter t.
Momentum Source	Price momentum, measured as the six-month raw return ending one month prior to the end of the fiscal quarter.
MISP Source	The mispricing measure for the prior month as developed by Stambaugh, Yu, and Yuan (2015).

Linked Firm Control Variables

Firm Size	Log of total assets.
FREV	The rolling sum of the preceding 30-day earnings forecast revisions scaled by the stock price.
Total Accruals	Total accruals scaled by average assets measured at the end of the quarter.
Past Return	Market-adjusted return during the 30-day window before an earnings announcement.
E/P	Ratio of the rolling sum of earnings over the preceding four quarters to price at the end of the quarter (Drake et al. 2011).
Sales Growth	The rolling sum of sales growth over the preceding four fiscal quarters (Drake et al. 2011).
LTG	Mean consensus long-term earnings growth forecast at the end of the calendar quarter.
Momentum	Price momentum, measured as the six-month raw return ending one month before the end of the fiscal quarter.
MISP	The mispricing measure for the prior month as developed by Stambaugh, Yu, and Yuan (2015).
Book-to-Market	Log of the book value of common equity plus deferred taxes scaled by the market value of common equity at the end of the fiscal quarter.
Turnover	Average daily volume turnover ratio measured as the exchange-specific, percentile rank, based on the six months before the calendar quarter.

Table 1. Summary Statistics

Table 1 presents summary statistics for sample source firms and linked firms as used for the earnings announcement news event sample, using abnormal short sales as the measure for shadow trading. Panel A displays summary statistics for source firms. Panel B presents descriptive data for sample linked firms. Panel C presents the top ten industries represented for sample source and linked firms. All variables are defined in the appendix. The sample consists of 745 unique linked firms and 598 unique source firms, which represents 3,111 source firm-linked firm quarter observations. Of those observations 1,129 represent earnings news with negative CARs and 1,982 represent earnings news with positive CARs.

Panel A: Source Firm Characteristics

	Mean	Median	Std. Dev.	Lower Quartile	Upper Quartile
CAR - Negative Earnings News (business partner)	-0.035	-0.028	0.256	-0.323	0.062
CAR - Negative Earnings News (competitor)	-0.033	-0.030	0.229	-0.292	0.068
CAR - Positive Earnings News (business partner)	0.021	0.011	0.219	-0.040	0.278
CAR - Positive Earnings News (competitor)	0.023	0.012	0.228	-0.043	0.235
Total Assets ($million)	6,137	1,229	9,162	287	7,263
Book-to-Market	0.818	0.778	0.517	0.477	1.113
FREV	-0.018	0.002	0.102	-0.039	0.025
Total Accruals	-0.027	-0.012	0.072	-0.047	0.003
E/P	-0.012	0.004	0.080	-0.021	0.015
Turnover	0.517	0.525	0.267	0.281	0.748
Sales Growth	0.024	0.011	0.086	-0.014	0.040
LTG	13.490	12.000	9.912	7.050	17.500
Momentum	0.090	0.047	0.233	-0.052	0.172
MISP	54.566	55.238	11.655	46.179	62.784
Past Return	0.027	0.030	0.592	-0.089	0.111

Panel B: Linked Firm Descriptive Statistics

	Mean	Median	Std. Dev.	Lower Quartile	Upper Quartile
Linked Firm Abnormal Short Sales Prior to Source Firm:					
Negative Earnings Announcement CAR	0.079	0.055	0.279	-0.088	0.225
Positive Earnings Announcement CAR	-0.036	-0.029	0.332	-0.193	0.122
Linked Firm Option/Stock Ratio prior to Source Firm:					
Negative Earnings Announcement CAR	2.336	1.527	3.221	0.420	4.293
Positive Earnings Announcement CAR	1.496	0.972	2.558	0.176	3.056
Linked Firm Order Imbalance prior to Source Firm:					
Negative Earnings Announcement CAR	-0.032	-0.037	0.072	-0.962	0.928
Positive Earnings Announcement CAR	0.025	0.032	0.075	-0.919	0.992
Total Assets ($million)	4,434	814	16,040	335	2,530

Book-to-Market	0.782	0.750	0.509	0.435	1.003
FREV	-0.012	0.003	0.095	-0.029	0.033
Total Accruals	-0.023	-0.009	0.070	-0.050	0.003
E/P	-0.007	0.005	0.076	-0.017	0.014
Turnover	0.522	0.530	0.273	0.280	0.755
Sales Growth	0.017	0.010	0.056	-0.002	0.037
LTG	15.552	13.000	9.156	8.273	19.108
Momentum	0.085	0.050	0.267	-0.060	0.182
MISP	53.223	54.902	10.985	48.192	61.007
Past Return	0.022	0.025	0.617	-0.099	0.126

Panel C: Industry Representation

Industry Name	% of Source Firms	Industry Name	% of Linked Firms
Pharmaceutical Products	10.02	Pharmaceutical Products	8.91
Business Services	9.71	Petroleum and Natural Gas	8.51
Petroleum and Natural Gas	7.27	Business Services	8.24
Chemicals	5.25	Restaurants, Hotel, Motel	6.68
Communication	4.34	Machinery	5.74
Retail	4.22	Healthcare	3.85
Machinery	3.73	Construction Materials	3.71
Healthcare	3.60	Retail	3.51
Electrical Equipment	3.54	Transportation	3.51
Construction Materials	3.48	Wholesale	3.31
Total	55.16	Total	55.97

Table 2. Earnings Announcements and Informed Trading

This table presents coefficients from regressions of the association between informed trading in a linked firm during the 30-day window before a source firm news event and the magnitude of the market reaction to the source firm's news event. We use earnings announcements to identify news events. A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is one of three proxies of informed trading: (1) *Abnormal Short Sales*, (2) *Option/Stock Ratio*, and (3) *Order Imbalance*. The primary independent variables, *Business Partner CAR* and *Competitor CAR*, are the absolute value of the source firm's cumulative abnormal return (CAR) between day t-1 and t+1, where t is the source firm's news event date. We partition samples based on whether the CAR is negative or positive. We define all variables in the appendix. Standard errors are clustered by firm and year, and we report t-values in parentheses. All specifications include year and Fama-French 48 industry fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable:	Linked Firm Abnormal Short Sales		Linked Firm Option/Stock Ratio		Linked Firm Order Imbalance	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)	(5)	(6)
Business Partner CAR	0.033**	-0.019**	0.699**	0.621**	0.011**	0.008**
	(2.55)	(-2.11)	(2.33)	(2.49)	(2.41)	(2.26)
Competitor CAR	0.031**	-0.020**	0.611**	0.581**	0.009*	0.008**
	(2.25)	(-2.20)	(2.09)	(2.17)	(1.72)	(2.23)
Firm Size	-0.019	0.007	-0.300	-0.089	0.010	0.009
	(-1.22)	(0.60)	(-1.17)	(-1.03)	(1.11)	(1.22)
Past Return	0.132	-0.092	2.356	1.722	0.018	0.013
	(1.31)	(-0.88)	(1.30)	(1.25)	(0.78)	(0.73)
FREV	0.056	0.033	1.002*	0.523*	0.012*	0.011**
	(1.31)	(1.46)	(1.90)	(1.92)	(1.90)	(2.01)
Book-to-Market	0.017	0.042	0.287	0.722	0.005	0.013
	(0.47)	(0.97)	(1.22)	(1.45)	(0.66)	(0.23)
Total Accruals	0.316*	0.143*	1.034*	2.322*	0.078*	0.055
	(1.90)	(1.95)	(1.69)	(1.80)	(1.74)	(1.56)
E/P	-0.120	0.143	-1.902	-2.009	0.056	0.045
	(-0.53)	(0.67)	(-0.89)	(-1.33)	(0.89)	(0.88)
Turnover	-0.026	-0.014	-0.293	-0.200	-0.005	-0.007
	(-1.13)	(-1.53)	(-1.52)	(-1.32)	(-1.55)	(-1.38)
Sales Growth	0.308	0.158	2.126*	0.788*	0.089	0.022
	(1.48)	(1.33)	(1.67)	(1.90)	(1.33)	(1.36)
LTG	-0.001	-0.003**	-0.013	-0.021*	-0.001	-0.001
	(-0.67)	(-2.13)	(-1.23)	(-1.80)	(-0.44)	(-0.27)
Momentum	-0.082	0.079	-1.221	-0.936	-0.033	-0.020
	(-0.88)	(1.13)	(-1.09)	(-1.23)	(-1.00)	(-1.33)
MISP	0.002	0.002	0.027	0.023	0.002	0.003
	(1.20)	(1.52)	(1.11)	(1.20)	(1.38)	(1.62)
Firm Size Source	0.011	-0.005	0.187	0.079	0.003	0.002
	(1.22)	(-1.29)	(1.39)	(1.27)	(1.11)	(1.26)
Past Return Source	-0.035	0.040	-0.556*	-0.366	-0.009	-0.012*
	(-1.20)	(1.37)	(-1.76)	(-1.60)	(-1.60)	(-1.77)
FREV Source	0.022	-0.017	0.401*	0.282	0.007	0.005
	(1.50)	(-1.09)	(1.79)	(1.52)	(1.28)	(0.80)
Book-to-Market Source	-0.018	-0.037	-0.322	-0.562	-0.005	-0.009
	(-0.82)	(-1.09)	(-1.10)	(-0.99)	(-0.90)	(-1.20)
Total Accruals Source	0.022	0.050	0.322	0.722	0.005	0.012
	(0.70)	(0.66)	(0.78)	(1.27)	(1.12)	(1.43)
E/P Source	0.070	-0.111	1.110	1.667*	0.022	-0.033
	(1.26)	(-1.38)	(1.51)	(1.89)	(1.23)	(-1.54)
Turnover Source	0.025	0.011	0.422	0.156	0.010	0.003
	(0.23)	(0.80)	(0.56)	(1.02)	(0.67)	(0.72)
Sales Growth Source	0.156	-0.022	2.443	0.311	0.067	0.020

	(1.00)	(-0.92)	(1.38)	(1.24)	(0.78)	(1.45)
LTG Source	-0.002*	0.006*	-0.025*	-0.011*	-0.001	0.002
	(-1.88)	(1.77)	(-1.69)	(-1.90)	(-0.56)	(1.35)
Momentum Source	0.056	-0.067	1.009	1.022	0.021	0.024
	(1.39)	(-1.45)	(1.58)	(1.32)	(1.01)	(1.12)
MISP Source	0.003	0.002	0.035	0.031	0.002	0.002
	(1.39)	(1.32)	(1.52)	(1.60)	(0.78)	(0.87)
F-test: $\beta_1 = \beta_2$	0.21	0.65	0.82	0.57	0.84	0.95
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,129	1,982	2,882	4,912	3,226	5,228
Adjusted R^2	0.189	0.180	0.142	0.127	0.113	0.115

Table 3. Alternative Information Shocks and Informed Trading

This table presents coefficients from regressions of the association between informed trading in a linked firm during the 30-day window before a source firm news event and the magnitude of the market reaction to the source firm's news event. We use M&A announcement (Panel A) and new product announcement (Panel B) to identify news events. A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is one of three proxies of informed trading: (1) *Abnormal Short Sales*, (2) *Option/Stock Ratio*, and (3) *Order Imbalance*. The primary independent variables, *Business Partner CAR* and *Competitor CAR*, are the absolute value of the source firm's cumulative abnormal return (CAR) between day t-1 and t+1 where t is the source firm's news event date. We partition samples based on whether the CAR is negative or positive. We define all variables in the appendix. Standard errors are clustered by firm and year, and we report t-values in parentheses. All specifications include year and Fama-French 48 industry fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Shadow trading prior to M&A news announcements

	Linked Firm *Abnormal Short Sales*		Linked Firm *Option/Stock Ratio*		Linked Firm *Order Imbalance*	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)	(6)	(7)
Business Partner CAR	0.018***	0.012***	0.238***	0.348*	0.117***	0.065**
	(3.60)	(2.95)	(4.50)	(1.80)	(3.83)	(2.31)
Competitor CAR	0.011	0.021	0.027	0.027	-0.115	0.128
	(0.59)	(1.21)	(0.72)	(0.45)	(-1.26)	(1.62)
Firm Size	0.002***	0.001***	-0.248	0.034	-0.039	-0.009
	(8.98)	(3.30)	(-1.36)	(0.13)	(-0.90)	(-0.22)
Past Return	0.008	-0.017	-0.677	-0.529	0.070	0.085
	(0.89)	(-0.67)	(-1.28)	(01.46)	(1.11)	(1.25)
FREV	0.001	-0.005	-0.367	-1.374	0.057	0.159
	(0.30)	(-1.61)	(-0.15)	(-1.16)	(0.07)	(0.30)
Book-to-Market	0.005***	0.001	-1.057	3.276	-0.051	-0.124
	(3.62)	(1.17)	(-1.00)	(0.99)	(-0.18)	(-0.47)
Total Accruals	0.009***	0.004	-1.157	0.396	0.089	0.193
	(2.88)	(1.48)	(-0.86)	(0.19)	(0.26)	(0.35)
E/P	-0.014	0.017***	4.821	75.954	-4.587*	-2.937
	(-1.26)	(3.71)	(0.52)	(1.08)	(-1.89)	(-1.11)
Turnover	-0.000***	-0.000***	-0.021	-0.026	-0.004	0.001
	(-9.67)	(-7.61)	(-1.57)	(-0.78)	(-1.28)	(0.43)
Sales Growth	0.010*	0.004	-0.151	5.994	1.180	0.080
	(1.88)	(0.82)	(-0.07)	(0.49)	(1.21)	(0.09)
LTG	-0.000***	-0.000***	0.027	-0.058	-0.004	-0.003
	(-6.64)	(-2.71)	(0.67)	(-0.65)	(-0.34)	(-0.33)
Momentum	0.003**	0.002*	0.536	0.784	-0.616*	0.070
	(2.18)	(1.85)	(0.42)	(0.41)	(-1.79)	(0.23)
MISP	0.000***	0.000***	-0.016	0.029	0.003	0.004
	(8.13)	(3.03)	(-0.70)	(0.86)	(0.66)	(0.84)
Firm Size Source	-0.004***	-0.005***	1.520***	1.279**	-0.052	-0.017
	(-24.92)	(-18.11)	(11.32)	(2.38)	(-1.50)	(-0.48)
Past Return Source	0.037	-0.051	1.029	-0.785	-0.772	0.903
	(0.76)	(-0.38)	(0.80)	(-1.19)	(-0.75)	(1.20)
FREV Source	-0.006	0.002	-0.937	14.802	-0.601	0.622
	(-1.64)	(0.55)	(-0.38)	(1.09)	(-1.13)	(1.05)
Book-to-Market Source	0.018***	0.019***	-2.712***	-7.198***	0.402	0.215
	(9.96)	(8.37)	(-3.31)	(-2.70)	(1.55)	(0.82)
Total Accruals Source	-0.042***	0.001	-1.665	-5.094	-0.075	-0.903*
	(-12.09)	(0.27)	(-0.93)	(-1.58)	(-0.17)	(-1.90)
E/P Source	0.015	0.415***	5.236	3.921	0.232	2.072
	(0.40)	(8.66)	(1.29)	(0.54)	(0.14)	(1.12)
Turnover Source	0.001***	0.000***	0.067***	0.097**	-0.000	0.000
	(31.76)	(11.23)	(4.81)	(1.98)	(-0.13)	(0.01)

Sales Growth Source	0.042***	0.036***	-4.976**	1.463	-0.726	-0.232
	(6.80)	(4.15)	(-2.31)	(0.22)	(-0.90)	(-0.32)
LTG Source	0.000	0.000***	0.113***	0.022	-0.011	-0.004
	(0.31)	(3.91)	(3.07)	(0.20)	(-1.56)	(-0.50)
Momentum Source	0.001	-0.008***	0.499	-0.134	0.747***	0.260
	(0.51)	(-3.89)	(0.80)	(-0.11)	(2.66)	(1.05)
MISP Source	0.001***	0.001***	-0.018	-0.014	0.005	-0.000
	(24.40)	(21.67)	(-0.65)	(-0.52)	(0.94)	(-0.02)
F-test: $\beta_1 = \beta_2$	0.73	0.61	0.00***	0.16	0.01**	0.55
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,164	6,596	1,979	2,048	1,694	1,758
Adjusted R^2	0.430	0.514	0.365	0.072	0.041	0.025

Panel B: Shadow trading prior to new product announcements

	Linked Firm *Abnormal Short Sales*		Linked Firm *Option/Stock Ratio*		Linked Firm *Order Imbalance*	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)	(5)	(6)
Business Partner CAR	0.003	-0.009***	0.003**	0.006***	0.126***	0.124***
	(1.29)	(-5.04)	(2.17)	(5.06)	(8.78)	(8.99)
Competitor CAR	-0.038***	0.029***	0.001	-0.001	0.071	0.069
	(-4.55)	(3.68)	(1.42)	(-1.60)	(1.20)	(0.69)
Firm Size	-0.005***	-0.005***	0.000	-0.000	0.005	0.004
	(-53.54)	(-52.26)	(0.19)	(-0.37)	(1.08)	(1.00)
Past Return	-0.005	0.002	0.011	0.015	0.043	0.037
	(-0.73)	(0.55)	(0.65)	(0.71)	(1.11)	(1.02)
FREV	0.000	-0.003*	-0.002	-0.003	-0.277**	-0.255**
	(0.12)	(-1.73)	(-0.53)	(-1.31)	(-2.54)	(-2.02)
Book-to-Market	0.004***	0.005***	-0.001**	-0.001**	0.004	-0.005
	(4.37)	(5.89)	(-2.01)	(-2.19)	(0.10)	(-0.13)
Total Accruals	0.001	0.002	0.001	0.001	0.010	0.024
	(0.44)	(1.00)	(1.19)	(0.93)	(0.25)	(0.58)
E/P	-0.042***	-0.049***	0.001	0.001	-0.171	-0.240
	(-4.78)	(-6.10)	(0.24)	(0.29)	(-0.91)	(-1.31)
Turnover	0.000***	0.000***	0.000	0.000	-0.000	-0.001
	(46.64)	(46.98)	(1.01)	(0.04)	(-0.68)	(-1.34)
Sales Growth	0.043***	0.046***	-0.000	-0.002	0.370***	0.253**
	(9.82)	(10.03)	(-0.06)	(-0.93)	(2.94)	(2.07)
LTG	0.000*	0.000***	-0.000	-0.000	0.001	0.002
	(1.90)	(2.64)	(-0.31)	(-1.19)	(0.56)	(1.30)
Momentum	0.007***	0.010***	0.001	0.000	-0.105***	-0.070**
	(8.30)	(11.49)	(0.99)	(0.78)	(-3.52)	(-2.47)
MISP	0.001***	0.001***	0.000	0.000	-0.001	-0.001
	(49.74)	(48.08)	(0.36)	(1.40)	(-0.69)	(-0.80)
Firm Size Source	0.001***	0.001***	-0.000**	-0.000***	-0.019***	-0.021***
	(8.50)	(7.39)	(-2.37)	(-5.14)	(-3.54)	(-4.51)
Past Return Source	0.002	-0.002	-0.011	-0.007	-0.076**	-0.127**
	(1.29)	(-0.99)	(-1.09)	(-1.25)	(-2.02)	(-2.41)
FREV Source	0.002	0.002	0.009**	0.008**	0.965***	0.946***
	(1.01)	(0.99)	(2.01)	(2.33)	(6.21)	(6.99)
Book-to-Market Source	-0.001*	-0.000	0.001	0.001	0.290***	0.266***
	(-1.87)	(-0.55)	(0.94)	(1.35)	(6.99)	(6.93)
Total Accruals Source	0.002	0.003**	0.012***	0.012***	-0.777***	-0.747***
	(1.41)	(2.02)	(4.45)	(5.53)	(-6.33)	(-7.14)
E/P Source	-0.003	-0.002	0.003	-0.010	1.791***	1.683***
	(-0.80)	(-0.50)	(0.29)	(-0.89)	(7.42)	(5.41)
Turnover Source	-0.000***	-0.000***	0.000*	0.000	-0.001	-0.001
	(-14.03)	(-13.11)	(1.90)	(0.91)	(-1.13)	(-1.06)
Sales Growth Source	0.014***	0.014***	0.046***	0.047***	-0.219	-0.266
	(4.70)	(4.87)	(8.39)	(9.21)	(-0.97)	(-1.30)
LTG Source	-0.000***	-0.000***	-0.000***	-0.000***	-0.004***	-0.006***
	(-7.10)	(-7.93)	(-4.10)	(-5.66)	(-2.84)	(-3.84)
Momentum Source	-0.001	-0.001	0.027***	0.027***	0.535***	0.523***
	(-1.46)	(-1.56)	(20.83)	(21.73)	(10.45)	(13.58)
MISP Source	0.000***	0.000***	0.000***	0.000***	0.006***	0.007***
	(10.32)	(9.17)	(7.98)	(9.55)	(8.21)	(8.72)
F-test: $\beta_1 = \beta_2$	21.65***	21.44***	3.09*	6.59***	4.57**	5.66**
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	217,864	215,601	1,241,346	1,300,637	929,610	970,139
Adjusted R^2	0.422	0.419	0.017	0.017	0.035	0.035

Table 4. Future Returns and Shadow Trading in Linked Firms

This table presents coefficients from regressions of the association between linked firm abnormal returns around source firm earnings announcements news event and the magnitude of informed trading in linked firms for the 30-day window prior to the source firm news event. A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is *Future Return,* measured as the cumulative abnormal return for a linked firm between t-1 and t+5, where t is the source firm earnings announcement news event date. The independent variable is one of three proxies of informed trading: (1) *Abnormal Short Sales*, (2) *Option/Stock Ratio*, and (3) *Order Imbalance* measured over the 30-day window prior to source firm earnings announcements. All variables are defined in the appendix. t-values are reported in parentheses based on standard errors clustered by firm and year. All specifications include year and Fama-French 48 industry fixed effects. Statistical significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

	Future Return		
	(1)	(2)	(3)
Abnormal Short Sales	-0.266**	-	-
	(-2.23)		
Option/Stock Ratio	-	-0.225**	-
		(-2.27)	
Order Imbalance	-	-	0.191***
			(2.65)
Firm Size	-0.069**	-0.116**	-0.109**
	(-2.21)	(-2.02)	(-2.11)
Past Return	0.071	0.094	0.099
	(1.45)	(1.38)	(1.41)
FREV	-0.206*	-0.235*	-0.210*
	(-1.81)	(-1.72)	(-1.85)
TACC	0.102	0.099	0.102
	(0.90)	(1.03)	(1.00)
Book-to-Market	-0.020	-0.020	-0.019
	(-1.37)	(-1.35)	(-1.22)
E/P	-0.035	-0.040	-0.043
	(-0.97)	(-0.90)	(-1.22)
Turnover	0.315**	0.322**	0.308**
	(2.20)	(2.11)	(1.99)
Sales Growth	0.033*	0.030*	0.035*
	(1.80)	(1.88)	(1.90)
LTG	0.002	0.001	0.001
	(1.28)	(1.18)	(1.29)
Momentum	0.035*	0.040*	0.035*
	(1.71)	(1.89)	(1.92)
MISP	0.002	0.002	0.002
	(1.22)	(1.15)	(1.16)
Year & Industry Fixed Effects	Yes	Yes	Yes
Observations	3,111	7,794	8,454
Adjusted R^2	0.283	0.235	0.222

Table 5. Shadow Trading Following Increased Attention to Conventional Insider Trading

This table presents coefficients from regressions examining whether the association between informed trading in a linked firm before a source firm earnings announcement news event and the magnitude of the market reaction to the source firm's news event is affected by high-profile regulatory enforcement events against insider trading. We identify high-profile regulatory enforcement against insider trading based on spikes in a month-level count of the number of articles in major U.S. newspapers that include the term "insider trading." A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is one of three proxies of informed trading: (1) *Abnormal Short Sales*, (2) *Option/Stock Ratio*, and (3) *Order Imbalance*. The primary independent variables, *Business Partner CAR* and *Competitor CAR*, are the absolute value of the source firm's cumulative abnormal return (CAR) between day t-1 and t+1 where t is the source firm's news event date. *Post* is an indicator variable set to one for all three-month periods following high-profile regulatory enforcement events against insider trading. We partition samples based on whether the CAR is negative or positive. We define all variables in the appendix. Standard errors are clustered by firm and year, and we report t-values in parentheses. All specifications include year and Fama-French 48 industry fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Linked Firm *Abnormal Short Sales*		Linked Firm *Option/Stock Ratio*		Linked Firm *Order Imbalance*	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)	(5)	(6)
Business Partner CAR	0.017*	-0.013*	0.227**	0.192**	0.008**	0.008*
	(1.91)	(-1.92)	(2.21)	(2.15)	(2.28)	(1.85)
Competitor CAR	0.016*	-0.010*	0.192**	0.221**	0.007*	0.005*
	(1.81)	(-1.88)	(2.25)	(2.11)	(1.82)	(1.79)
Post	0.011	0.007	0.117**	0.102**	0.006*	0.004*
	(1.40)	(1.15)	(2.03)	(2.11)	(1.90)	(1.83)
Business Partner CAR * Post	0.019***	-0.013**	0.191***	0.178***	0.007***	0.006**
	(2.60)	(-2.50)	(2.72)	(2.59)	(2.71)	(2.55)
Competitor CAR * Post	0.013**	-0.012*	0.120**	0.125**	0.004*	0.004**
	(2.22)	(-1.82)	(2.19)	(2.36)	(1.82)	(2.12)
Firm Size	-0.015	0.006	-0.202	-0.076	0.011	0.010
	(-1.09)	(0.77)	(-1.20)	(-0.95)	(1.26)	(1.21)
Past Return	0.111	-0.072	1.782	1.883	0.022	0.011
	(1.17)	(-0.80)	(1.20)	(1.51)	(1.20)	(0.79)
FREV	0.060	0.035	0.832*	0.572*	0.011*	0.011*
	(1.31)	(1.42)	(1.77)	(1.88)	(1.82)	(1.90)
Book-to-Market	0.011	0.042	0.312	0.627	0.005	0.012
	(0.49)	(1.15)	(1.55)	(1.30)	(1.02)	(0.70)
Total Accruals	0.290*	0.149**	0.930*	2.109*	0.085*	0.072*
	(1.90)	(2.11)	(1.92)	(1.88)	(1.88)	(1.82)
E/P	-0.111	0.129	-1.267	-1.732	0.068	0.055
	(-0.95)	(0.75)	(-0.66)	(-1.20)	(1.25)	(1.19)
Turnover	-0.028	-0.016	-0.242	-0.222	-0.004	-0.007
	(-1.30)	(-1.46)	(-1.51)	(-1.46)	(-1.25)	(-1.31)
Sales Growth	0.251	0.130	1.437	0.509	0.082	0.028
	(1.38)	(1.40)	(1.50)	(1.50)	(1.30)	(1.33)
LTG	-0.001	-0.003*	-0.009	-0.012	-0.002	-0.002
	(-0.60)	(-1.90)	(-1.29)	(-1.31)	(-0.87)	(-0.66)
Momentum	-0.072	0.074	-0.660	-0.801	-0.030	-0.022
	(-0.78)	(1.11)	(-0.90)	(-1.22)	(-0.99)	(-1.35)
MISP	0.002	0.002	0.024	0.029	0.002	0.003
	(1.02)	(1.28)	(1.22)	(1.36)	(1.06)	(1.45)
Firm Size Source	0.010	-0.005	0.121	0.080	0.003	0.003
	(1.15)	(-1.22)	(0.81)	(1.05)	(0.99)	(1.02)

Past Return Source	-0.032	0.034	-0.378	-0.241	-0.009	-0.010
	(-1.20)	(1.26)	(-1.28)	(-1.50)	(-1.21)	(-1.36)
FREV Source	0.020	-0.019	0.225	0.220	0.008	0.006
	(1.26)	(-1.26)	(1.26)	(1.35)	(1.39)	(0.97)
Book-to-Market Source	-0.027	-0.039	-0.337	-0.556	-0.008	-0.010
	(-1.11)	(-1.20)	(-1.02)	(-1.28)	(-1.33)	(-1.21)
Total Accruals Source	0.026	0.049	0.115	0.326	0.005	0.007
	(0.89)	(0.90)	(0.69)	(0.88)	(0.87)	(1.11)
E/P Source	0.071	-0.104	1.255*	1.828*	0.025	0.024
	(1.42)	(-1.41)	(1.90)	(1.92)	(1.50)	(1.42)
Turnover Source	0.022	0.012	0.302	0.126	0.011	0.005
	(0.30)	(0.85)	(0.90)	(1.20)	(0.82)	(1.25)
Sales Growth Source	0.160	-0.020	1.298	0.678	0.062	0.055
	(0.99)	(-0.91)	(1.00)	(1.33)	(0.92)	(1.01)
LTG Source	-0.003*	0.006*	-0.022*	-0.015**	-0.002	-0.002
	(-1.80)	(1.91)	(-1.77)	(-2.01)	(-1.25)	(-1.52)
Momentum Source	0.053	-0.062	0.778	0.764	0.023	0.022
	(1.22)	(-1.35)	(1.50)	(1.20)	(1.18)	(1.20)
MISP Source	0.003	0.002	0.025	0.032	0.003	0.003
	(1.22)	(1.05)	(1.33)	(1.50)	(1.07)	(1.03)
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	220	305	519	742	582	720
Adjusted R^2	0.180	0.171	0.179	0.158	0.146	0.139

Table 6. IDD Legal Case Shock and Shadow Trading

This table presents coefficients from regressions examining whether the association between informed trading in a linked firm before a source firm earnings announcement news event and the magnitude of the market reaction to the source firm's news event is affected when source firms are located in state that experiences a change to the inevitable disclosure doctrine (IDD) by state courts. The IDD affects the ability of corporate insiders with knowledge of the firm's trade secrets to obtain employments with competitors. A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is one of two proxies of informed trading: (1) *Option/Stock Ratio*, or (2) *Order Imbalance*. The primary independent variables, *Business Partner CAR* and *Competitor CAR*, are the absolute value of the source firm's cumulative abnormal return (CAR) between day *t*-1 and *t*+1 where *t* is the source firm's news event date. *IDDShock* is an indicator variable. For source firms headquartered in states that adopt (reject) the IDD, *IDDShock* is set to zero (one) before the IDD shock and set to one (zero) following the adoption (rejection) of the IDD. We partition samples based on whether the CAR is negative or positive. We define all variables in the appendix. Standard errors are clustered by firm and year, and we report *t*-values in parentheses. All specifications include year and Fama-French 48 industry fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Linked Firm *Option/Stock Ratio*		Linked Firm *Order Imbalance*	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)
Business Partner CAR	0.456**	0.432**	0.008**	0.005*
	(2.25)	(2.11)	(2.20)	(1.80)
Competitor CAR	0.410**	0.401*	0.006*	0.005*
	(2.15)	(1.89)	(1.85)	(1.82)
IDDShock	0.111**	0.121**	0.005*	0.005*
	(1.99)	(2.20)	(1.89)	(1.86)
Business Partner CAR * IDD Shock	0.257***	0.222**	0.005**	0.005**
	(2.72)	(2.27)	(2.16)	(2.52)
Competitor CAR * IDD Shock	0.202**	0.198**	0.004*	0.004*
	(2.21)	(1.99)	(1.87)	(1.79)
Firm Size	-0.289	-0.092	0.009	0.010
	(-1.24)	(-1.11)	(1.02)	(1.35)
Past Return	2.190	1.755	0.017	0.015
	(1.31)	(1.33)	(0.79)	(0.89)
FREV	0.896*	0.511*	0.011*	0.010*
	(1.88)	(1.90)	(1.78)	(1.92)
Book-to-Market	0.303	0.656	0.007	0.012
	(1.30)	(1.23)	(0.78)	(0.35)
Total Accruals	1.190*	2.109*	0.075*	0.052
	(1.77)	(1.86)	(1.80)	(1.46)
E/P	-1.782	-2.229	0.053	0.049
	(-0.86)	(-1.50)	(0.82)	(0.95)
Turnover	-0.260	-0.178	-0.005	-0.006
	(-1.42)	(-1.22)	(-1.46)	(-1.32)
Sales Growth	2.001	0.821*	0.076	0.026
	(1.57)	(1.88)	(1.20)	(1.50)
LTG	-0.011	-0.023*	-0.001	-0.001
	(-1.09)	(-1.88)	(-0.50)	(-0.33)
Momentum	-1.156	-0.882	-0.031	-0.022
	(-1.02)	(-1.20)	(-1.01)	(-1.35)
MISP	0.030	0.021	0.002	0.003
	(1.18)	(1.15)	(1.44)	(1.56)
Firm Size Source	0.171	0.083	0.003	0.003
	(1.25)	(1.36)	(1.02)	(1.40)
Past Return Source	-0.515*	-0.392*	-0.008	-0.013*
	(-1.70)	(-1.78)	(-1.36)	(-1.84)
FREV Source	0.366*	0.266	0.007	0.004
	(1.77)	(1.32)	(1.25)	(0.89)
Book-to-Market Source	-0.300	-0.535	-0.006	-0.010
	(-1.00)	(-1.23)	(-0.99)	(-1.30)

Total Accruals Source	0.335	0.702	0.005	0.011
	(0.90)	(1.35)	(1.22)	(1.23)
E/P Source	1.023	1.522	0.025	0.020
	(1.33)	(1.60)	(1.48)	(1.24)
Turnover Source	0.367	0.144	0.011	0.003
	(0.60)	(0.90)	(0.72)	(0.78)
Sales Growth Source	1.892	0.356	0.062	0.023
	(1.02)	(1.27)	(0.85)	(1.50)
LTG Source	-0.022*	-0.013*	-0.001	-0.001
	(-1.71)	(-1.92)	(-0.50)	(-0.66)
Momentum Source	1.132	0.923	0.020	0.021
	(1.55)	(1.40)	(0.92)	(1.00)
MISP Source	0.030	0.026	0.002	0.002
	(1.43)	(1.47)	(0.83)	(0.82)
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,422	1,682	1,556	1,726
Adjusted R^2	0.140	0.125	0.114	0.115

Table 7. Source Firm Policies on Shadow Trading

This table presents coefficients from regressions examining whether the association between informed trading in a linked firm before a source firm earnings announcement news event and the magnitude of the market reaction to the source firm's news event varies for source firm with and without corporate policies against shadow trading. A source firm is a company from which private information emerges, and a linked firm is a stakeholder for which the private information could be price-relevant. Source firms are either business partners or competitors of linked firms. The dependent variable is one of two proxies of informed trading: (1) *Option/Stock Ratio*, or (2) *Order Imbalance*. *Business Partner CAR* and *Competitor CAR*, are the absolute value of the source firm's cumulative abnormal return (CAR) between day t-1 and t+1 where t is the source firm's news event date. *Prohibit* is an indicator variable set to one if the source firm has a policy prohibiting its employees from engaging in shadow trading, and set to zero otherwise. We partition samples based on whether the CAR is negative or positive. We define all variables in the appendix. Standard errors are clustered by firm and year, and we report *t*-values in parentheses. All specifications include year and Fama-French 48 industry fixed effects. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Linked Firm *Abnormal Short Sales*		Linked Firm *Option/Stock Ratio*		Linked Firm *Order Imbalance*	
	Negative CAR	Positive CAR	Negative CAR	Positive CAR	Negative CAR	Positive CAR
	(1)	(2)	(3)	(4)	(5)	(6)
Prohibit	-0.013**	0.009*	-0.723**	-0.432**	-0.006**	-0.005*
	(-2.16)	(1.90)	(-2.23)	(-2.28)	(-2.22)	(-1.88)
Business Partner CAR	0.020**	-0.009*	0.660*	0.609**	0.011*	0.004*
	(2.23)	(-1.76)	(1.90)	(2.11)	(1.88)	(1.83)
Business Partner CAR * Prohibit	-0.025**	0.018**	-0.834**	-0.562**	-0.011**	-0.005**
	(-2.23)	(2.45)	(2.34)	(-2.39)	(-2.19)	(-2.28)
Competitor CAR	0.017*	-0.010*	0.670**	0.449*	0.008*	0.005**
	(1.89)	(-1.88)	(2.11)	(1.91)	(1.80)	(2.09)
Competitor CAR * Prohibit	-0.015*	0.009*	0.478*	0.423*	0.010*	0.003*
	(-1.82)	(1.85)	(1.70)	(1.88)	(1.75)	(1.82)
Firm Size	-0.020	0.011	-0.278	-0.082	0.011	0.010
	(-1.25)	(0.67)	(-1.20)	(-0.90)	(1.02)	(1.29)
Past Return	0.126	-0.090	2.172	1.562	0.020	0.015
	(1.25)	(-0.90)	(1.22)	(1.22)	(0.72)	(0.79)
FREV	0.060	0.037	0.982*	0.545*	0.015*	0.013**
	(1.39)	(1.50)	(1.81)	(1.82)	(1.82)	(2.25)
Book-to-Market	0.015	0.040	0.262	0.711	0.005	0.015
	(0.40)	(0.92)	(1.20)	(1.40)	(0.79)	(0.20)
Total Accruals	0.322*	0.150*	1.119*	2.182*	0.082*	0.051
	(1.88)	(1.92)	(1.89)	(1.81)	(1.77)	(1.51)
E/P	-0.110	0.123	-1.878	-2.276	0.052	0.049
	(-0.50)	(0.72)	(-0.93)	(-1.60)	(0.76)	(0.95)
Turnover	-0.023	-0.012	-0.287	-0.221	-0.005	-0.007
	(-1.10)	(-1.50)	(-1.43)	(-1.50)	(-1.45)	(-1.32)
Sales Growth	0.323	0.160	2.092*	0.825*	0.082	0.020
	(1.50)	(1.30)	(1.69)	(1.92)	(1.21)	(1.30)
LTG	-0.001	-0.003**	-0.016	-0.019*	-0.001	-0.001
	(-0.62)	(-2.00)	(-1.49)	(-1.77)	(-0.40)	(-0.22)
Momentum	-0.089	0.082	-1.012	-0.967	-0.027	-0.017
	(-0.82)	(1.20)	(-1.11)	(-1.35)	(-0.82)	(-1.28)
MISP	0.002	0.002	0.022	0.028	0.002	0.003
	(1.11)	(1.42)	(1.10)	(1.25)	(1.48)	(1.50)
Firm Size Source	0.010	-0.005	0.166	0.082	0.004	0.002
	(1.16)	(-1.33)	(1.20)	(1.33)	(1.30)	(1.30)
Past Return Source	-0.032	0.041	-0.540*	-0.332	-0.010	-0.011*
	(-1.25)	(1.46)	(-1.78)	(-1.59)	(-1.52)	(-1.72)
FREV Source	0.020	-0.018	0.387*	0.250	0.008	0.005
	(1.40)	(-1.12)	(1.88)	(1.32)	(1.38)	(0.88)

Book-to-Market Source	-0.020	-0.044	-0.309	-0.532	-0.005	-0.008
	(-0.99)	(-1.34)	(-1.20)	(-0.72)	(-0.91)	(-1.11)
Total Accruals Source	0.020	0.056	0.310	0.756	0.006	0.013
	(0.77)	(0.89)	(0.72)	(1.39)	(1.30)	(1.50)
E/P Source	0.072	-0.101	1.002	1.578*	0.028	-0.031
	(1.30)	(-1.25)	(1.35)	(1.82)	(1.50)	(-1.50)
Turnover Source	0.021	0.013	0.402	0.133	0.015	0.004
	(0.20)	(0.87)	(0.78)	(0.87)	(0.80)	(0.99)
Sales Growth Source	0.137	-0.027	2.190	0.335	0.056	0.017
	(0.89)	(-1.32)	(1.21)	(1.56)	(0.80)	(1.22)
LTG Source	-0.002*	0.006*	-0.022*	-0.013*	-0.001	0.002
	(-1.82)	(1.72)	(-1.76)	(-1.92)	(-0.66)	(1.31)
Momentum Source	0.052	-0.069	1.120	1.293	0.023	0.020
	(1.45)	(-1.55)	(1.50)	(1.55)	(1.22)	(1.01)
MISP Source	0.004	0.002	0.032	0.028	0.002	0.002
	(1.40)	(1.21)	(1.32)	(1.50)	(0.85)	(0.85)
Year & Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	586	611	674	1,192	1,258	2,164
Adjusted R^2	0.230	0.321	0.151	0.139	0.118	0.120