

# Insider Trading in Takeover Targets

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Comments welcome

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## Abstract

Takeover announcements typically result in large increases in stock prices of target firms, providing a tempting opportunity for insider trading. Surprisingly, no prior study has examined whether the level and pattern of profitable insider trading before takeover announcements is abnormal for a broad cross-section of targets of takeovers during modern times. This paper brings large-sample evidence on this issue in an attempt to fill this gap in the literature. We examine insider trading in about 3,700 targets of takeovers announced during 1988-2006. We analyze open-market purchases, sales and net purchases of five groups of corporate insiders during the one year pre-takeover period. Using cross-sectional and time-series control samples, the paper estimates difference-in-differences regressions of several measures of the level of insider trading that control for its other determinants. We find an interesting and subtle pattern in the average pre-takeover trading behavior of target insiders. While insiders reduce both their purchases and sales below normal levels, their sales reduce more than purchases, leading to an increase in net purchases. This pattern of 'passive' insider trading is confined to the six-month period before takeover announcement, holds for each insider group, for all three measures of net purchases examined, and in certain subsamples with less uncertainty about takeover completion, such as deals with a single bidder, domestic acquirer, and less regulated target. Our findings suggest that target insiders engage in profitable passive, though not active, insider trading before deal announcement.

JEL classification: G14, G18, G34, K22

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# Insider Trading in Takeover Targets

## 1. Introduction

In August 2006, the *New York Times* reported that securities of over 40 percent of the companies receiving buyout bids exhibited suspicious trading in the weeks before the deals became public (see Morgenson (2006)). Shortly after that, the Senate Judiciary Committee held a hearing on insider trading where Chairman Arlen Specter said, “I’m interested in indictments, even more interested in convictions, and most interested in jail sentences.”<sup>1</sup> U.S. Securities and Exchange Commission (SEC) is responsible for enforcing insider trading laws. U.S. securities rules (section 10(b) of the Securities Exchange Act of 1934 (SEA) and SEC rule 10(b)-5) prohibit trades based on material, non-public information. Subsequent court rulings, such as U.S. Supreme Court (1969, 1980), have buttressed these rules. Insider trading rules have been strengthened by the Insider Trading Sanctions Act of 1984 (ITSA), which imposes monetary penalties of up to three times the illegal profits made or losses avoided by insiders. The sanctions have been further increased by the Insider Trading and Securities Fraud Enforcement Act of 1988 (ITSFEA). In insider trading cases that involve obstruction of justice, fraud, recidivism or egregious misconduct, the SEC may seek even harsher punishment, including incarceration.<sup>2</sup> In addition to penalties imposed by law, offenders face potential loss of reputational capital.

In Congressional hearings on “Improper Activities of the Securities Industry” held on April 22, 1987, Edward Markey, then chairman of the House Telecommunications and Finance Subcommittee, stated: “In our current economic environment, corporate takeovers regularly provide a catalyst for insider trading.” During 2001-2006, the SEC brought more than 300 cases against over 600 individuals and entities for insider trading

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<sup>1</sup> Transcript of Panel I of the Hearing of the Senate Judiciary Committee on “Illegal Insider Trading: How Widespread Is The Problem And Is There Adequate Criminal Enforcement?”, September 26, 2006.

<sup>2</sup> See Seyhun (1992) and Bainbridge (1999) for excellent discussions of insider trading regulations and their enforcement.

violations.<sup>3</sup> A sizeable chunk of these cases is related to mergers, and many of the cases involve target firms' insiders. Thus, prevention of insider trading in takeover targets is a particular focus of regulatory efforts against insider trading. This regulatory focus on takeovers is driven by the fact that a great deal of insider trading takes place around takeovers.<sup>4</sup>

This paper provides systematic evidence on the level, pattern and prevalence of insider trading before takeovers during 1988-2006. This issue is important for at least five reasons. First, any corporate event that results in large changes in stock prices provides insiders with an opportunity either to make profits or to avoid losses by trading before public announcements of the events. Prior studies examine insider trading before a number of important corporate events such as announcements of dividend initiations, bankruptcies, earnings, and earnings restatements.<sup>5</sup> Since takeover announcements usually result in large increases in stock prices of target firms, target insiders have a strong incentive to trade on private knowledge of a forthcoming deal. While a number of prior studies (reviewed in section 3 below) have examined insider trading before takeovers, surprisingly, no prior study has examined whether the level and pattern of profitable insider trading before takeover announcements (i.e., increase in purchases or decrease in sales) is abnormal for a broad cross-section of targets of takeovers during modern times. This paper aims at filling this gap in the literature and provides large-sample evidence on this issue.

Second, stock market participants want to know if insider trading is widespread because it affects investors' willingness to trade, and consequently affects the liquidity of the stock (see Ausubel (1990)). Third, measuring the prevalence of insider trading is of interest to policy makers and regulators concerned with the effectiveness of existing insider trading regulations. Fourth, recent high-profile corporate scandals such as Enron, Worldcom and HealthSouth, and the consequent adoption of tough governance rules

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<sup>3</sup> Testimony by Linda C. Thomsen, Director, Division of Enforcement, U.S. Securities & Exchange Commission, before the U.S. Senate Committee on the Judiciary concerning insider trading, September 26, 2006.

<sup>4</sup> E.g., Meulbroek (1992, p.1669) reports that about 80% of the illegal insider trading episodes in her sample during 1980-1989 are related to corporate control transactions.

<sup>5</sup> See, e.g., John and Lang (1991), Seyhun and Bradley (1997), Huddart, Ke and Shi (2007), and Agrawal and Cooper (2008).

under the Sarbanes-Oxley Act and under listing requirements of the NYSE, Nasdaq and AMEX have focused investor, media and regulators' attention on the activities of insiders. This raises the question whether insiders change their trading behavior in response to greater scrutiny of their activities. Finally, large waves of takeovers in recent years provide an opportunity to analyze the behavior of insiders before this major corporate event.

We examine the level and pattern of insider trading in about 3,700 targets of takeovers announced during 1988-2006 and in two control samples: a cross-sectional control sample and a time-series control sample. We analyze open-market stock transactions of five groups of corporate insiders: top management, top financial officers, all corporate officers, board members, and large blockholders. We separately examine their purchases, sales and net purchases in target and control firms during the one year period prior to takeover announcement (takeover period) and the preceding one year (control) period, using a difference-in-differences approach. Using several measures of the level of insider trading, we estimate cross-sectional regressions that control for other determinants of the level of insider trading.

We find an interesting pattern in the average trading behavior of target insiders over the one year period before takeover announcement. While insiders reduce both their purchases and sales below their normal levels, the reduction in sales exceeds the reduction in purchases, resulting in an increase in their net purchases. This pattern is confined to the six-month period before takeover announcement; it holds for each insider group, and for all three measures of net purchases that we examine. We find a consistent pattern of statistically significant increases in insiders' net purchases relative to the dual control in certain sub-samples with less uncertainty about takeover completion, such as deals with a single bidder, domestic acquirer, and less regulated target. The pattern of significant increases in insiders' net purchases is also more evident in deals completed after 1995, in deals involving large targets and in targets traded on more prominent stock markets, namely NYSE and Nasdaq.

The rest of the paper is organized as follows. Section 2 analyzes insiders' trading decision. Section 3 briefly reviews prior studies on insider trading before takeovers. Section 4 describes our sample, data and the stock price reaction to takeover

announcements. Sections 5 and 6 present our results for the full sample and for a number of sub-samples, respectively. Section 7 concludes.

## **2. Insiders' trading decision**

How can target insiders trade profitably during the period of takeover negotiations, before a takeover is publicly announced? There are two possibilities. First, insiders can increase their purchases to profit from the stock price increase upon the announcement. We call this active insider trading. Second, insiders can increase their net stock purchases (= purchases - sales) by postponing their planned sales until after the announcement, even though their actual purchases may not increase. We call this passive insider trading. While takeover talks provide a tempting opportunity to target insiders for active insider trading, such trading is prohibited by insider trading laws. On the contrary, there is no rule against passive insider trading. We consider both possibilities by separately examining insiders' purchases, sales and net purchases. While it is generally difficult to know, even ex-post, when target insiders first learned about a takeover attempt or when takeover talks were first initiated, such talks typically precede takeover announcements by several months with a large cross-sectional variation in the length of this period (see Sanders and Zdanovicz (1992)). Therefore, we follow previous studies (see, e.g., Agrawal and Jaffe (1995)) and consider the 12-month period preceding takeover announcements as the period when insiders may have private information about an upcoming takeover of the firm.

What is the trade-off an insider faces when deciding whether to buy stock while in possession of non-public information about an upcoming takeover? An extensive literature in finance finds that takeover announcements typically result in large increases in target stock prices (for reviews of this literature, see Jensen and Ruback (1983), Jarrell, Brickley and Netter (1988), Andrade, Mitchell and Stafford (2001), and Kaplan and Holmstrom (2001)). So an insider's benefit from buying equals the potential profit to be made by selling his stockholdings after the takeover announcement. An insider's cost of buying stock before a takeover announcement consists of three components. First, he stands to lose his job or directorship with the company. Second, he risks damaging his

reputation and faces a reduction in future career prospects. Third, he faces possible civil and criminal penalties under insider trading laws.

Given the costs and benefits that insiders face when trading on material, non-public information about an upcoming takeover, what do insiders typically do? While there are well-publicized episodes involving certain insiders who traded before takeover announcements, how widespread is such insider trading? This paper provides systematic, large-sample evidence on these questions. Our findings shed light on insiders' expected net benefits from buying before a takeover announcement.

We examine trades by several groups of insiders. These include top management, top financial officers, other corporate officers, directors, and blockholders. Are all of these groups likely to be equally informed about an upcoming takeover? We do not believe so. One would expect the first, second and the fourth groups to have greater knowledge of the takeover. But the other two groups also are sufficiently close to the firm that they may become aware of it. We account for the possibility of differential information of these groups by examining their trades separately.

### **3. Prior studies on insider trading before takeovers**

Several papers examine the level of insider trading in takeover targets to assess the effectiveness of insider trading regulations. Arshadi and Eysell (1991) test the effectiveness of ITSA, adopted in 1984, by examining levels of insider trading in tender offer targets pre- and post-ITSA. In a sample of 330 tender offer targets during 1975-87, they find that over the 40-week pre-announcement period, insiders change from being net buyers pre-ITSA to being net sellers post-ITSA.

Seyhun (1992) provides a broad-ranging analysis of the effectiveness of tougher rules and greater enforcement of insider trading regulations by the SEC during the 1980s. He examines the profitability and volume of insider trading in general, and the level and pattern of insider trading before earnings announcements and insider trading in target firms before takeover announcements during three regulatory eras during 1975-1989. He finds that the level of target insiders' net purchases before takeover announcements reduces post-ITSA compared to prior periods. Given its coverage of a wide range of issues, the paper has only one table (Table 10) on insider trading before takeover

announcements that analyzes net purchases by insiders. Since the purpose of both these papers is to compare the level of insider trading during different regulatory regimes, they have no control sample for takeover targets. So these papers do not address the question of whether the level of profitable insider trading in targets before takeover announcements (i.e., increase in purchases or reduction in sales) was abnormal.

Agrawal and Jaffe (1995) examine the deterrent effect of the ‘short-swing’ trading rule (section 16b of the SEA) on trading by top managers (i.e., officer-directors) in takeover targets during 1941-1961. Their sample predates the Cady, Roberts decision in November 1961, which was the first insider trading case where the SEC enforced rule 10b-5 against stock exchange transactions.<sup>6</sup> They find that managers reduce their purchases significantly before takeover announcements relative to both cross-sectional and time-series benchmarks, but their sales do not decrease.

Two studies examine insider trading in specialized groups of takeover targets using time-series benchmarks. Harlow and Howe (1993) analyze a sample of 121 leveraged buyouts (LBOs) announced during 1980-1989. They find an increase in the aggregate number of net insiders buying (= number buying – number selling) over the year preceding the announcement for management-led buyouts, but not for other buyouts. Madison, Roth and Saporoschenko (2004) examine a sample of 111 target firms in bank mergers during 1991-1997. They find that insiders reduce their purchases as well as sales in the two months prior to merger announcements. None of these studies examines whether the level and pattern of profitable insider trading before takeover announcements (i.e., increase in purchases or reduction in sales) is abnormal for a broad cross-section of targets of takeovers during modern times, a task that we tackle in this paper.

In addition, several papers examine insider trading in acquiring firms (see, e.g., Seyhun (1990), Boehmer and Netter (1997), Akbulut (2005), and Song (2007)). In contrast to most of the literature on insider trading that analyzes trades reported to the SEC by registered corporate insiders, Meulbroek (1992) analyzes a sample of illegal insider trades prosecuted by the SEC during 1974-1989, about 80% of which are related to takeovers. She finds that almost one-half of the pre-announcement stock price run-up

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<sup>6</sup> See Columbia Law Review (1962), Hines (1963) and Manne (1966). Before this case, the SEC’s view was that insider trading in stock exchange transactions is a ‘victimless crime’.



in takeover targets occurs on insider trading days. Other papers indirectly examine the prevalence of illegal insider trading by examining abnormal stock returns and trading volume prior to takeover announcements (see, e.g., Keown and Pinkerton (1981), Jarrell and Poulsen (1989) and Sanders and Zdanowicz (1992)).

## **4. Sample and data**

Section 4.1 details our sample selection procedure and describes the sample of takeover target firms. Section 4.2 deals with the selection of our cross-sectional control sample and compares the target and control samples. Sections 4.3 and 4.4 describe our time-series control samples and insider trading data, respectively. Section 4.5 describes the stock-price reactions to the full sample of takeover announcements and a number of sub-samples.

### **4.1 Sample of takeover targets**

We obtain our initial sample of target firms in completed or partially completed takeovers announced during 1988-2006 from the SDC database.<sup>7,8</sup> We require each acquisition to have a deal value of at least \$1 million, the target firm to be traded on the NYSE, AMEX, or NASDAQ before the acquisition, and exclude transactions that are spin-offs, recapitalizations, self-tenders, exchange offers, repurchases, minority stake purchases, acquisitions of remaining interest, or privatizations. These criteria yield an initial sample of 5,792 takeover transactions.

We apply several screens to obtain the final sample of target firms. Table 1 outlines the sample selection process. We omit 103 repeat acquisitions of a target firm after the initial acquisition. These include a clean-up merger following a partial acquisition, and a resale of a company following its initial sale to another company, management or investor group. We also drop 126 observations consisting of tender offers that sought to buy less than 60 percent of the target's outstanding equity. Since we need

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<sup>7</sup>Our sample begins with takeovers announced in 1988 because we need two years of insider trading data before a takeover announcement and insider trading data in TFN Insider database starts from 1986.

<sup>8</sup>The SDC database was accessed in November 2007.

insider trading data from TFN Insider database and control variables constructed using financial and stock price data from Compustat and CRSP, we eliminate firms that are not listed, or have incomplete coverage, in these databases. A total of 689 firms are not listed, and an additional 557 firms have incomplete coverage, on Compustat during the two-year period before the takeover announcement. An additional 223 firms are not listed on CRSP. We omit 165 firms with CRSP share code other than 10, 11, or 12; these are American Depository Receipts, units, exchange-traded funds, real estate investment trusts, or closed-end funds. We exclude an additional 152 firms with incomplete coverage on CRSP. Finally, we drop 58 firms that are not listed in the TFN Insider database. This yields our final sample of 3,701 target firms.

Table 2 presents the distributions of the sample by the year of takeover announcement (in Panel A) and by industry (in Panel B), and shows the mean and median deal values for each group. The industry distribution is based on a firm's 2-digit primary SIC code reported in SDC, and uses the industry classification in Song and Walkling (1993). The deal values are obtained from SDC. All dollar values throughout the paper are in inflation-adjusted year 2000 dollars. Panel A shows that except during 1990-93, the sample includes over 100 takeovers in each year. After 1994, there are about 200 or more takeovers in each year except 2002. The mean (median) deal value is \$1,448 million (\$227 million). Panel B shows that the sample is distributed over a wide range of industries. Industries with the largest number of takeovers are finance and services, and industries with the fewest takeovers are public administration and agriculture.

## **4.2 Cross-sectional control sample**

We match each target firm with a control firm from its 2-digit Compustat primary SIC industry that has the smallest percentage difference in total assets at the end of fiscal year  $-2$ , relative to the fiscal year in which the takeover announcement occurs (year 0). The pool of potential control firms excludes target firms, and is required to have CRSP share codes 10, 11 or 12 and complete Compustat and CRSP data needed for the study. A control firm matched with a given target firm in a takeover announced during fiscal year  $t$  is taken out of the pool of potential control firms for other target firms during fiscal years  $t-2$  to  $t+2$ .

Table 3 shows descriptive statistics of our samples. Panel A reports mean and median values of financial and operating characteristics for our sample of 3,701 matched-pairs of target and control firms. The table also reports p-values of two-tailed t-tests for differences in means and two-tailed Wilcoxon tests for differences in distributions. All dollar values in the paper are in inflation-adjusted 2000 dollars. The typical target firm in the sample is relatively small, with a median market capitalization (total assets) of \$136 million (\$240 million), although the sample includes some very large firms, as indicated by substantially larger mean values. The median daily stock volatility in target (control) firm is about 3.1% (3.0%). Target and control firms have similar median operating performance (measured as operating income before depreciation to total assets) over the two years before the takeover announcement, although targets under-perform the control firms somewhat in year -3. Both target and control firms have moderate financial leverage, with median ratios of long-term debt to total assets of about 11% and 10%, respectively.

### **4.3 Time-series control sample**

We compare the levels of insider trading in target and control firms during the pre-takeover period to their levels during the control period. The ‘pre-takeover period’ is the one-year period before a takeover announcement, and ‘control period’ is the year before that. We focus on insider trading *before* takeover announcements because insiders clearly have an information advantage over outsiders during this period, and they can mask their trades by timing them sufficiently before the public announcement. We do not examine insider trading *after* the takeover announcement because insiders’ actions are under a spotlight during that period. So while insiders may still have an information advantage over outsiders as the details of the takeover are worked out between the target and acquiring firms, insiders are unlikely to trade on the basis of this information. As discussed in section 2 above, we choose a one-year period before the announcement to examine possibly informed trading because takeover talks typically appear to begin about three to six months before the first public announcement of a takeover, with substantial cross-sectional variation in the length of this interval (see Sanders and Zdanovicz (1992)). While systematic, reliable data on the beginning date of takeover talks is

publicly unavailable even ex-post, we find that most of the abnormal insider trading is concentrated over the six months before takeover announcement.

#### 4.4 Insider trading data

We obtain data on insider trading from the Thomson Financial Insider Filing Data Files (hereafter, TFN). TFN reports ownership, insider transactions and changes in ownership that insiders report on Forms 3, 4, and 5 filed with the SEC.<sup>9</sup> For each target and control firm, we obtain data on insiders' open-market purchases and sales during the pre-takeover and control periods.<sup>10</sup>

Panel B of Table 3 shows the mean and median number of insiders in each of our five insider groups. These statistics are based on matched-pairs of target and control firms with non-zero number of insiders. Data on the number of insiders is based on all transactions or holdings reported by insiders during the two-year period prior to the takeover announcement date. The *top management* group consists of Chairman, Chief Executive Officer (CEO), Chief Operating Officer (COO), and President. *Top financial officers* are Chief Financial Officer (CFO), Controller and Treasurer. *All officers* are all corporate officers defined by the SEC under section 16a of the Securities Exchange Act of 1934.<sup>11</sup> *All directors* are all members of the board of directors. *Blockholders* are beneficial owners of 10% or more of any class of equity securities of a firm. The panel also shows the numbers of target, control, and matched pairs of firms with non-zero number of insiders. The median number of individuals in the top management group in target (control) firms is 2 (3); the corresponding number is 1 (1) for top financial officers, 5 (5) for all officers, 6 (6) for all directors, and 2 (2) for 10% blockholders. The small

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<sup>9</sup>Most insider transactions are reported on Form 4. Form 3 is the initial statement of beneficial ownership that insiders must file. Form 5 is an annual statement of changes in beneficial ownership and contains activity from small or exempt transactions that are not reported on Form 4.

<sup>10</sup>We review the TFN database for obvious coding and transposition errors and make corrections where appropriate. We delete filings marked as inaccurate or incomplete by TFN (labeled via cleanse indicators 'S' or 'A'). We also remove transactions that are amended by subsequent filings, and transactions involving shares indirectly owned by insiders via a partnership, corporation, trust or other entity.

<sup>11</sup>This group includes top management, principal financial officer, principal accounting officer, vice presidents in charge of principal business units, divisions or functions, and any other person who performs a policy-making function for the company.

numbers of officers and directors and the large numbers of blockholders are consistent with the relatively small size of the typical firm in both samples.

Panel C shows mean and median values of four different measures of the latest shareholdings reported by insiders of matched target and control firm pairs during the one year period prior to takeover announcement, for each of the five insider groups. We define *# insiders* as the number of individuals within the insider group that reported shareholdings, and *# shares* (*\$ shares*) [*% equity*] as total insider shareholdings expressed in thousands of shares (in thousands of dollars) [as a percentage of shares outstanding]. The median shareholding by top management is \$545 (\$602) thousand in target (control) firms. The corresponding shareholding is \$643 (\$722) thousand for all officers, and \$1,621 (\$1,760) for all directors. Mean values of shareholdings are substantially higher (by orders of magnitude) than median values, indicating that the distribution of ownership data is highly skewed, with some insider groups having extremely large holdings.

#### 4.5 Stock price reaction

We next examine the stock-price reaction to takeover announcements for our full-sample of target firms, as well as a number of sub-samples. For comparison, as well as to examine potential contagion effects, we also present corresponding reactions for the control sample of non-targets. We compute the abnormal return for stock *i* on day *t* as:

$$e_{it} = r_{it} - r_{mt}, \quad (1)$$

where  $r_i$  and  $r_m$  are the stock returns for firm *i* and the market, respectively. The market return is defined as the return on the equal-weighted CRSP (i.e., NYSE, AMEX and Nasdaq) stock index. We measure the cumulative abnormal return for firm *i* over days ( $t_1$ ,  $t_2$ ) as:

$$CAR_{t_1, t_2}^i = \sum_{t=t_1}^{t_2} e_{it}. \quad (2)$$

We compute t-statistics for mean CARs after adjusting for cross-sectional dependence, as in Brown and Warner (1985), and use the two-tailed Wilcoxon test for assessing the significance of median CARs.

The first two rows of Table 4 show the mean and median values of CARs for our full samples of target and control firms over four windows covering trading days (-40, +10), (-20, +5), (-10, +1), and (-5, +1) around the takeover announcement date (day 0). Consistent with prior research (see, e.g., Jensen and Ruback (1983) and Jarrell, Brickley and Netter (1988)), takeover announcements result in large increases in stock prices of target firms. Over the shorter (-5, +1) day window, target firms experience a mean CAR of about 24.2%; over the longer (-40, +10) day window, the mean CAR is 29.23%. The corresponding CARs for control firms are 0.4% and 1.4%, consistent with a contagion effect in the industries of takeover targets found by prior studies (e.g., Song and Walkling (2000)).

The remaining rows of Table 4 present CARs for sub-samples resulting from nine partitions of the target sample. These partitions are based on the method of acquisition, target management's response to the bid, number of bidders, method of payment, bidder domicile, level of regulation of the target firm, time period, target size, and target's exchange listing. Consistent with prior research (see the references cited above), target firms experience greater abnormal returns in tender-offers, hostile bids, cash deals, and cross-border acquisitions. In addition, targets in less regulated industries, targets acquired during 1996-2001, smaller targets and targets listed on Nasdaq or AMEX experience greater abnormal returns. Surprisingly, target abnormal returns are somewhat lower in takeovers with multiple bidders (cf. Bradley, Desai and Kim (1988)).

## **5. Results for the full sample**

Section 5.1 presents univariate results on insider trading in our full sample of takeover targets, and section 5.2 presents cross-sectional regressions that control for other determinants of the level of insider trading found in prior research.

### **5.1 Univariate results**

We start by comparing the level of insider trading in target firms during the one-year pre-takeover period to two sets of controls: contemporaneous trades by insiders of control firms (the cross-sectional control) and trades by target firm insiders during the preceding one-year control period (the time-series control). By examining trades by

insiders of both target and control firms at the same time, the cross-sectional control provides a perfect control for the effect of the time period, but it provides an imperfect control for firm attributes that may affect the level of insider trading. The time-series control emphasizes the opposite trade-off. It provides a perfect control for firm characteristics by using the target firm as its own control, but by comparing insider trades over different periods, it does not control for possible changes in the trading behavior of insiders over time. While each control has its merits and limitations, our main interest is in the dual-control, which equals the abnormal purchases of target firm insiders (i.e., their purchases during the pre-takeover period minus their purchases during the control period) minus the abnormal purchases of control firm insiders (i.e., their purchases during the pre-takeover period minus their purchases during the control period). This difference-in-differences approach controls for both the effects of firm characteristics and the time period.

We present results for insider purchases in section 5.1.1 and insider sales in section 5.1.2. We examine purchases and sales separately because, as discussed in section 2 above, the incentives and penalties faced by insiders differ for the two types of transactions. Of course, what insiders really care about is the net effect of their trading, reflected in their net purchases, which we examine in section 5.1.3.

### **5.1.1 Insider purchases**

Table 5 shows mean and median values of five parametric measures and values of two non-parametric measures of insider purchases for the target and control samples for the pre-takeover and control periods. The ‘pre-takeover period’ is the one year period before the takeover announcement date, and ‘control period’ is the one year period before that. Each panel shows measures of purchases for one of the five groups of insiders defined in section 4.4 above. The parametric measures of insider purchases are: number of insiders buying during a year (denoted ‘# insiders’ in the table), number of shares bought in thousands (‘# shares’), dollar value of shares bought in millions (‘\$ shares’), percentage of outstanding equity bought (‘% equity’), and number of pure buy months, i.e., months with some insider purchases and no insider sales (‘# buy months’). The dollar value of shares traded is computed by multiplying the number of shares traded by the

transaction price reported on TFN. Missing transaction prices are replaced by the closing price or the bid-ask average from CRSP on the transaction date. The percentage of equity traded equals the number of shares traded divided by the number of shares outstanding on the transaction date.

The table reports p-values of the two-tailed t-test for the difference in means and Wilcoxon test for the difference in distributions (shown in rows for medians). The last two rows in each panel show the percentages of firms with at least one or at least two insiders buying shares in a year and p-values of two-tailed z-tests for differences in proportions. Signs of the test statistics are shown in parentheses after p-values. Column 5 (labeled '1 - 2') shows p-values of test statistics for the change in the level of purchases of target firm insiders between the pre-takeover and control periods (i.e., the time-series control); column 6 ('1 - 3') is for differences in the level of insider purchases during the pre-takeover period between target and control firms (i.e., the cross-sectional control); column 7 ('3 - 4') is for the change in the level of purchases of control firm insiders between the pre-takeover and control periods; and column 8 ['(1 - 2) - (3 - 4)'] is for the difference between (1) the change in the level of purchases of target firm insiders between the pre-takeover and control periods and (2) the change in the level of purchases of control firm insiders between the pre-takeover and control periods. While the tests in columns 5 and 6 are certainly pertinent, our focus is on the test in column 8, which uses the dual control or the difference-in-differences approach.

In Panel A of Table 5, the top management group in target firms significantly reduces their purchases during the pre-takeover period. This conclusion holds whether we use the time-series control, the cross-sectional control, or the dual control, and is based on all seven measures of insider purchases. Of the 12 p-values for the dual control shown in column 8, nine are less than .001, one is between .001 and .05, and the remaining two are between .05 and .10. The results are generally similar for the group of all financial officers (in Panel B), all officers (in Panel C), and all directors (in Panel D). While blockholders (in Panel E) also reduce their pre-takeover purchases, only two of the p-values for the dual control are below .05 and another two are below .10. These results are inconsistent with active insider trading based on private negotiations on the takeover. The fact that insiders not only avoid increasing their pre-announcement purchases above their



normal levels, but actually decrease it suggests that they are concerned about being caught by either insider trading laws or company regulations against insider trading.

### **5.1.2 Insider sales**

Table 6 examines insider sales in a format similar to Table 5. Column 8 shows that target insiders reduce their pre-takeover sales significantly compared to their normal levels. This conclusion holds for all five insider groups in Panels A through E, and for all seven measures of the level of insider sales. These results are consistent with passive insider trading. While securities laws and company rules against insider trading can deter insiders from purchasing shares based on inside information about the upcoming takeover, they cannot prevent them from postponing their planned sales.

### **5.1.3 Net purchases**

Table 7 examines the net effect of insiders' purchases and sales. Four of the measures of insider trading (namely # insiders, # buy or sell months, and % of firms with at least one or at least two insiders buying or selling) that we examine in Tables 5 and 6 are no longer well-defined for measuring the level of net purchases. So we examine the remaining three measures (# shares, \$ shares, and % equity). Table 7 provides some evidence that insiders increase their net purchases before the takeover announcement. This conclusion holds for top management, top financial officers and all officers (Panels A through C), and is based on the Wilcoxon test for the dual control in column 8. For the group of all directors and blockholders in Panels D and E, while the signs of the dual control in column 8 are positive for the Wilcoxon test, only one of the three p-values is low (.011) for directors and two of the p-values are low (.046 and .058) for blockholders. While these results provide both a time-series and a cross-sectional control for the level of insider trading, they do not control for other determinants of the level of insider trading, a task that we turn to next.

## 5.2 Cross-sectional regressions

We next estimate cross-sectional regressions that control for other determinants of the level of insider trading. Section 5.2.1 discusses our regression specification. We present the results for insiders' purchases, sales and net purchases in sections 5.2.2 through 5.2.4.

### 5.2.1 Regression specification

We next estimate cross-sectional regressions of the level of insider trading. Each regression includes four observations corresponding to each target firm: two observations for the target firm (for the pre-takeover and control periods) and two for the control firm. The main explanatory variables are Pre-takeover, Target and Pre-takeover\*Target. Pre-takeover is a dummy variable equal to 1 (0) if the insider trading activity occurs during the pre-takeover (control) period. Target is a dummy variable equal to 1 (0) for a target (control) firm. The marginal effects of the first two variables measure the abnormal level of insider trading relative to our time-series and cross-sectional controls, respectively. The marginal effect of the interaction term measures abnormal insider trading relative to our dual control, i.e., it represents the difference-in-differences (DiD) estimate.

The regressions control for other determinants of the level of insider trading found by prior studies, including firm size, the level and change in stock volatility, prior stock returns, stock liquidity, firm valuation, innovation, and insider holdings. Seyhun (1986) finds that insiders at small (large) firms tend to be net buyers (sellers) of their firms' stock. We measure firm size as the natural logarithm of market capitalization, denoted  $\ln(\text{Market cap})$ , defined as the market value of equity as of the second last fiscal year ending prior to a takeover announcement. Meulbroek (2000) finds that managers in more risky companies tend to sell equity more aggressively. We measure risk,  $\sigma$ , as the standard deviation of stock returns over trading days (-250, -126) relative to the beginning of the pre-takeover or control period.<sup>12</sup>

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<sup>12</sup>We require that at least two thirds of the daily stock returns over this period be available on CRSP. We impose the same requirement when calculating the average daily stock returns for a period.

Demsetz and Lehn (1985), Aggarwal and Samwick (1999, 2003), and Jin (2002) show theoretically and empirically that managers' equity holdings are determined by optimal contracting considerations. Their findings imply that changes in equity risk should induce changes in managers' holdings via stock purchases or sales. We measure the change in equity risk,  $\Delta\sigma$ , as the standard deviation of a firm's daily stock returns computed over trading days (-125, -1) relative to the takeover or control period minus  $\sigma$ . Lakonishok and Lee (2001) find that insiders are contrarian investors who buy (sell) stock with poor (good) past performance. We control for prior stock returns using  $PRET_t$  for quarter  $t$ ,  $t = -4$  to  $-1$ .  $PRET_t$  is the market-adjusted average daily prior stock return for a firm for quarter  $t$  (of either the pre-takeover or the control period), where the market return is the equal-weighted CRSP market index return.

Ofek and Yermack (2000) find that executives with large shareholdings sell stock after receiving new equity incentives to diversify their portfolios. We control for the direct shareholdings last reported by insiders during the relevant period. Jenter (2005) finds that insiders tend to be contrarian investors who buy a stock when it is selling at a low valuation, and sell it when it has a high valuation. Book-to-market (B/M) decile is our measure of a firm's valuation ratio relative to other firms. B/M deciles equal 1 through 10 depending on a firm's B/M ratio. NYSE B/M decile breakpoints during the year are used to ascertain a firm's B/M decile in a given year.<sup>13</sup>

Aboody and Lev (2000) argue that research and development (R&D) activities increase the information asymmetry between insiders and outsiders, thereby allowing insiders to reap greater profits on their trades. Their finding implies that insiders will trade more in firms with greater R&D expenses. We divide R&D expense by sales revenue for the fiscal year.  $R\&D/Sales$  equals zero for firms whose R&D expenses are not reported by Compustat. Data for B/M and  $R\&D/Sales$  are for (or at the end of) the fiscal year  $t-2$ , where the takeover announcement occurs during fiscal year  $t$ .

The market microstructure models of Grossman and Stiglitz (1980), Kyle (1985) and Holmstrom and Tirole (1993) imply that informed traders are more likely to trade when stock liquidity is higher due to more trading by uninformed traders. Our regressions

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<sup>13</sup> The NYSE decile breakpoints were obtained from Professor Kenneth French's website: <http://mba.tuck.dartmouth.edu/pages/faculty/ken.french>.

control for stock liquidity, measured as daily average over the prior year of the ratio of share trading volume to shares outstanding.

Finally, an insider's incentive to trade before the announcement increases with the potential effect of a takeover announcement on the target's stock price. We measure this stock price effect as the cumulative abnormal stock return over days -40 to +10 around the takeover announcement (denoted  $CAR_{-40,+10}$ ), as defined in equation (2) in section 4.5 above. The beginning date of the window for measuring the stock price effect of the takeover announcement follows the findings of a stock price run-up before a takeover announcement, possibly due to published rumors and leakage of information about the upcoming bid (see, e.g., Jarrell and Poulsen (1989)). The ending date allows for more bid-related information that typically follows the initial announcement.

We construct the explanatory variables using stock-price data from CRSP and financial statement data from Compustat. Financial statement data are for the last fiscal year ending prior to the relevant misstated or pre-misstated period. To be included in the regressions, we require that two observations (one for the pre-takeover period, the other for the control period) be available for all explanatory variables for both the target firm and the control firm. Accordingly, the regression includes observations pooled from these four matched samples. We estimate the following equation:

$$\begin{aligned}
 IT_i = & \beta_0 + \beta_1 \text{Ln}(\text{Market cap})_i + \beta_2 \sigma_{si} + \beta_3 \Delta\sigma_{si} + \beta_4 \text{PRET}_{-1i} + \beta_5 \text{PRET}_{-2i} + \beta_6 \text{PRET}_{-3i} \\
 & + \beta_7 \text{PRET}_{-4i} + \beta_8 \text{Holdings}_i + \beta_9 \text{B/M decile}_i + \beta_{10} \text{R\&D/Sales}_i + \beta_{11} \text{Liquidity} \\
 & + \beta_{12} \text{CAR}_{-40,+10,i} + \beta_{13} \text{Pre-Takeover}_i + \beta_{14} \text{Target}_i + \beta_{15} \text{Pre-Takeover}_i * \text{Target}_i \\
 & + \varepsilon_i, \quad i=1, 2, \dots,
 \end{aligned} \tag{3}$$

where  $IT$  is one of the five measures of insider trading ( $\#Insiders$ ,  $\#Shares$ ,  $\$Shares$ ,  $\%Equity$ , or  $\#Buy$  months) as defined in section 5.1.1 above. The error term is denoted by  $\varepsilon$ . All other variables are defined above.

The first and fifth dependent variables used in the regressions are the number of insiders ( $\#Insiders$ ) buying or selling shares during the period of interest and the number of pure buy months ( $\#Buy$  months). Both variables take integer values from 0 to 5 in most cases. For example, the last two rows in Panel A of Table 5 show that the number of

top managers of target firms who sell during the pre-takeover period is zero for about 80% of the sample, one for 10.8% of the sample, and two or more for the remaining 9.4% of the sample. Given that the observations of these two dependent variable represent count data, we estimate equation (3) using the Poisson or Negative Binomial regression here. We use the Poisson model if the equi-dispersion restriction holds; otherwise we use the Negative Binomial model.

The remaining three dependent variables (#Shares, \$Shares, and %Equity) are censored from below at zero. We use the single-censored Tobit model to estimate these regressions (see Greene (2003) for an exposition of these models). Since these variables contain some influential outliers, we winsorize the top and bottom 1% of the dependent-variable observations in each regression. Finally, we calculate test statistics using robust standard errors where appropriate.

## 5.2.2 Insider purchases

Table 8 shows estimates of the regressions of insider purchases. From here on, the sample consists of 2,763 target firms and 2,763 control firms for which data for all the variables in the regressions is not missing. Each regression contains two observations for each firm: one for the one-year period immediately before a takeover announcement (pre-takeover period), and the other for the year before that (control period). Panel A of Table 8 shows the coefficient estimates and p-values of the regressions for top management purchases for the full year. Panel B shows the coefficient estimates of Pre-takeover\*Target in similar regressions, where the pre-takeover and control periods are partitioned into two half-year periods; these regressions are estimated separately for each half-year pre-takeover sub-periods, using the first half-year control period (i.e. half-year -3 relative to the takeover announcement date) as the control in both cases. Half-year -1 consists of months -1 to -6 relative to the takeover announcement date.

Panel C presents the marginal effect (ME) of Pre-takeover\*Target and the %ME from regressions for each of the five insider groups for the full year and the two half-year periods. The marginal effect of Pre-takeover\*Target is computed as  $\{E(IT| \text{Pre-takeover}=1, \text{Target}=1, \text{Pre-takeover*Target}=1, \bar{x}) - E(IT| \text{Pre-takeover}=0, \text{Target}=1, \text{Pre-takeover*Target}=0, \bar{x})\} - \{E(IT| \text{Pre-takeover}=1, \text{Target}=0, \text{Pre-takeover*Target}=0, \bar{x}) - E(IT| \text{Pre-takeover}=0, \text{Target}=0, \text{Pre-takeover*Target}=0, \bar{x})\}$

Target=0, Pre-takeover\*Target=0,  $\bar{x}$  }], where  $\bar{x}$  represents all other covariates at their mean values. The % marginal effect (%ME) of Target\*Pre-takeover is computed as  $100*(\text{Marginal Effect} / \text{Mean value of the dependent variable})$ , if the mean of the dependent variable  $>0$ , and as  $-100*(\text{Marginal Effect} / \text{Mean of the dependent variable})$ , if the mean of the dependent variable  $<0$ .

In Panel A, top management purchases are positively related to stock volatility, change in stock volatility, insider holdings, firm valuation and (for the last two measures of insider purchases) stock liquidity; they are negatively related to firm size and stock returns over the three previous quarters. While their purchases are not abnormal using either the time-series or the cross-sectional benchmark, they are significantly lower using the dual (i.e., DiD) control, as indicated by the coefficient of the interaction term, Pre-takeover\*Target. That is, during the one-year pre-takeover announcement period, top managers of target firms reduce their purchases relative to their normal levels significantly more than do top managers of control firms. Panel B shows that this reduction is confined to the six month period before takeover announcement.

To give an idea of the magnitudes of these effects, Panel C of Table 8 shows the marginal effect of the interaction term for each of the five insider groups for each of the five measures of insider trading, for the full year before takeover announcement and for its two equal sub-periods. Each set of three values (ME, p-value, %ME) in Panel C shows the result of one regression. The first five rows in the panel show that for the full year before takeover announcement, each of the first four insider groups (i.e., all except blockholders) significantly reduce their purchases. The magnitude of this reduction is quite substantial regardless of the measure of insider purchase we use. For example, the number of top managers purchasing goes down by 0.158. Relative to the usual number of top managers buying, this represents a 52% reduction. The dollar value of their purchases drops by about 124% and the number of pure buy months drops by 44%. The magnitudes of the effects are particularly striking for top financial officers, who reduce the dollar value of their purchases by about 247%. Even for the group of all directors, the drop is almost 60% in dollar terms. The remaining of Panel C shows that these effects are confined to, and much stronger for, the six month period immediately preceding the takeover announcement. This finding is

consistent with our expectation that most takeover talks begin within six months before the public announcement of a deal.

### **5.2.3 Insider sales**

Table 9 shows estimates of the regressions of insider sales in a format similar to Table 8. In Panel A, the significant determinants of top management's sales for the full year before takeover announcement are largely the same as the determinants of their purchases found in Table 8, except that their sales are also negatively related to their firms' R&D intensity. Top management's sales increase with their holdings; as one would expect, the signs of the other determinants of their sales are the opposite of the signs for purchases. Once again, relative to either time-series or cross-sectional benchmarks, the levels of their sales show no evidence of being abnormal. But importantly, relative to the dual benchmark, their sales are significantly lower for each of the five sales measures. Panel B shows that, as in Table 8, the decrease in top managers' sales is also confined to the six month period immediately preceding the takeover announcement.

In Panel C of Table 9, the reduction in sales is seen for all five sales measures for the first four insider groups, and for the second through fourth measures, also by blockholders. The magnitudes of the reduction are quite substantial. For example, top managers reduce the dollar value of their sales by about 133% relative to the DiD benchmark. The magnitude of the reduction in sales is particularly striking for blockholders and top financial officers. As with purchases, the reduction in insider sales is confined to the six month pre-bid period.

### **5.2.4 Net insider purchases**

We next examine the net effect of the reduction in insiders' purchases and sales. Since the definition of net purchases is not clear for our first and fifth measures of insider trading (number of insiders and percentage of pure buy months), Table 10 shows the results for the remaining three measures of net purchases in the same format as Tables 8 and 9. Panel A shows that for the full pre-bid year, top managers significantly increase their net purchases. This conclusion holds for each of the three net purchase measures. Panel B shows that the effect is largely confined to the six month pre-bid period.

Panel C shows that the increase in net purchases for the full year before takeover announcement is not confined to top managers. It is also displayed by each of the other four insider groups. The magnitude of the effect on dollar value of net purchases is about 33% for each of the first four insider groups; at 74%, it is substantially larger for blockholders. For the first four insider groups, the effect is confined to the six month pre-bid period; the magnitude of the increase in the dollar value of their net purchases is quite substantial, about 50%. For blockholders, while the signs of the effects are positive for each the two 6-month periods before the bid, they are statistically insignificant in both sub-periods.

## **6. Sub-sample results**

In section 5, we find an interesting and subtle pattern of insider trading in takeover targets. While insiders reduce both their purchases and sales before takeover announcement, they reduce their sales much more than their purchases, thus effectively increasing their (net) purchases. We next examine whether this pattern of insider trading is more pronounced in certain sub-samples of takeovers. In particular, one might expect insiders to increase their effective (i.e., net) stock purchases in sub-samples where there is less uncertainty about the completion of the takeover, such as mergers, friendly bids, single bidder deals, cash deals, bids with a domestic acquirer, and deals with smaller or less regulated targets.

Table 11 shows the marginal effects of the interaction term, Pre-takeover\*Target, from regressions of trades by top management for a number of sub-samples. Panels A and B of the table show the results for purchases and sales, respectively. The sample is partitioned by the type of acquisition, target management reaction to the bid, number of bidders, method of payment, acquirer nationality, the degree of target regulation, the year of acquisition, target size or target exchange listing. The rows in the table are for the various sub-samples; the columns are the same as in Panel C of Table 8, with an additional column for sample size.

In general, the results in Table 11 are consistent with those seen in Panel A of Tables 8 and 9. For most of the sub-samples, the levels of both purchases and sales by top management are lower relative to the dual control, after controlling for other determinants of the levels of insider trades. Statistical significance of the marginal effect of the interaction term reduces in many sub-samples, particularly those with lower sample sizes.



Table 12 shows the marginal effects of the interaction term for the three measures of net purchases for each of the sub-samples. Panels A through E of this table show the results for each of the five insider groups. Consistent with the results for the full sample in Table 10, insiders increase their net purchases in most of the sub-samples. As in Table 11, statistical significance of the marginal effect of the interaction term reduces in many sub-samples, partly reflecting lower sample sizes. The table shows a consistent pattern of statistically significant increases in insiders' net purchases relative to the dual control in certain sub-samples with less uncertainty about takeover completion, such as deals with a single bidder, domestic acquirer, and less regulated target.

The pattern of significant increases in insiders' net purchases is also more evident in deals completed after 1995, in deals involving large targets and in targets traded on more prominent stock markets, namely NYSE and Nasdaq. Table 11 shows that the increase in top managers' net purchases in large and NYSE-listed targets is driven by a significant reduction in their pre-bid sales, but not in their purchases. Given the large trading volume in these stocks and the large amount of media coverage of these firms, their insiders may find it easier to hide this subtle, unregulated pattern of their trading.

## **7. Summary and conclusions**

This paper provides systematic evidence on the level, pattern and prevalence of insider trading before takeovers during modern times. We examine the level and pattern of insider trading in about 3,700 targets of takeovers announced during 1988-2006 and in two control samples: a cross-sectional control sample and a time-series control sample. We analyze open-market stock transactions of five groups of corporate insiders: top management, top financial officers, all corporate officers, board members, and large blockholders. We separately examine their purchases, sales and net purchases in target and control firms during the one year period prior to takeover announcement (takeover period) and the preceding one year (control) period, using a difference-in-differences approach. Using several measures of the level of insider trading, we estimate cross-sectional regressions that control for other determinants of the level of insider trading.

Our conclusions are tempered by three caveats that apply to most studies of insider trading.<sup>14</sup> First, we only examine trades of registered corporate insiders; we do not observe the activities of other potentially informed insiders who are not required to report their trades to the SEC. Second, registered insiders may trade via friends or extended family members (outside their immediate family), who are not required to report their trades. However, an insider who trades illegally may think twice about involving others, because expanding the circle of participants increases the likelihood that the crime will be revealed. Third, our tests assume that registered insiders report their trades to the SEC as required by law.

We find an interesting and subtle pattern in the average trading behavior of target insiders over the one year period before takeover announcement. While insiders reduce both their purchases and sales below their normal levels, the reduction in sales exceeds the reduction in purchases, resulting in an increase in their net purchases. This pattern of passive insider trading is confined to the six-month period before takeover announcement when insiders are more likely to be informed about an upcoming takeover; it holds for each insider group, and for all three measures of net purchases that we examine. We find a consistent pattern of statistically significant increases in insiders' net purchases relative to the dual control in certain sub-samples with less uncertainty about takeover completion, such as deals with a single bidder, domestic acquirer, and less regulated target. The pattern of significant increases in insiders' net purchases is also more evident in deals completed after 1995, in deals involving large targets and in targets traded on more prominent stock markets, namely NYSE and Nasdaq. Our findings suggest that target insiders engage in profitable passive, though not active, insider trading before takeover announcement.

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<sup>14</sup>An exception is Meulbroek (1992), who examines illegal insider trading uncovered by, rather than reported to, the SEC.

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**Table 1**  
**Sample Selection**

The table shows sample selection out of the 5,792 target firms in takeover transactions with a deal value of \$1 million or more, announced during 1988-2006. The sample is obtained from Securities Data Corporation (SDC).

Explanation	Dropped mergers	Number of mergers
Total number of merger observation obtained from SDC		5,792
Repeat acquisitions of a firm <sup>1</sup>	103	5,689
Tender offer with less than 60% shares tendered	126	5,563
Firms not present in Compustat during two years prior to merger	689	4,874
Firms with incomplete Compustat coverage	557	4,317
Firms not on CRSP (NYSE, AMEX, or NASDAQ) before takeover	223	4,085
ADRs, Units, ETFs, REITs, or Closed-end funds (Firms with share codes other than 10, 11, or 12)	165	3,920
Firms with incomplete CRSP coverage	152	3,759
Firms not present in TFN	58	
Final sample		3,701

<sup>1</sup>These include partial acquisitions, followed by a clean-up merger; sale to a company or management or investor group, followed by a resale, etc.

**Table 2**  
**Time and Industry Distributions**

Panels A and B show, respectively, the time and industry distributions of 3,701 NYSE, AMEX, or NASDAQ-listed target firms in takeover transactions with a deal value of \$1 million or more announced during 1988-2006. Industry distribution is based on a firm's 2-digit primary SIC code reported in SDC, and uses the industry classification in Song and Walkling (1993). Deal values are obtained from SDC. All dollar values are in inflation-adjusted 2000 dollars.

Panel A: Distribution by year of announcement					Panel B: Industry Distribution				
Year	Merger count	% of Total count	Deal value (\$ mill.)		Industry (SIC2 codes)	Merger count	% of total count	Deal value (\$ mill.)	
			Mean	Median				Mean	Median
All	3,701	100	1,448	227	Agriculture (01-09)	14	0.38	1,205	214
1988	159	4.30	740	119	Mining (10-14)	133	3.59	2,816	398
1989	114	3.08	770	162	Construction (15-19)	26	0.70	446	308
1990	80	2.16	539	80	Food and Tobacco (20-21)	58	1.57	2,462	299
1991	56	1.51	504	154	Textile and apparel (22-23)	33	0.89	454	182
1992	50	1.35	504	218	Lumber, furniture, paper, and print (24-27)	103	2.78	1,244	313
1993	66	1.78	865	143	Chemicals (28)	206	5.57	2,297	425
1994	120	3.24	743	174	Petroleum, rubber, and plastic (29-30)	61	1.65	2,412	206
1995	219	5.92	858	179	Leather, stone, and glass (31-32)	26	0.70	734	353
1996	231	6.24	1,077	213	Primary and fabricated metals (33-34)	85	2.30	1,179	186
1997	311	8.40	1,087	357	Machinery (35-36)	450	12.16	954	188
1998	357	9.65	2,441	256	Transport equipment (37)	49	1.32	2,190	370
1999	402	10.86	1,935	327	Instruments and miscellaneous manufacturing (38-39)	241	6.51	671	174
2000	325	8.78	1,985	306	Transport, communications, and utilities (40-49)	284	7.67	3,715	711
2001	251	6.78	1,155	151	Wholesale trade (50-51)	97	2.62	546	154
2002	151	4.08	724	106	Retail trade (52-59)	201	5.43	923	172
2003	203	5.49	857	126	Finance, insurance, and real estate (60-69)	799	21.59	1,520	209
2004	191	5.16	1,721	268	Hotels and personal services (70-71)	46	1.24	1,794	465
2005	196	5.30	2,139	339	Services (72-89)	788	21.29	813	192
2006	219	5.92	2,369	548	Public administration and others (90-99)	1	0.03	174	174

**Table 3**  
**Descriptive Statistics of Target and Control Samples**

Panel A shows characteristics of target and control samples. The samples consists of 3,701 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. Each target firm is matched to a control firm in its 2-digit primary SIC code industry on Compustat that has the smallest percentage difference in total assets at the end of fiscal year -2, where fiscal year 0 is the year in which the takeover announcement occurs. Measures of firm size, financial leverage and the first two growth measures shown are for (or the end of) fiscal year -1. Sales growth is computed as  $[(Sales_{t-1}/Sales_{t-5})^{(1/4)} - 1]$ . OPA(t) is Operating performance to total assets for year  $t$ . Operating performance is operating income before depreciation. OPA equals  $[(OPA(-1)+OPA(-2)+OPA(-3))/3]$ . Firm value equals (Total assets – Book value of equity + market value of equity). All publicly traded common shares of a firm are used to compute market value of equity. PRET(t) is the market-adjusted average daily prior stock return for a firm for quarter t relative to the beginning of one year prior to the merger announcement date, where market return is the equal-weighted CRSP market index return. Stock return volatility ( $\sigma$ ) is the standard deviation of stock returns for the period of (-250, -126) days before one year prior to the announcement date. The change in stock return volatility ( $\Delta\sigma$ ) is computed as  $[\sigma_{(-250, -126)} - \sigma_{(-125, -1)}]$ . Stock returns and market value of equity are obtained from CRSP, and all other financial data are from Compustat. Panel B shows descriptive statistics of the number of insiders for matched target and control firm pairs with non-zero number of insiders, for each of five insider groups. The panel also shows the numbers of target, control, and matched pairs of firms with non-zero number of insiders. The number of insiders is obtained from TFN Insider database based on all transactions or holdings reported by insiders during the two-year period prior to the takeover announcement date. The ‘top management’ group consists of Chairman, Chief Executive Officer (CEO), Chief Operating Officer (COO), and President. ‘Top financial officers’ are Chief Financial Officer (CFO), Controller and Treasurer. ‘All officers’ are all corporate officers defined by the SEC under section 16a of the Securities Exchange Act of 1934. ‘All directors’ are all members of the board of directors. ‘Blockholders’ are beneficial owners of 10% or more of any class of equity securities of a firm. Panel C shows descriptive statistics of four different measures of the latest shareholdings reported by insiders of matched target and control firm pairs during the one year period prior to takeover announcement, for each of the five insider groups. Shareholding data is obtained from TFN Insider. We define # *insiders* as the number of individuals within the insider group that reported shareholdings, and # *shares* (\$ *shares*) [% *equity*] as total insider shareholdings expressed in thousands of shares (in thousands of dollars) [as a percentage of shares outstanding]. The table reports p-values of two-tailed t-tests for differences in means and two-tailed Wilcoxon tests for differences in distributions. All dollar values are in inflation-adjusted 2000 dollars.



**Table 3 (cont.)**

Panel A: Firm Characteristics							
Measure	N	Mean			Median		
		Target	Control	p-value	Target	Control	p-value
<i>Firm size</i>							
Market value of equity (\$ mill.)	3,701	912	1,079	0.015	136	145	0.000
Firm value (\$ mill.)	3,546	2,833	2,888	0.487	345	361	0.000
Total assets (\$ mill.)	3,563	2,245	2,148	0.039	240	243	0.098
Sales (\$ mill.)	3,566	832	836	0.890	145	144	0.975
Employees ('000s)	3,156	4.110	4.672	0.005	0.824	0.846	0.538
<i>Stock volatility and prior returns</i>							
$\sigma$ (%)	3,700	3.669	3.683	0.781	3.108	3.004	0.332
$\Delta\sigma$ (%)	3,700	0.005	-0.032	0.558	-0.042	0.023	0.527
PRET(-1) (%)	3,701	0.019	-0.004	0.130	-0.029	-0.032	0.434
PRET(-2) (%)	3,699	-0.022	-0.007	0.098	-0.037	-0.034	0.111
PRET(-3) (%)	3,699	-0.006	-0.003	0.737	-0.023	-0.029	0.877
PRET(-4) (%)	3,610	0.000	0.009	0.403	-0.024	-0.016	0.518
<i>Growth</i>							
B/M	3,546	0.651	0.622	0.559	0.579	0.554	0.000
Firm value/Total assets	3,546	1.660	1.806	0.000	1.208	1.225	0.000
Sales growth rate (%)	2,066	19.552	20.004	0.753	11.164	12.849	0.010
<i>Operating performance</i>							
OPA(-1) (%)	3,492	5.466	6.244	0.080	8.795	8.421	0.154
OPA(-2) (%)	3,641	6.578	7.070	0.188	9.346	8.788	0.144
OPA(-3) (%)	3,516	5.806	6.740	0.079	9.380	9.588	0.027
OPA (%)	3,338	5.919	6.803	0.027	9.298	8.961	0.074
<i>Financial leverage</i>							
Long-term debt/Total assets	3,538	0.169	0.173	0.406	0.109	0.102	0.962
Long-term debt/Firm value	3,524	0.124	0.124	0.777	0.074	0.066	0.440

  

Panel B: Number of insiders									
Insider group	Number of firms with non-zero number of insiders			Mean			Median		
	Target	Control	Pair	Target	Control	p-value	Target	Control	p-value
Top management	3,248	3,060	2,753	2.748	2.834	0.035	2.000	3.000	0.020
Top financial officers	2,242	2,118	1,584	1.712	1.744	0.349	1.000	1.000	0.342
All officers	3,415	3,204	2,970	6.448	6.557	0.284	5.000	5.000	0.225
All directors	3,537	3,324	3,184	6.760	7.192	0.000	6.000	6.000	0.000
Blockholders	1,668	1,493	739	2.892	2.578	0.072	2.000	2.000	0.022

**Table 3 (cont.)**

Panel C: Shareholdings							
Measure	N	Mean			Median		
		Target	Control	p-value	Target	Control	p-value
<i>Top Management</i>							
# insiders	3,701	1.469	1.516	0.116	1	1	0.077
# shares	3,701	634	959	0.243	43	55	0.000
\$ shares	3,701	15,604	23,936	0.390	545	602	0.000
% equity	3,701	3.653	4.311	0.403	0.267	0.305	0.000
<i>Top Financial Officers</i>							
# insiders	3,701	0.615	0.610	0.758	0	0	0.974
# shares	3,701	103	187	0.586	0	0	0.197
\$ shares	3,701	4,059	1,529	0.323	0	0	0.102
% equity	3,701	0.379	0.275	0.517	0	0	0.187
<i>All Officers</i>							
# insiders	3,701	3.324	3.431	0.136	2	2	0.138
# shares	3,701	867	787	0.729	54	65	0.000
\$ shares	3,701	22,463	19,360	0.717	643	722	0.001
% equity	3,701	3.892	3.655	0.708	0.327	0.377	0.000
<i>All Directors</i>							
# insiders	3,701	3.828	4.148	0.000	3	3	0.000
# shares	3,701	1,066	1,388	0.407	132	152	0.000
\$ shares	3,701	30,493	34,796	0.767	1,621	1,760	0.000
% equity	3,701	5.041	6.261	0.178	0.868	0.987	0.000
<i>Blockholders</i>							
# insiders	3,701	0.376	0.357	0.433	0	0	0.587
# shares	3,701	881	1,031	0.249	0	0	0.742
\$ shares	3,701	16,089	22,262	0.120	0	0	0.428
% equity	3,701	4.327	4.087	0.526	0	0	0.958

**Table 4**

**Abnormal Returns for Target and Control Samples and Sub-samples**

The table shows mean and median values of cumulative abnormal returns (CARs) for four windows around the takeover announcement date (day 0) for target and control samples, and various sub-samples. For each firm, the abnormal return for trading day  $t$  is computed by subtracting the return on the equal-weighted CRSP (i.e., NYSE, Nasdaq and AMEX) index from the return on a stock on day  $t$ . The samples consists of 3,701 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. The table presents nine sub-samples of takeover targets. Firms with market value of equity (as of the latest fiscal year-end before day 0) in the bottom (top) 30% of the NYSE are classified as small (large) firms, and the remaining as medium-size firms. Three different sub-samples are constructed based on takeover announcements during the periods 1988-1995, 1996-2001 and 2002-2006. The NYSE, AMEX and NASDAQ sub-samples correspond to target firms listed on each exchange. The 'Hostile' sub-sample consists of target firms whose initial reaction to the merger is hostile; the remaining targets are 'Friendly'. Tender-offers consist of takeovers where 60% or more of the target's outstanding equity is acquired via a tender-offer; LBOs are leverage buyouts; the remaining takeovers are classified as mergers. The sub-samples 'Stock deal' and 'Cash deal' consist of takeovers via 100% stock and 100% cash, respectively; the remaining takeovers are classified as 'Other deals'. Target firms in railroad, public utility, banking, finance, or insurance industries (i.e. 2-digit primary SIC codes 40, 49, 60, 61, or 63) are classified as 'More regulated'; all other firms are called 'Less regulated.' A target firm is classified into small, mid-size or large target group if it is in the bottom, middle or top tercile, respectively, of all the firms on CRSP by market capitalization at the end of its fiscal year -1. \*, \*\*, and \*\*\* denote significantly different from zero at the 10%, 5%, and 1% levels, respectively, using two-tailed Brown and Warner (1985) t-tests for means and two-tailed Wilcoxon tests for medians.

**Table 4 (cont.)**

Category	Observations		Days around announcement Means				Days around announcement Medians			
	Count	%	(-40,+10)	(-20,+5)	(-10,+1)	(-5,+1)	(-40,+10)	(-20,+5)	(-10,+1)	(-5,+1)
Target	3,701	100	29.23***	27.75***	25.68***	24.16***	25.41***	23.85***	21.52***	20.04***
Control	3,701	100	1.36***	1.07***	0.77***	0.43**	-0.61	-0.29	-0.28	-2.16
<i>Sub-samples:</i>										
Mergers	2,673	72.22	25.41***	24.29***	22.55***	21.18***	22.07***	21.18***	19.28***	17.69***
Tender-offers <sup>a</sup>	836	22.59	43.02***	40.31***	36.63***	34.40***	39.90***	35.53***	32.93***	30.20***
LBOs <sup>a</sup>	243	6.57	23.80***	22.76***	22.26***	21.71***	22.32***	19.37***	18.54***	19.02***
Hostile	128	3.46	34.40***	31.75***	28.97***	27.51***	29.00***	27.27***	24.81***	23.82***
Friendly	3,573	96.54	29.04***	27.61***	25.56***	24.04***	25.18***	23.67***	21.38***	19.78***
Single bidder	3,469	93.73	29.26***	27.91***	25.99***	24.47***	25.33***	24.20***	22.01***	20.28***
Multiple bidder	232	6.27	28.74***	25.30***	21.00***	19.57***	26.30***	20.33***	17.86***	17.64***
Stock deals	1,128	31.13	24.93***	23.45***	21.46***	19.74***	21.63***	19.68***	18.28***	16.78***
Cash deals	1,421	38.40	34.96***	33.39***	30.87***	29.20***	30.58***	28.19***	25.87***	24.32***
Other deals	1,152	30.48	26.37***	25.00***	23.41***	22.27***	23.09***	21.67***	20.18***	18.84***
Cross border acquirer	595	16.08	36.39***	34.31***	30.87***	28.97***	31.27***	28.47***	25.58***	23.50***
Domestic acquirer	3,106	83.92	27.88***	26.49***	24.69***	23.24***	24.41***	22.92***	20.84***	19.27***
More regulated	859	23.21	21.80***	21.86***	20.85***	19.87***	19.12***	18.91***	17.57***	16.45***
Less regulated	2,842	76.79	31.48***	29.53***	27.19***	25.46***	27.92***	25.93***	23.01***	21.14***
1988-1995	864	23.35	29.16***	28.32***	25.65***	24.11***	25.34***	24.45***	21.40***	19.82***
1996-2001	1,877	50.72	30.94***	29.27***	26.63***	24.89***	27.35***	25.68***	22.95***	20.64***
2002-2006	960	25.94	25.96***	24.26***	23.85***	22.78***	22.37***	20.96***	19.92***	18.87***
Small target	2,027	54.77	32.84***	30.59***	27.77***	26.16***	28.28***	25.91***	22.95***	21.36***
Mid-size target	780	21.08	26.48***	25.91***	24.74***	23.29***	25.11***	23.39***	21.67***	20.10***
Large target	894	24.16	23.44***	22.92***	21.76***	20.39***	20.88***	19.99***	18.87***	17.32***
NYSE target	937	25.32	25.00***	23.98***	22.87***	21.95***	23.05***	21.39***	19.55***	18.59***
AMEX target	299	8.08	30.44***	27.82***	25.65***	24.33***	27.46***	23.94***	21.20***	18.68***
NASDAQ target	2,465	66.60	30.69***	29.17***	26.75***	24.98***	26.34***	25.12***	22.54***	20.67***

<sup>a</sup> Note that tender offers and LBOs are not mutually exclusive. There are 51 LBOs that are also tender offers.

**Table 5****Insider Purchases at Target and Control Firms during Pre-takeover and Control periods**

The table shows mean and median values of five parametric measures and values of two non-parametric measures of insider purchases for target and control samples during the pre-takeover and control periods. The pre-takeover period is the one-year period before the takeover announcement date and control period is the one-year period before that. Each panel shows measures of purchases for one of the five groups of insiders defined in Table 3. Insider trading data is from TFN Insider database. The samples consists of 3,701 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. The parametric measures of insider trading are: number of insiders buying during a year (# insiders), number of shares bought '000 (# shares), dollar value of shares bought in millions (\$ shares), percentage of outstanding equity bought (% equity), and number of pure buy months, i.e., months with some insider purchases and no insider sales (# buy months). The table reports p-values of two-tailed t-tests for differences in means and Wilcoxon tests for differences in distributions (shown in rows for medians). The last two rows in each Panel show the percentages of firms with at least one or at least two insiders buying shares in a year and p-values of two-tailed z-tests for differences in proportions. Signs of the test statistics are shown in parentheses after p-values. All dollar values are in inflation-adjusted 2000 dollars.

Panel A: Top Management								
Statistic	Target firms		Control firm		p-values			
	(1) Pre-Takeover Period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.269	0.354	0.335	0.329	0.000 (-)	0.000 (-)	0.683 (+)	0.000 (-)
# shares	6.639	9.533	13.231	8.846	0.212 (-)	0.024 (-)	0.082 (+)	0.034 (-)
\$ shares	0.050	0.107	0.101	0.096	0.020 (-)	0.022 (-)	0.838 (+)	0.072 (-)
% equity	0.057	0.084	0.131	0.092	0.220 (-)	0.021 (-)	0.220 (+)	0.089(-)
# buy months	0.303	0.412	0.405	0.409	0.000 (-)	0.000 (-)	0.801 (-)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.679 (+)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.165 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.686 (-)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.198 (+)	0.000 (-)
# buy months	0	0	0	0	0.000 (-)	0.000 (-)	0.797 (-)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders buying	20.08	24.97	23.99	24.10	0.000 (-)	0.000 (-)	0.913 (-)	0.001 (-)
≥2 insiders buying	9.38	13.37	12.97	12.16	0.000 (-)	0.000 (-)	0.293 (+)	0.000 (-)

**Table 5 (cont.)**

Panel B: Top Financial Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.098	0.126	0.110	0.113	0.000 (-)	0.117 (-)	0.675 (-)	0.013 (-)
# shares	0.471	1.341	1.216	1.298	0.182 (-)	0.189 (-)	0.919 (-)	0.448 (-)
\$ shares	0.004	0.018	0.011	0.009	0.162 (-)	0.106 (-)	0.645 (+)	0.147 (-)
% equity	0.004	0.010	0.008	0.013	0.074 (-)	0.226 (-)	0.465 (-)	0.978 (-)
# buy months	0.119	0.154	0.141	0.135	0.000 (-)	0.054 (-)	0.484 (+)	0.001 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.117 (-)	0.760 (-)	0.007 (-)
# shares	0	0	0	0	0.000 (-)	0.087 (-)	0.679 (+)	0.010 (-)
\$ shares	0	0	0	0	0.000 (-)	0.302 (-)	0.482 (-)	0.040(-)
% equity	0	0	0	0	0.001 (-)	0.163 (-)	0.729 (+)	0.018 (-)
# buy months	0	0	0	0	0.000 (-)	0.042 (-)	0.451 (+)	0.001 (-)
<i>% of firms with</i>								
≥1 insiders buying	9.05	11.45	10.11	10.13	0.001 (-)	0.123 (-)	0.969 (+)	0.017 (-)
≥2 insiders buying	2.51	3.35	3.22	3.13	0.033 (-)	0.070 (-)	0.842 (+)	0.104 (-)
Panel C: All Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.426	0.509	0.531	0.477	0.000 (-)	0.000 (-)	0.008 (+)	0.000 (-)
# shares	5.882	8.670	13.151	7.391	0.170 (-)	0.008 (-)	0.023 (+)	0.009 (-)
\$ shares	0.049	0.100	0.135	0.082	0.040 (-)	0.036 (-)	0.209 (+)	0.035 (-)
% equity	0.054	0.067	0.104	0.061	0.512 (-)	0.036 (-)	0.014 (+)	0.032 (-)
# buy months	0.341	0.427	0.469	0.422	0.000 (-)	0.000 (-)	0.005 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.002 (+)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.001 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.020 (+)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.001 (+)	0.000 (-)
# buy months	0	0	0	0	0.000 (-)	0.000 (-)	0.006 (+)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders buying	23.21	28.07	27.99	26.18	0.000 (-)	0.000 (-)	0.080 (+)	0.000 (-)
≥2 insiders buying	11.21	14.10	16.59	13.94	0.000 (-)	0.000 (-)	0.002 (+)	0.000 (-)

**Table 5 (cont.)**

Panel D: All Directors								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.672	0.907	0.939	0.952	0.000 (-)	0.000 (-)	0.608 (-)	0.000 (-)
# shares	11.348	22.970	25.499	17.002	0.001 (-)	0.014 (-)	0.156 (+)	0.004 (-)
\$ shares	0.127	0.258	0.238	0.188	0.001 (-)	0.031 (-)	0.307 (+)	0.004 (-)
% equity	0.104	0.171	0.164	0.147	0.019 (-)	0.022 (-)	0.515 (+)	0.030 (-)
# buy months	0.608	0.828	0.869	0.851	0.000 (-)	0.000 (-)	0.441 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.938 (-)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.159 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.542 (-)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.368 (+)	0.000 (-)
# buy months	0	0	0	0	0.000 (-)	0.000 (-)	0.411 (+)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders buying	35.86	44.07	44.31	43.83	0.000 (-)	0.000 (-)	0.673 (+)	0.000 (-)
≥2 insiders buying	19.35	26.88	28.12	27.45	0.000 (-)	0.000 (-)	0.517 (+)	0.000 (-)

  

Panel E: Blockholders								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.076	0.106	0.088	0.098	0.001 (-)	0.140 (-)	0.206 (-)	0.071 (-)
# shares	82.230	42.027	62.103	51.246	0.421 (+)	0.702 (+)	0.392 (+)	0.569 (+)
\$ shares	0.917	0.528	0.705	0.505	0.352 (+)	0.632 (+)	0.267 (+)	0.678 (+)
% equity	0.243	0.243	0.287	0.191	0.998 (+)	0.620 (-)	0.115 (+)	0.333 (-)
# buy months	0.105	0.119	0.121	0.129	0.162 (-)	0.215 (-)	0.461 (-)	0.700 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.001 (-)	0.140 (-)	0.325 (-)	0.125 (-)
# shares	0	0	0	0	0.001 (-)	0.644 (-)	0.792 (+)	0.018 (-)
\$ shares	0	0	0	0	0.009 (-)	0.541 (-)	0.725 (-)	0.053 (-)
% equity	0	0	0	0	0.010 (-)	0.837 (-)	0.563 (+)	0.034 (-)
# buy months	0	0	0	0	0.044 (-)	0.255 (-)	0.610 (-)	0.329 (-)
<i>% of firms with</i>								
≥1 insiders buying	6.19	7.19	7.05	7.00	0.085 (-)	0.135 (-)	0.928 (+)	0.205 (-)
≥2 insiders buying	3.05	4.08	3.35	3.86	0.019 (-)	0.468 (-)	0.216 (-)	0.401 (-)

**Table 6**

**Insider Sales at Target and Control Firms during Pre-takeover and Control periods**

The table shows mean and median values of five parametric measures and values of two non-parametric measures of insider sales for target and control samples during the pre-takeover and control periods. The pre-takeover period is the one-year period before the takeover announcement date and control period is the one-year period before that. Each panel shows measures of sales for one of the five groups of insiders defined in Table 3. Insider trading data is from TFN Insider database. The samples consists of 3,701 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. The parametric measures of insider trading are: number of insiders selling during a year (# insiders), number of shares sold '000 (# shares), dollar value of shares sold in millions (\$ shares), percentage of outstanding equity sold (% equity), and number of pure selling months, i.e., months with some insider sales and no insider purchases (# sell months). The table reports p-values of two-tailed t-tests for differences in means and Wilcoxon tests for differences in distributions (shown in rows for medians). The last two rows in each Panel show the percentages of firms with at least one or at least two insiders selling shares in a year and p-values of two-tailed z-tests for differences in proportions. Signs of the test statistics are shown in parentheses after p-values. All dollar values are in inflation-adjusted 2000 dollars.

Panel A: Top Management								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.419	0.507	0.516	0.497	0.000 (-)	0.000 (-)	0.177 (+)	0.000 (-)
# shares	41.517	48.812	55.169	49.228	0.238 (-)	0.045 (-)	0.175 (+)	0.078 (-)
\$ shares	1.172	1.256	1.746	1.347	0.615 (-)	0.012 (-)	0.030 (+)	0.049 (-)
% equity	0.163	0.212	0.224	0.221	0.020 (-)	0.014 (-)	0.874 (+)	0.090 (-)
# sale months	0.521	0.627	0.701	0.640	0.000 (-)	0.000 (-)	0.006 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.099 (+)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.019 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.009 (+)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.042 (+)	0.000 (-)
# sale months	0	0	0	0	0.000 (-)	0.000 (-)	0.029 (+)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders selling	26.72	31.53	31.69	29.94	0.000 (-)	0.000 (-)	0.102 (+)	0.000 (-)
≥2 insiders selling	15.86	19.05	19.56	19.13	0.000 (-)	0.000 (-)	0.638 (+)	0.004 (-)

(-) and (+) show the sign of the test statistic.



**Table 6 (cont.)**

Panel B: Top Financial Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.178	0.206	0.215	0.208	0.001 (-)	0.001 (-)	0.427 (+)	0.004 (-)
# shares	4.649	8.971	7.261	6.826	0.178 (-)	0.002 (-)	0.726 (+)	0.167 (-)
\$ shares	0.145	0.454	0.239	0.192	0.264 (-)	0.002 (-)	0.155 (+)	0.202 (-)
% equity	0.017	0.027	0.033	0.024	0.001 (-)	0.049 (-)	0.268 (+)	0.030 (-)
# sale months	0.243	0.283	0.313	0.281	0.005 (-)	0.000 (-)	0.024 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.001 (-)	0.001 (-)	0.352 (+)	0.002 (-)
# shares	0	0	0	0	0.001 (-)	0.001 (-)	0.028 (+)	0.000 (-)
\$ shares	0	0	0	0	0.001 (-)	0.001 (-)	0.009 (+)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.019 (+)	0.000 (-)
# sale months	0	0	0	0	0.000 (-)	0.000 (-)	0.066 (+)	0.001 (-)
<i>% of firms with</i>								
≥1 insiders selling	14.97	17.66	17.86	17.21	0.002 (-)	0.001 (-)	0.463 (+)	0.007 (-)
≥2 insiders selling	6.40	8.05	8.35	7.65	0.006 (-)	0.001 (-)	0.265 (+)	0.007(-)
Panel C: All Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	1.056	1.206	1.262	1.148	0.000 (-)	0.000 (-)	0.000 (+)	0.000 (-)
# shares	59.630	98.471	70.950	65.708	0.226 (-)	0.178 (-)	0.328 (+)	0.175 (-)
\$ shares	1.702	2.100	3.212	4.734	0.274 (-)	0.133 (-)	0.602 (-)	0.702(+)
% equity	0.295	0.618	0.256	0.251	0.408 (-)	0.678 (+)	0.847 (+)	0.403 (-)
# sale months	0.912	1.009	1.110	1.007	0.000 (-)	0.000 (-)	0.000 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.000 (+)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.001 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.000 (+)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.001 (+)	0.000 (-)
# sale months	0	0	0	0	0.000 (-)	0.000 (-)	0.001 (+)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders selling	38.31	42.77	42.61	40.45	0.000 (-)	0.000 (-)	0.059 (+)	0.000 (-)
≥2 insiders selling	26.34	30.05	29.56	27.86	0.000 (-)	0.002 (-)	0.105 (+)	0.000 (-)

**Table 6 (cont.)**

Panel D: All Directors								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover Period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.752	0.889	0.942	0.910	0.000 (-)	0.000 (-)	0.151 (+)	0.000 (-)
# shares	78.666	84.010	77.758	76.632	0.661 (-)	0.933 (+)	0.884 (+)	0.654 (-)
\$ shares	2.037	2.019	2.449	2.276	0.951 (+)	0.304 (-)	0.624 (+)	0.740 (-)
% equity	0.346	0.366	0.341	0.357	0.642 (-)	0.905 (+)	0.655 (-)	0.954 (-)
# sale months	0.812	0.921	1.007	0.959	0.000 (-)	0.000 (-)	0.072 (+)	0.000 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.000 (-)	0.092 (+)	0.000 (-)
# shares	0	0	0	0	0.000 (-)	0.000 (-)	0.295 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.000 (-)	0.201 (+)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.000 (-)	0.631 (+)	0.000 (-)
# sale months	0	0	0	0	0.000 (-)	0.000 (-)	0.096 (+)	0.000 (-)
<i>% of firms with</i>								
≥1 insiders selling	39.58	44.64	44.31	43.31	0.000 (-)	0.000 (-)	0.386 (+)	0.000 (-)
≥2 insiders selling	24.56	29.02	29.91	28.83	0.000 (-)	0.000 (-)	0.307 (+)	0.000 (-)
Panel E: Blockholders								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover Period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# insiders	0.124	0.187	0.132	0.152	0.000 (-)	0.529 (-)	0.171 (-)	0.033 (-)
# shares	102.739	136.806	129.591	88.094	0.277 (-)	0.647 (-)	0.484 (+)	0.272 (-)
\$ shares	2.405	3.413	1.663	2.084	0.333 (-)	0.307 (+)	0.605 (-)	0.663 (-)
% equity	0.477	0.484	0.486	0.366	0.940 (-)	0.955(-)	0.392 (+)	0.448 (-)
# sale months	0.132	0.184	0.155	0.163	0.000 (-)	0.115 (-)	0.497 (-)	0.011 (-)
<i>Median</i>								
# insiders	0	0	0	0	0.000 (-)	0.471 (-)	0.296 (-)	0.001 (-)
# shares	0	0	0	0	0.000 (-)	0.249 (-)	0.788 (+)	0.000 (-)
\$ shares	0	0	0	0	0.000 (-)	0.183 (-)	0.973 (-)	0.000 (-)
% equity	0	0	0	0	0.000 (-)	0.263 (-)	0.819 (+)	0.000 (-)
# sale months	0	0	0	0	0.000 (-)	0.068 (-)	0.399 (-)	0.003 (-)
<i>% of firms with</i>								
≥1 insiders selling	7.75	10.75	8.97	9.21	0.000 (-)	0.058 (-)	0.716 (-)	0.004 (-)
≥2 insiders selling	4.35	5.92	4.62	4.89	0.002 (-)	0.574 (-)	0.585 (-)	0.069 (-)

**Table 7**

**Insiders' Net Purchases at Target and Control Firms during Pre-takeover and Control periods**

This Table presents means and medians of three different measures of insiders' net purchases for target and control samples during the pre-takeover and control periods. The pre-takeover period is the one-year period before the takeover announcement date and control period is the one-year period before that. Each panel shows net purchase measures for one of the five groups of insiders defined in Table 3. Insider trading data is from TFN Insider database. The samples consists of 3,701 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. The measures of insiders' net purchases are: net number of shares bought during a year in '000 (# shares), net dollar value of shares bought during a year in millions (\$ shares), and net percentage of outstanding equity bought during a year (% equity). The table reports p-values of two-tailed t-tests for differences in means and Wilcoxon tests for differences in distributions (shown in rows for medians). Signs of the test statistics are shown in parentheses after p-values. All dollar values are in inflation-adjusted 2000 dollars.

Panel A: Top Management								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# shares	-34.878	-39.280	-41.938	-40.381	0.506 (+)	0.319 (+)	0.735 (-)	0.457 (+)
\$ shares	-1.123	-1.150	-1.615	-1.250	0.873 (+)	0.030 (+)	0.034 (-)	0.089 (+)
% equity	-0.106	-0.128	-0.093	-0.129	0.497 (+)	0.727 (-)	0.342 (+)	0.769 (-)
<i>Median</i>								
# shares	0	0	0	0	0.009 (+)	0.119 (+)	0.127 (-)	0.008 (+)
\$ shares	0	0	0	0	0.003 (+)	0.006 (+)	0.003 (-)	0.000 (+)
% equity	0	0	0	0	0.016 (+)	0.354 (+)	0.229 (-)	0.034 (+)
Panel B: Top Financial Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# shares	-4.178	-7.630	-6.045	-5.528	0.292 (+)	0.063 (+)	0.727 (-)	0.270 (+)
\$ shares	-0.141	-0.437	-0.228	-0.183	0.287 (+)	0.005 (+)	0.183 (-)	0.223 (+)
% equity	-0.013	-0.017	-0.025	-0.011	0.405 (+)	0.171 (+)	0.192 (-)	0.130 (+)
<i>Median</i>								
# shares	0	0	0	0	0.108 (+)	0.023 (+)	0.057 (-)	0.005 (+)
\$ shares	0	0	0	0	0.075 (+)	0.003 (+)	0.008 (-)	0.000 (+)
% equity	0	0	0	0	0.111 (+)	0.009 (+)	0.040 (-)	0.005 (+)

**Table 7 (cont.)**

Panel C: All Officers								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# shares	-53.478	-89.801	-57.799	-58.317	0.262 (+)	0.635 (+)	0.925 (+)	0.276 (+)
\$ shares	-1.653	-2.001	-3.077	-4.653	0.343 (+)	0.157 (+)	0.589 (+)	0.676 (-)
% equity	-0.241	-0.551	-0.152	-0.190	0.428 (+)	0.357 (-)	0.159 (+)	0.488 (+)
<i>Median</i>								
# shares	0	0	0	0	0.001 (+)	0.157 (+)	0.112 (-)	0.006 (+)
\$ shares	0	0	0	0	0.000 (+)	0.015 (+)	0.008 (+)	0.000 (+)
% equity	0	0	0	0	0.003 (+)	0.395 (+)	0.242 (-)	0.019 (+)

  

Panel D: All Directors								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# shares	-67.318	-61.040	-52.259	-59.630	0.620 (-)	0.210 (-)	0.446 (+)	0.392 (-)
\$ shares	-1.910	-1.761	-2.211	-2.088	0.621 (-)	0.455 (+)	0.731 (-)	0.955 (-)
% equity	-0.243	-0.195	-0.176	-0.210	0.343 (-)	0.216(-)	0.432 (+)	0.217 (-)
<i>Median</i>								
# shares	0	0	0	0	0.032 (+)	0.561 (+)	0.707 (-)	0.211 (+)
\$ shares	0	0	0	0	0.006 (+)	0.081 (+)	0.088 (-)	0.011 (+)
% equity	0	0	0	0	0.138 (+)	0.857 (-)	0.960 (-)	0.279 (+)

  

Panel E: Blockholders								
Statistic	Target		Control		p-values			
	(1) Pre-Takeover period	(2) Control period	(3) Pre-Takeover period	(4) Control period	1 - 2	1 - 3	3 - 4	(1-2) - (3-4)
<i>Mean</i>								
# shares	-20.510	-94.780	-67.488	-36.848	0.202 (+)	0.542 (+)	0.614 (-)	0.220 (+)
\$ shares	-1.487	-2.885	-0.958	-1.579	0.204 (+)	0.504 (-)	0.438 (+)	0.576 (+)
% equity	-0.234	-0.241	-0.199	-0.175	0.952 (+)	0.834 (-)	0.873 (-)	0.869 (+)
<i>Median</i>								
# shares	0	0	0	0	0.008 (+)	0.440 (+)	0.696 (+)	0.100 (+)
\$ shares	0	0	0	0	0.002 (+)	0.375 (+)	0.652 (+)	0.046 (+)
% equity	0	0	0	0	0.004 (+)	0.353 (+)	0.579 (+)	0.058 (+)

**Table 8**  
**Regressions of Insider Purchases**

Panel A of the table shows coefficient estimates from regressions of measures of stock purchases by top management (Chairman, CEO, COO, and President) on several explanatory variables. The sample consists of 2,763 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample, with non-missing data for all the variables in the regressions. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. There are two observations for each firm: one measures insider purchases during the one-year period immediately before a takeover announcement (pre-takeover period), and the other measures it during the year before that (control period). ‘# insiders’ is the number of insiders buying during a year, ‘# shares’ is the number of shares (in ‘000) bought during the year, ‘\$ shares’ is the dollar value of shares (in millions) bought, ‘% equity’ is the percentage of outstanding equity bought, and ‘# buy months’ is the number of pure buy months, i.e., months with some insider purchases and no insider sales. All dollar values are in inflation-adjusted 2000 dollars. The top and bottom 1% of the observations of three of the dependent variables (‘# shares’, ‘\$ shares’ and ‘% equity’) in each regression are winsorized. Market cap equals the market value of equity as of the second last fiscal year ending prior to a takeover announcement. The standard deviation of daily stock returns ( $\sigma$ ) is computed over trading days (-250, -126) relative to the beginning of the pre-takeover or control period. The change in standard deviation ( $\Delta\sigma$ ) equals the standard deviation of the firm’s daily stock returns computed over trading days (-125, -1) relative to the pre-takeover or control period minus  $\sigma$ .  $PRET(t)$  is the market-adjusted average daily stock return for a firm for quarter  $t$  prior to either the pre-takeover or the control period, where the market return is the equal-weighted CRSP market index return. Book-to-market (B/M) deciles equal 1 through 10 depending on a firm’s B/M ratio. NYSE B/M decile breakpoints during the year are used to assign B/M deciles. R&D/Sales is R&D expense to sales revenue. Data for B/M and R&D/Sales are for (or at the end of) the fiscal year  $t-2$  and  $t-3$  for pre-takeover and control period, respectively, where the takeover announcement occurs during fiscal year  $t$ . Liquidity equals the average daily trading volume scaled by shares outstanding during the pre-takeover (control) period, provided that data is available for at least 160 trading days.  $CAR_{-40,+10}$  is the cumulative abnormal return on the stock from 40 days before to 10 days after the takeover announcement date. Pre-takeover is a dummy variable equal to 1 (0) if the insider trading activity occurs during the pre-takeover (control) period. Using TFN Insider data, insider holdings are measured as the number of insiders (when dependent variable is # insiders or # buy months), log of 1 plus total shares held (when dependent variable is # shares), log of 1 plus total shareholdings in dollar value (when dependent variable is \$ shares), and total number of shares held as a percentage of shares outstanding (when dependent variable is % equity), based on the latest holdings reported by insider during either the pre-takeover or the control period. Target is a dummy variable equal to 1 (0) for a target (control) firm. Regressions of ‘# insiders’ and ‘# buy months’ use the Poisson model if the equi-dispersion restriction holds; otherwise they use the Negative Binomial model. Regressions of ‘# shares’, ‘\$ shares’, and ‘% equity’ use the single-censored Tobit model. Test statistics are calculated using robust standard errors where appropriate. Panel A shows coefficient estimates for the full sample period. Panel B shows the coefficient estimates of Pre-takeover\*Target in similar regressions, where the pre-takeover and control periods are partitioned into two half-year periods; these regressions are estimated separately for each half-year pre-takeover sub-periods, using the first half-year control period (i.e. half-year -3 relative to the takeover announcement date) as the control in both cases. Half-year -1 consists of months -1 to -6 relative to the takeover announcement date. Panel C presents the marginal effect (ME) of Pre-takeover\*Target and the %ME from regressions for each of the five insider groups for the full year and the two half-year periods. The marginal effect of Pre-takeover\*Target is computed as  $[(E(IT| \text{Pre-takeover}=1, \text{Target}=1, \text{Pre-takeover*Target}=1, \bar{X}) - (E(IT| \text{Pre-takeover}=0, \text{Target}=1, \text{Pre-takeover*Target}=0, \bar{X})) - ((E(IT| \text{Pre-takeover}=1, \text{Target}=0, \text{Pre-takeover*Target}=0, \bar{X}) - (E(IT| \text{Pre-takeover}=0, \text{Target}=0, \text{Pre-takeover*Target}=0, \bar{X})))]$ , where  $\bar{X}$  represents all other covariates at their mean values. The % marginal effect (%ME) of Target\*Pre-takeover is computed as  $100 * (\text{Marginal Effect} / \text{Mean of the dependent variable})$ , if the mean of the dependent variable  $> 0$ , and as  $-100 * (\text{Marginal Effect} / \text{Mean of the dependent variable})$ , if the mean of the dependent variable  $< 0$ .

**Table 8 (cont.)**

Panel A: Top Management Purchases (Full Year)												
Independent variables	Dependent variables		# insiders <sup>a</sup>		# shares		\$ shares		% equity		# buy months <sup>b</sup>	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Ln (market cap)	-0.241	0.000	-5.536	0.000	-0.044	0.000	-0.041	0.000	-0.253	0.000		
$\sigma$	1.592	0.124	221.332	0.000	1.334	0.000	1.367	0.000	1.285	0.325		
$\Delta\sigma$	0.235	0.841	134.827	0.004	0.666	0.062	0.978	0.018	-0.073	0.963		
PRET1	-21.660	0.000	-969.070	0.000	-6.316	0.000	-7.601	0.000	-19.278	0.000		
PRET 2	-16.535	0.001	-505.850	0.005	-3.800	0.007	-4.125	0.010	-21.050	0.000		
PRET 3	-8.322	0.097	-544.734	0.004	-4.499	0.006	-4.085	0.009	-14.654	0.011		
PRET 4	-4.353	0.322	-299.694	0.051	-1.999	0.114	-1.034	0.447	-1.989	0.683		
Insider holdings	0.391	0.000	5.809	0.000	0.043	0.000	0.001	0.033	0.565	0.000		
B/M decile	0.019	0.016	1.288	0.000	0.010	0.000	0.011	0.000	0.029	0.001		
R&D/Sales	-0.005	0.544	-0.384	0.169	-0.003	0.271	-0.003	0.198	-0.009	0.356		
Liquidity	0.004	0.271	0.167	0.284	0.000	0.670	0.002	0.032	-0.015	0.002		
CAR <sub>-40,+10</sub>	0.023	0.669	-1.833	0.369	0.000	0.986	0.007	0.670	-0.023	0.708		
Pre-takeover	-0.031	0.597	-0.235	0.896	-0.011	0.481	-0.001	0.930	-0.079	0.213		
Target	0.069	0.223	1.276	0.491	0.009	0.610	0.022	0.194	0.063	0.324		
Pre-takeover * Target	-0.278	0.001	-7.695	0.002	-0.069	0.002	-0.094	0.000	-0.257	0.005		
Constant	-0.882	0.000	-82.461	0.000	-0.737	0.000	-0.277	0.000	-0.893	0.000		
N		11,052		11,052		11,052		11,052		11,052		
Chi-square p-value		0.000		0.000		0.000		0.000		0.000		
Pseudo R-squared		0.1095		0.058		0.166		0.044				
Mean of dependent variable		0.303		4.548		0.039		0.040		0.371		

  

Panel B: Top Management Purchases ( Half- Year Periods)												
First half (months -1 to -6)	-0.638 <sup>a</sup>	0.000	-11.782	0.000	-0.099	0.000	-0.104	0.000	-0.612 <sup>a</sup>	0.000		
Second half (months -7 to -12)	0.012 <sup>a</sup>	0.910	-1.290	0.513	-0.012	0.458	-0.021	0.210	-0.045 <sup>a</sup>	0.681		

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression

**Table 8 (cont.)**

Panel C: Marginal effect of Pre-takeover * Target																		
Insider Category	Dependent variables			# insiders			# shares			\$ shares			% equity			# buy months		
	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME			
<i>Full Year (months -1 to -12)</i>																		
Top management	-0.158 <sup>a</sup>	0.005	-52.193	-7.695	0.002	-169.201	-0.047	0.003	-123.511	-0.082	0.000	-208.199	-0.164 <sup>b</sup>	0.024	-44.299			
Top financial officers	-0.505 <sup>a</sup>	0.015	-481.502	-1.080	0.024	-307.799	-0.09	0.040	-246.683	-0.016	0.002	-518.970	-0.488 <sup>a</sup>	0.024	-372.091			
All officers	-0.163 <sup>b</sup>	0.013	-34.071	-6.497	0.001	-155.946	-0.041	0.002	-110.222	-0.057	0.000	-172.916	-0.149 <sup>b</sup>	0.009	-35.981			
All directors	-0.181 <sup>b</sup>	0.003	-20.328	-10.192	0.000	-102.263	-0.064	0.002	-59.446	-0.093	0.000	-107.537	-0.191 <sup>b</sup>	0.001	-23.613			
Blockholders	0.026 <sup>a</sup>	0.665	30.824	-51.620	0.162	-389.553	-0.349	0.178	-284.981	-0.296	0.293	-293.678	-0.021 <sup>a</sup>	0.639	-17.560			
<i>First half year (months -1 to -6)</i>																		
Top management	-0.260 <sup>a</sup>	0.001	-153.050	-11.782	0.000	-643.768	-0.079	0.000	-523.366	0.098	0.000	-650.112	-0.240 <sup>a</sup>	0.002	-133.663			
Top financial officers	-0.768 <sup>a</sup>	0.012	-1,360.471	-1.124	0.033	-815.281	-0.013	0.002	-988.071	-0.017	0.000	-1,608.248	-0.602 <sup>a</sup>	0.022	-945.877			
All officers	-0.376 <sup>a</sup>	0.001	-141.608	-10.083	0.000	-593.239	-0.074	0.000	-481.397	-0.087	0.000	-635.382	-0.314 <sup>a</sup>	0.000	-154.408			
All directors	-0.338 <sup>b</sup>	0.000	-66.318	-12.751	0.000	-296.059	-0.091	0.000	-200.367	-0.111	0.000	-299.713	-0.279 <sup>b</sup>	0.000	-70.766			
Blockholders	-0.014 <sup>a</sup>	0.801	-28.614	-21.959	0.311	-545.810	-0.209	0.160	-655.252	-0.328	0.139	-826.077	-0.022 <sup>a</sup>	0.622	-36.899			
<i>Second half year (months -7 to -12)</i>																		
Top management	0.004 <sup>a</sup>	0.951	1.981	-1.290	0.513	-61.135	-0.008	0.461	-50.912	-0.018	0.214	-103.786	-0.026 <sup>a</sup>	0.668	-13.472			
Top financial officers	-0.087 <sup>a</sup>	0.612	-141.117	0.063	0.905	36.698	0.002	0.583	112.937	-0.001	0.719	-107.809	-0.156 <sup>a</sup>	0.384	-227.061			
All officers	-0.029 <sup>a</sup>	0.701	-10.123	-1.210	0.441	-60.828	-0.011	0.287	-63.842	-0.016	0.154	-104.274	-0.034 <sup>a</sup>	0.540	-15.927			
All directors	0.048 <sup>b</sup>	0.441	8.927	-1.510	0.435	-32.021	-0.005	0.749	-10.244	-0.020	0.207	-50.186	0.010 <sup>b</sup>	0.863	2.263			
Blockholders	0.023 <sup>a</sup>	0.759	44.666	-9.459	0.665	-215.162	-0.091	0.518	-267.363	-0.107	0.565	-278.952	0.007 <sup>a</sup>	0.924	11.207			

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression.

**Table 9**  
**Regressions of Insider Sales**

Panel A of the table shows coefficient estimates from regressions of measures of stock sales by top management (Chairman, CEO, COO, and President) on several explanatory variables. The sample consists of 2,763 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample, with non-missing data for all the variables in the regressions. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. There are two observations for each firm: one measures insider sales during the one-year period immediately before a takeover announcement (pre-takeover period), and the other measures it during the year before that (control period). ‘# insiders’ is the number of insiders selling during a year, ‘# shares’ is the number of shares (in `000) sold during the year, ‘\$ shares’ is the dollar value of shares (in millions) sold, ‘% equity’ is the percentage of outstanding equity sold, and ‘# sales months’ is the number of pure sales months, i.e., months with some insider sales and no insider purchases. All dollar values are in inflation-adjusted 2000 dollars. The top and bottom 1% of the observations of three of the dependent variables (‘# shares’, ‘\$ shares’ and ‘% equity’) in each regression are winsorized. The independent variables, the regression models used, and computations of test statistics and marginal effect are as described in Table 8. Panel A shows coefficient estimates for the full sample period. Panel B shows the coefficient estimates of Pre-takeover\*Target in similar regressions, where the pre-takeover and control periods are partitioned into two half-year periods; these regressions are estimated separately for each half-year pre-takeover sub-periods, using the first half-year control period (i.e. half-year -3 relative to the takeover announcement date) as the control in both cases. Half-year -1 consists of months -1 to -6 relative to the takeover announcement date. Panel C presents the marginal effect (ME) of Pre-takeover\*Target and the %ME (computed as described in Table 8) from regressions for each of the five insider groups for the full year and the two half-year periods.



**Table 9 (cont.)**

Panel A: Top Management Sales (Full Year)												
Independent variables	Dependent variables		# insiders <sup>a</sup>		# shares		\$ shares		% equity		# sales months <sup>b</sup>	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Ln (market cap)	0.102	0.000	27.438	0.000	0.937	0.000	0.059	0.000	0.074	0.000		
$\sigma$	-3.498	0.002	-243.296	0.181	-5.625	0.252	-3.870	0.000	-5.946	0.000		
$\Delta\sigma$	-4.635	0.000	-358.150	0.102	-9.679	0.100	-2.555	0.015	-6.544	0.000		
PRET1	25.153	0.000	4,147.908	0.000	121.583	0.000	17.934	0.000	18.345	0.000		
PRET 2	13.027	0.001	2,547.720	0.002	81.827	0.000	11.246	0.001	10.735	0.028		
PRET 3	9.781	0.018	2,528.858	0.001	80.319	0.000	16.616	0.000	19.915	0.000		
PRET 4	-0.388	0.914	312.176	0.665	1.257	0.948	5.276	0.094	0.686	0.886		
Insider holdings	0.281	0.000	26.262	0.000	0.642	0.000	0.002	0.025	0.438	0.000		
B/M decile	-0.088	0.000	-12.172	0.000	-0.353	0.000	-0.053	0.000	-0.103	0.000		
R&D/Sales	-0.016	0.198	-3.699	0.014	-0.102	0.014	-0.014	0.047	-0.004	0.641		
Liquidity	0.024	0.000	6.443	0.000	0.192	0.000	0.031	0.000	0.046	0.000		
CAR <sub>-40,+10</sub>	-0.021	0.692	-12.143	0.226	-0.175	0.550	0.007	0.863	-0.043	0.516		
Pre-takeover	0.020	0.676	11.896	0.125	0.433	0.055	0.052	0.126	0.035	0.529		
Target	0.013	0.783	4.917	0.559	0.071	0.768	0.036	0.323	-0.048	0.411		
Pre-takeover * Target	-0.208	0.002	-42.444	0.000	-1.303	0.000	-0.220	0.000	-0.254	0.001		
Constant	-1.438	0.000	-499.890	0.000	-15.766	0.000	-0.662	0.000	-1.293	0.000		
N		11,052		11,052		11,052		11,052		11,052		
Chi-square p-value		0.000		0.000		0.000		0.000		0.000		
Pseudo R-squared		0.191		0.067		0.131		0.069				
Mean of dependent variable		0.481		35.800		0.981		0.146		0.622		

  

Panel B: Top Management Sales (Half Year Periods)												
First half (months -1 to -6)	-0.490 <sup>a</sup>	0.000	-58.879	0.000	-1.647	0.000	-0.293	0.000	-0.507 <sup>a</sup>	0.000		
Second half (months -7 to -12)	-0.097 <sup>a</sup>	0.246	-13.667	0.120	-0.381	0.116	-0.092	0.020	-0.075 <sup>a</sup>	0.408		

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression

**Table 9 (cont.)**

Panel C: Marginal effect of Pre-takeover * Target																		
Insider Category	Dependent variables			# insiders			# shares			\$ shares			% equity			# sell months		
	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME			
<i>Full Year (months -1 to -12)</i>																		
Top management	-0.300 <sup>a</sup>	0.006	-62.391	-42.444	0.000	-118.559	-1.303	0.000	-132.861	-0.248	0.000	-169.691	-0.357 <sup>b</sup>	0.008	-57.334			
Top financial officers	-0.413 <sup>a</sup>	0.048	-199.045	-7.361	0.009	-158.718	-0.225	0.004	-163.735	-0.046	0.002	-266.118	-0.406 <sup>a</sup>	0.048	-143.940			
All officers	-0.459 <sup>b</sup>	0.005	-37.732	-41.131	0.001	-72.334	-1.339	0.000	-90.649	-0.192	0.000	-109.241	-0.308 <sup>b</sup>	0.011	-29.256			
All directors	-0.315 <sup>b</sup>	0.000	-35.729	-35.191	0.002	-58.625	-1.352	0.000	-90.452	-0.202	0.000	-83.937	-0.223 <sup>b</sup>	0.021	-23.644			
Blockholders	-0.035 <sup>a</sup>	0.718	-28.463	-199.228	0.009	-590.774	-2.987 <sup>*</sup>	0.007 <sup>*</sup>		-1.306	0.042	-598.871	-0.027 <sup>a</sup>	0.669	-20.009			
<i>First half year (months -1 to -6)</i>																		
Top management	-0.658 <sup>a</sup>	0.000	-230.987	-58.879	0.000	-371.883	-1.647 <sup>*</sup>	0.000 <sup>*</sup>		-0.343	0.000	-523.117	-0.594 <sup>a</sup>	0.000	-194.966			
Top financial officers	-0.846 <sup>a</sup>	0.015	-705.912	-8.400	0.001	-406.255	-0.260	0.000	-416.393	-0.051	0.000	-657.834	-0.721 <sup>a</sup>	0.022	-520.855			
All officers	-1.090 <sup>b</sup>	0.000	-152.008	-51.680	0.000	-216.188	-1.524	0.000	-226.672	-0.240	0.000	-295.751	-0.642 <sup>b</sup>	0.000	-123.380			
All directors	-0.672 <sup>b</sup>	0.000	-131.665	-56.782	0.000	-225.792	-1.693	0.000	-255.985	-0.294	0.000	-275.689	-0.524 <sup>b</sup>	0.000	-112.863			
Blockholders	-0.022 <sup>a</sup>	0.861	-31.224	-118.972	0.011	-1,143.917	-1.529	0.019	-1,083.358	-0.789	0.014	-1,169.673	-0.080 <sup>a</sup>	0.347	-121.059			
<i>Second half year (months -7 to -12)</i>																		
Top management	-0.124 <sup>a</sup>	0.263	-40.849	-13.667	0.120	-79.982	-0.381	0.116	-83.363	-0.105	0.020	-147.700	-0.078 <sup>a</sup>	0.424	-23.909			
Top financial officers	-0.166 <sup>a</sup>	0.471	-130.895	-0.041	0.987	-1.826	-0.006	0.935	-8.853	-0.009	0.516	-104.593	-0.196 <sup>a</sup>	0.380	-134.133			
All officers	-0.024 <sup>b</sup>	0.877	-3.181	-3.888	0.624	-15.421	-0.113	0.627	-16.057	-0.033	0.318	-38.390	0.005 <sup>b</sup>	0.966	0.897			
All directors	0.000 <sup>b</sup>	1.000	-0.007	-3.602	0.670	-13.367	-0.077	0.743	-10.996	-0.036	0.404	-31.428	0.029 <sup>b</sup>	0.735	5.817			
Blockholders	0.057 <sup>a</sup>	0.520	76.886	-26.850	0.507	-273.434	-0.349	0.454	-232.434	-0.221	0.476	-337.144	0.050 <sup>a</sup>	0.428	74.315			

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression, \*Reports the regression coefficient and its p-value instead of ME and its p-value, as the ME estimation is non-convergent.

**Table 10****Regressions of Insiders' Net Purchases**

Panel A of the table shows coefficient estimates from OLS regressions of measures of net purchases of top management (Chairman, CEO, COO, and President) on several explanatory variables. The sample consists of 2,763 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample, with non-missing data for all the variables in the regressions. There are two observations for each firm: one measures insiders' net purchases during the one-year period immediately before a takeover announcement (pre-takeover period), and the other measures it during the year before that (control period). '# shares' is the net number of shares (in '000) bought by insiders during a year, '\$ shares' is the net dollar value of shares (in millions) bought during the year, and '% equity' is the net percentage of outstanding equity bought. All dollar values are in inflation-adjusted 2000 dollars. The top and bottom 1% of the observations of dependent variables in each regression have been winsorized. The independent variables are as in Table 8. Panel A shows coefficient estimates for the full sample period. Panel B shows coefficient estimates of Pre-takeover\*Target in similar regressions, where the pre-takeover and control periods are partitioned into two half-year periods; these regressions are estimated separately for each half-year pre-takeover sub-periods, using the first half-year control period (i.e. half-year -3 relative to the takeover announcement date) as the control in both cases. Half-year -1 consists of months -1 to -6 relative to the takeover announcement date. Panel C presents the marginal effect (ME) of Pre-takeover\*Target and the %ME (computed as described in Table 8) from regressions for each of the five insider groups for the full year and the two half-year periods.

Panel A: Top Management's Net Purchase (Full Year)						
Independent variables	Dependent variables					
	# shares		\$ shares		% equity	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Ln (market cap)	-11.291	0.000	-0.460	0.000	0.003	0.276
$\sigma$	-96.560	0.100	-2.396	0.100	1.872	0.000
$\Delta\sigma$	4.266	0.953	-0.182	0.916	1.229	0.002
PRET1	-1,522.833	0.000	-41.525	0.000	-8.534	0.000
PRET 2	-1,057.997	0.002	-36.527	0.000	-5.473	0.000
PRET 3	-890.727	0.002	-26.075	0.001	-7.170	0.000
PRET 4	-24.625	0.935	2.635	0.726	-2.165	0.094
Insider holdings	-2.983	0.000	-0.068	0.000	-0.001	0.068
B/M deciles	3.125	0.000	0.076	0.000	0.016	0.000
R&D/Sales	0.760	0.001	0.022	0.003	0.002	0.003
Liquidity	-2.758	0.000	-0.086	0.000	-0.013	0.000
CAR <sub>-40,+10</sub>	5.428	0.073	0.068	0.419	0.002	0.889
Pre-takeover	-1.478	0.637	-0.111	0.234	-0.008	0.532
Target	0.704	0.829	0.058	0.532	0.002	0.881
Pre-takeover * Target	8.754	0.037	0.304	0.014	0.036	0.044
Constant	48.685	0.000	2.160	0.000	-0.228	0.000
N	11,052		11,052		11,052	
F-statistic p-value	0.000		0.000		0.000	
R-squared	0.138		0.169		0.062	
Mean value of dependent variable	-31.314		-0.942		-0.107	
Panel B: Half Year Periods						
First half	6.634	0.002	0.200	0.001	0.033	0.000
Second Half	2.999	0.193	0.084	0.196	0.017	0.098

**Table 10 (cont.)**

Panel C: Marginal effect of Pre-takeover * Target									
Insider Category	Dependent variables			\$ shares			% equity		
	ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
<i>Full Year</i>									
Top management	8.754	0.037	27.96	0.304	0.014	32.27	0.036	0.044	33.78
Top financial officers	1.178	0.060	27.52	0.045	0.021	33.84	0.007	0.008	46.52
All officers	15.194	0.004	32.62	0.465	0.008	32.50	0.054	0.003	38.22
All directors	10.744	0.086	23.02	0.484	0.006	35.14	0.024	0.386	15.82
Blockholders	14.760	0.056	77.32	0.251	0.026	74.19	0.091	0.074	83.26
<i>First half (months -1 to -6)</i>									
Top management	6.634	0.002	47.62	0.200	0.001	48.14	0.033	0.000	66.02
Top financial officers	0.796	0.017	41.54	0.031	0.004	50.79	0.004	0.008	53.86
All officers	10.384	0.000	46.95	0.316	0.000	48.18	0.083	0.000	56.66
All directors	8.789	0.006	42.38	0.331	0.000	53.92	0.030	0.036	43.02
Blockholders	4.126	0.118	71.76	0.046	0.187	49.06	0.022	0.224	91.52
<i>Second half (months -7 to -12)</i>									
Top management	2.999	0.193	20.01	0.084	0.196	19.18	0.017	0.098	31.23
Top financial officers	0.071	0.842	3.46	0.003	0.757	5.41	0.002	0.275	22.17
All officers	2.947	0.333	12.76	0.084	0.358	12.31	0.009	0.378	13.26
All directors	0.484	0.884	2.18	0.015	0.871	2.33	-0.002	0.903	2.54
Blockholders	1.584	0.538	28.79	0.023	0.566	20.66	0.009	0.619	32.47

**Table 11**  
**Regressions for Sub-samples of Top Management Purchases and Sales**

The table shows marginal effects (ME), p-values and percentage marginal effects (%ME) of Pre-takeover\*Target from regressions similar to those shown in Tables 8 and 9 for nine partitions of the target sample. Regressions are estimated for each of five measures of purchases (in Panel A) or sales (in Panel B) of the top management group. The sample consists of 2,763 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample, with non-missing data for all the variables in the regressions. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. There are two observations for each firm: one measures insider trading activity during the one-year period immediately before takeover announcements (pre-takeover period), and the other measures it during the year before that (control period). Pre-takeover is a dummy variable that equals 1 (0) for the pre-takeover (control) period. Target is a dummy variable that equals 1 (0) for the target (control) firm. The dependent and independent variables, the regression models and methodology used, and computations of test statistics and marginal effects are as described in Tables 8 (for insider purchases) and 9 (for sales). The sample partitions are as described in Table 4.

**Table 11 (cont.)**

Panel A: Top Management Purchases																	
Sub-samples	Dependent variable	N	# insiders			# shares			\$ shares			% equity			# buy months		
			ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME
Merger		8,180	-0.180 <sup>a</sup>	0.014	-54.49	-8.042	0.006	-180.72	-0.056	0.003	-149.42	-0.082	0.000	-219.49	-0.214 <sup>b</sup>	0.034	-56.51
Tender offer		2,248	-0.117 <sup>a</sup>	0.192	-38.29	-5.072	0.336	-109.77	-0.021	0.523	-49.96	-0.069	0.099	-158.30	-0.110 <sup>a</sup>	0.245	-29.08
LBO		784	-0.128 <sup>a</sup>	0.364	-48.86	-13.323	0.249	-252.70	-0.030	0.454	-85.32	-0.095	0.280	-184.76	-0.033 <sup>b</sup>	0.525	-9.29
Hostile		432	0.013 <sup>a</sup>	0.491	5.84	-3.291	0.805	-79.58	-0.037	0.778	-77.39	-0.018	0.886	-48.19	0.003 <sup>a</sup>	0.336	1.13
Friendly		10,620	-0.178 <sup>a</sup>	0.004	-58.00	-7.657 <sup>*</sup>	0.003 <sup>*</sup>		-0.047	0.003	-123.42	-0.082	0.000	-206.71	-0.191 <sup>b</sup>	0.020	-50.85
Single bidder		10,324	-0.161 <sup>a</sup>	0.006	-52.27	-7.750	0.003	-166.20	-0.046	0.005	-117.97	-0.080	0.000	-198.82	-0.171 <sup>b</sup>	0.024	-45.25
Multiple bidder		728	-0.064 <sup>a</sup>	0.579	-27.42	8.556	0.918	293.00	-0.080	0.187	-229.85	-0.096	0.182	-320.67	-0.110 <sup>a</sup>	0.940	-3.91
Stock deals		3,344	-0.148 <sup>a</sup>	0.161	-45.57	-6.901	0.090	-173.81	-0.039	0.136	-107.92	-0.084	0.018	-212.87	-0.155 <sup>b</sup>	0.237	-39.06
Cash deals		4,112	-0.216 <sup>a</sup>	0.043	-79.06	-11.866	0.010	-239.44	-0.057	0.026	-155.03	-0.100	0.008	-225.84	-0.151 <sup>a</sup>	0.105	-45.28
Other deals		3,596	-0.100 <sup>a</sup>	0.200	-31.89	-3.799	0.389	-82.26	-0.041	0.173	-94.29	-0.055	0.064	-159.56	-0.135 <sup>b</sup>	0.255	-34.62
Cross border acquirer		1,748	-0.132 <sup>a</sup>	0.162	-45.59	-11.100	0.077	-250.31	-0.078	0.089	-192.39	-0.096	0.055	-272.66	-0.138 <sup>a</sup>	0.204	-40.76
Domestic acquirer		9,304	-0.154 <sup>a</sup>	0.016	-50.40	-6.987	0.011	-152.91	-0.042	0.012	-110.85	-0.080	0.000	-198.67	-0.152 <sup>b</sup>	0.059	-40.39
More regulated		2,840	-0.151 <sup>b</sup>	0.342	-40.40	-3.391	0.293	-107.64	-0.026	0.301	-63.87	-0.029	0.188	-92.99	-0.078 <sup>b</sup>	0.448	-15.52
Less regulated		8,212	-0.152 <sup>a</sup>	0.010	-54.62	-9.595	0.004	-190.71	-0.054	0.004	-143.85	-0.097	0.000	-227.00	-0.168 <sup>a</sup>	0.012	-51.29
1988-1995		2,592	-0.561 <sup>a</sup>	0.243	-291.40	-10.408	0.099	-311.72	-0.081	0.038	-261.54	-0.100	0.073	-267.84	-0.120 <sup>a</sup>	0.449	-80.25
1996-2001		5,260	-0.088 <sup>b</sup>	0.075	-23.00	-5.011	0.119	-95.40	-0.032	0.145	-64.81	-0.048	0.055	-102.97	-0.128 <sup>b</sup>	0.155	-27.21
2002-2006		3,200	-0.124 <sup>a</sup>	0.068	-45.51	-13.734	0.010	-314.34	-0.065	0.021	-248.44	-0.103	0.003	-348.63	-0.070 <sup>a</sup>	0.173	-23.77
Small target		5,784	-0.080 <sup>a</sup>	0.286	-24.20	-8.076	0.019	-151.19	-0.034	0.041	-107.60	-0.102	0.002	-174.19	-0.081 <sup>b</sup>	0.466	-19.40
Mid-size target		2,300	-0.222 <sup>a</sup>	0.241	-78.66	-12.439	0.023	-311.38	-0.084	0.023	-199.60	-0.081	0.021	-313.46	-0.405 <sup>b</sup>	0.152	-119.78
Large target		2,968	-0.087 <sup>a</sup>	0.188	-33.32	-2.623	0.599	-76.49	-0.033	0.407	-67.75	-0.022	0.300	-159.30	-0.084	0.176	-27.40
NYSE target		3,164	-0.063 <sup>a</sup>	0.330	-24.47	-3462	0.452	-103.25	-0.029	0.458	-64.91	-0.034	0.177	-192.31	-0.041 <sup>b</sup>	0.389	-12.70
AMEX target		924	-0.952 <sup>a</sup>	0.207	-322.19	-17.255	0.079	-338.44	-0.152	0.024	-414.73	-0.207	0.027	-350.91	-2.248 <sup>b</sup>	0.230	-585.04
NASDAQ target		6,964	-0.168 <sup>a</sup>	0.036	-51.86	-8.264	0.008	-164.70	-0.042	0.015	-116.68	-0.091	0.001	-193.36	-0.144 <sup>b</sup>	0.097	-36.82

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression, \*Reports the regression coefficient and its p-value instead of ME and its p-value, as the ME estimation is non-convergent.

**Table 11 (cont.)**

Panel B: Top Management Sales																	
Sub-samples	Dependent variable	N	# insiders			# shares			\$ shares			% equity			# sales months		
			ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME	ME	p-value	% ME
Merger		8,180	-0.202 <sup>a</sup>	0.076	-40.80	-31.826	0.011	-88.44	-0.943	0.010	-94.58	-0.216	0.000	-149.66	-0.230 <sup>b</sup>	0.093	-36.26
Tender offer		2,248	-0.514 <sup>a</sup>	0.118	-122.44	-49.922	0.038	-168.09	-1.758	0.008	-219.57	-0.183	0.113	-124.88	-0.553 <sup>b</sup>	0.147	-102.10
LBO		784	-1.682 <sup>a</sup>	0.077	-324.84	-149.775	0.009	-279.57	-4.235	0.008	-302.11	-0.591	0.002	-342.16	-2.451 <sup>b</sup>	0.119	-346.21
Hostile		432	-0.445 <sup>a</sup>	0.255	-77.20	-199.94	0.006	-318.71	-5.947	0.005	-327.08	-0.495	0.009	-294.06	-1.695 <sup>b</sup>	0.255	-218.62
Friendly		10,620	-0.298 <sup>a</sup>	0.008	-62.39	-36.861	0.001	-106.22	-1.131 <sup>*</sup>	0.000 <sup>*</sup>		-0.234	0.000	-161.43	-0.336 <sup>b</sup>	0.013	-54.55
Single bidder		10,324	-0.273 <sup>a</sup>	0.012	-55.85	-42.139	0.000	-116.89	-1.287	0.000	-131.13	-0.243	0.000	-162.41	-0.330 <sup>b</sup>	0.013	-52.30
Multiple bidder		728	-1.160 <sup>a</sup>	0.210	-301.71	-46.433	0.347	-143.98	-1.463	0.348	-151.34	-0.257	0.109	-270.14	-1.547 <sup>b</sup>	0.358	-306.11
Stock deals		3,344	-0.186 <sup>a</sup>	0.243	-36.19	-36.561	0.054	-103.43	-1.264	0.030	-118.95	-0.257	0.009	-169.29	-0.188 <sup>b</sup>	0.371	-30.07
Cash deals		4,112	-0.685 <sup>a</sup>	0.028	-152.52	-41.949	0.023	-117.70	-1.185	0.017	-138.07	-0.231	0.005	-149.49	-1.019 <sup>b</sup>	0.033	-160.40
Other deals		3,596	-0.292 <sup>a</sup>	0.059	-59.62	-52.093	0.009	-143.10	-1.571	0.008	-150.52	-0.238	0.008	-181.82	-0.203 <sup>b</sup>	0.191	-33.58
Cross border acquirer		1,748	-0.236 <sup>a</sup>	0.291	-47.49	-37.935	0.162	-108.84	-1.110	0.136	-119.34	-0.272	0.044	-173.19	-0.281 <sup>b</sup>	0.122	-42.25
Domestic acquirer		9,304	-0.329 <sup>a</sup>	0.007	68.69	-43.629	0.000	-121.26	-1.356	0.000	-136.98	-0.246	0.000	-170.72	-0.354 <sup>b</sup>	0.029	-57.73
More regulated		2,840	-0.334 <sup>a</sup>	0.491	-82.53	-18.644	0.194	-122.03	-0.666	0.183	-126.91	-0.103	0.113	-152.34	-0.589 <sup>b</sup>	0.529	-127.74
Less regulated		8,212	-0.353 <sup>a</sup>	0.012	-69.46	-50.187	0.000	-116.99	-1.516	0.000	-133.19	-0.272	0.000	-157.04	-0.481 <sup>b</sup>	0.013	-71.02
1988-1995		2,592	-0.345 <sup>a</sup>	0.369	-130.92	-6.929	0.738	-44.95	-0.280	0.642	-71.33	0.000	0.999	0.09	-0.191 <sup>a</sup>	0.543	-54.03
1996-2001		5,260	-0.313 <sup>a</sup>	0.029	-61.75	-46.519	0.003	-137.86	-1.622	0.001	-158.39	-0.294	0.000	-198.90	-0.335 <sup>b</sup>	0.038	-58.93
2002-2006		3,200	-0.270 <sup>a</sup>	0.077	-43.76	-56.424	0.007	-101.32	-1.476	0.011	-106.47	-0.254	0.001	-152.46	-0.373 <sup>b</sup>	0.095	-40.23
Small target		5,784	-0.651 <sup>a</sup>	0.071	-198.39	-29.477	0.027	-150.45	-0.677 <sup>*</sup>	0.022 <sup>*</sup>		-0.269	0.002	-186.44	-1.147 <sup>b</sup>	0.149	-259.04
Mid-size target		2,300	-0.876 <sup>a</sup>	0.111	-159.12	-33.938	0.131	-79.05	-0.747	0.196	-72.70	-0.151	0.136	-82.71	-1.161 <sup>b</sup>	0.215	-158.77
Large target		2,968	0.046 <sup>b</sup>	0.719	5.79	-62.812	0.006	-101.54	-2.274	0.002	-103.87	-0.214	0.002	-175.21	-0.370 <sup>b</sup>	0.094	-41.79
NYSE target		3,164	-0.247 <sup>a</sup>	0.200	-41.18	-60.456	0.007	-126.00	-1.900	0.008	-118.13	-0.209	0.003	-196.32	-0.624 <sup>b</sup>	0.029	-83.30
AMEX target		924	-0.115 <sup>a</sup>	0.886	-44.09	7.386	0.860	43.77	-0.036	0.963	-12.86	-0.123	0.618	-92.12	1.098 <sup>a</sup>	0.536	318.94
NASDAQ target		6,964	-0.459 <sup>a</sup>	0.007	-100.48	-39.120	0.003	-119.36	-1.145	0.001	-145.14	-0.276	0.000	-166.78	-0.375 <sup>b</sup>	0.063	-62.38

<sup>a</sup>Poisson regression, <sup>b</sup>Negative binomial regression, \*Reports the regression coefficient and its p-value instead of ME and its p-value, as the ME estimation is non-convergent.

**Table 12**

**Regressions for Sub-samples of Insider Net Purchases**

The table shows marginal effects (ME), p-values and percentage marginal effects (%ME) of Pre-takeover\*Target from regressions similar to those shown in Panels A and C of Table 10 for nine partitions of the target sample. Regressions are estimated for each of three measures of net purchases. Panels A through E show the results for each of the five insider groups. The sample consists of 2,763 target firms in takeover transactions announced during 1988-2006 with a deal value of \$1 million or more, and an industry-size matched control sample, with non-missing data for all the variables in the regressions. Both target and control firms are listed on the NYSE, AMEX, or NASDAQ. There are two observations for each firm: one measures insider trading activity during the one-year period immediately before takeover announcements (pre-takeover period), and the other measures it during the year before that (control period). Pre-takeover is a dummy variable that equals 1 (0) for the pre-takeover (control) period. Target is a dummy variable that equals 1 (0) for the target (control) firm. The dependent and independent variables, the regression models and methodology used, and computations of test statistics and marginal effects are as described in Table 10. The sample partitions are as described in Table 4.

Panel A: Top Management Net Purchases										
Sub-samples	N	# shares			\$ shares			% equity		
		ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
Merger	8,180	6.122	0.203	19.37	0.188	0.193	19.61	0.035	0.085	32.60
Tender offer	2,248	10.566	0.212	42.12	0.491	0.038	64.67	-0.001	0.987	0.67
LBO	784	27.792	0.181	57.40	0.884	0.134	64.66	0.108	0.157	88.30
Hostile	432	68.109	0.023	63.59	2.059	0.021	116.58	0.164	0.092	124.24
Friendly	10,620	6.655	0.111	22.03	0.240	0.051	26.38	0.032	0.078	30.27
Single bidder	10,324	8.431	0.052	26.81	0.294	0.021	31.20	0.035	0.066	31.47
Multiple bidder	728	14.106	0.403	48.08	0.434	0.408	46.58	0.051	0.369	77.98
Stock deals	3,344	4.526	0.544	14.37	0.209	0.371	20.34	0.048	0.155	41.89
Cash deals	4,112	8.978	0.192	29.12	0.315	0.089	38.30	0.044	0.142	39.64
Other deals	3,596	13.024	0.081	41.08	0.392	0.084	39.33	0.015	0.597	15.93
Cross border acquirer	1,748	4.990	0.640	16.38	0.188	0.526	21.20	0.043	0.379	34.94
Domestic acquirer	9,304	9.443	0.038	30.01	0.326	0.016	30.20	0.036	0.064	34.18
More regulated	2,840	3.607	0.468	29.41	0.130	0.454	26.75	0.029	0.194	76.88
Less regulated	8,212	10.442	0.050	27.55	0.362	0.019	32.88	0.035	0.119	27.04
1988-1995	2,592	-1.077	0.844	-8.88	0.031	0.844	8.57	-0.057	0.105	-70.83
1996-2001	5,260	5.293	0.379	18.51	0.291	0.116	29.94	0.045	0.095	44.91
2002-2006	3,200	23.346	0.014	45.50	0.585	0.028	43.04	0.077	0.011	56.29
Small target	5,784	1.141	0.782	7.94	0.061	0.502	19.69	0.023	0.380	26.37
Mid-size target	2,300	7.134	0.461	18.28	0.106	0.674	10.70	0.004	0.930	2.35
Large target	2,968	26.988	0.013	46.24	1.032	0.004	48.36	0.073	0.009	67.58
NYSE target	3,164	19.040	0.042	42.70	0.604	0.048	38.76	0.054	0.042	60.35
AMEX target	924	-12.268	0.257	-101.72	-0.171	0.378	-70.10	-0.046	0.512	-58.72
NASDAQ target	6,964	7.692	0.117	27.64	0.265	0.048	35.19	0.039	0.109	32.40



**Table 12 (cont.)**

Panel B: Top Financial Officers' Net Purchases										
Sub-samples	Dependent variable N	# shares			\$ shares			% equity		
		ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
Merger	8,180	0.914	0.218	20.51	0.033	0.164	23.27	0.006	0.027	43.99
Tender offer	2,248	0.678	0.569	21.79	0.052	0.127	57.24	0.002	0.687	18.43
LBO	784	4.892	0.076	82.17	0.113	0.177	64.42	0.015	0.067	106.88
Hostile	432	3.869	0.311	55.17	0.134	0.314	57.08	0.009	0.367	59.17
Friendly	10,620	1.31	0.073	27.13	0.043	0.028	33.25	0.007	0.010	46.53
Single bidder	10,324	1.356	0.037	31.48	0.051	0.012	37.95	0.007	0.006	49.51
Multiple bidder	728	-1.445	0.541	-37.26	-0.042	0.604	-32.22	-0.003	0.648	-36.39
Stock deals	3,344	0.716	0.520	17.38	0.021	0.574	14.59	0.008	0.066	61.78
Cash deals	4,112	1.500	0.140	34.78	0.041	0.163	34.93	0.007	0.087	45.00
Other deals	3,596	1.104	0.326	25.14	0.071	0.051	48.83	0.004	0.381	28.09
Cross border acquirer	1,748	1.833	0.221	44.90	0.052	0.257	42.60	0.003	0.669	18.64
Domestic acquirer	9,304	1.056	0.124	24.47	0.044	0.042	32.39	0.007	0.007	51.31
More regulated	2,840	-0.046	0.958	-2.07	0.021	0.490	25.84	0.005	0.211	52.62
Less regulated	8,212	1.610	0.039	32.29	0.054	0.027	35.14	0.007	0.024	43.47
1988-1995	2,592	0.639	0.254	75.69	0.018	0.279	74.74	0.002	0.410	49.59
1996-2001	5,260	0.787	0.339	21.61	0.044	0.135	32.02	0.005	0.133	42.43
2002-2006	3,200	2.366	0.137	29.17	0.075	0.098	34.25	0.011	0.045	46.10
Small target	5,784	0.742	0.211	39.97	0.017	0.227	41.34	0.006	0.122	47.59
Mid-size target	2,300	0.754	0.575	16.38	0.025	0.516	19.79	0.003	0.595	15.77
Large target	2,968	2.829	0.095	32.33	0.139	0.017	43.43	0.010	0.009	68.15
NYSE target	3,164	1.994	0.178	29.11	0.089	0.073	37.59	0.009	0.017	68.88
AMEX target	924	-0.352	0.751	-34.63	-0.009	0.745	-34.12	0.004	0.610	45.93
NASDAQ target	6,964	1.170	0.099	33.00	0.038	0.069	37.41	0.006	0.075	39.03

**Table 12 (cont.)**

Panel C: All Officers' Net Purchases										
Sub-samples	N	# shares			\$ shares			% equity		
		ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
Merger	8,180	9.471	0.128	19.65	0.247	0.232	16.51	0.044	0.033	30.94
Tender offer	2,248	22.588	0.019	69.46	0.884	0.004	87.29	0.049	0.206	39.06
LBO	784	60.433	0.016	88.12	1.632	0.036	84.80	0.132	0.090	71.84
Hostile	432	84.808	0.019	111.61	2.169	0.088	84.54	0.156	0.108	91.84
Friendly	10,620	12.669	0.017	27.91	0.405	0.019	29.24	0.050	0.006	36.18
Single bidder	10,324	14.129	0.010	30.17	0.441	0.014	30.84	0.051	0.007	35.22
Multiple bidder	728	30.033	0.161	69.72	0.736	0.336	49.97	0.085	0.131	88.59
Stock deals	3,344	5.867	0.520	13.76	0.155	0.629	10.60	0.053	0.085	42.01
Cash deals	4,112	16.323	0.065	33.65	0.516	0.049	40.15	0.072	0.029	41.99
Other deals	3,596	22.709	0.018	47.26	0.712	0.030	45.25	0.028	0.301	23.76
Cross border acquirer	1,748	25.623	0.068	52.23	0.785	0.077	51.81	0.088	0.079	54.77
Domestic acquirer	9,304	13.130	0.022	28.47	0.402	0.034	28.39	0.045	0.017	33.20
More regulated	2,840	5.866	0.389	27.12	0.170	0.518	19.77	0.027	0.220	43.13
Less regulated	8,212	18.305	0.006	33.15	0.563	0.009	34.57	0.060	0.008	35.74
1988-1995	2,592	-0.147	0.967	-2.02	0.070	0.601	27.21	-0.012	0.542	-26.81
1996-2001	5,260	12.228	0.084	32.24	0.478	0.057	34.84	0.059	0.026	47.97
2002-2006	3,200	33.679	0.010	36.37	0.832	0.040	33.57	0.089	0.021	36.24
Small target	5,784	7.080	0.148	34.08	0.197	0.106	45.40	0.044	0.084	37.23
Mid-size target	2,300	14.635	0.216	28.02	0.345	0.294	26.12	0.057	0.173	29.69
Large target	2,968	36.368	0.010	39.32	1.290	0.012	37.28	0.057	0.047	39.27
NYSE target	3,164	23.318	0.059	32.86	0.722	0.102	28.15	0.055	0.045	44.29
AMEX target	924	-7.876	0.449	-62.26	-0.154	0.405	-62.33	-0.021	0.701	-31.91
NASDAQ target	6,964	16.209	0.008	40.06	0.486	0.008	45.23	0.062	0.010	39.70

**Table 12 (cont.)**

Panel D: All Directors' Net Purchases										
Sub-samples	N	# shares			\$ shares			% equity		
		ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
Merger	8,180	5.604	0.444	11.77	0.387	0.065	27.41	0.014	0.652	9.50
Tender offer	2,248	19.111	0.110	52.69	0.553	0.099	50.85	0.029	0.633	19.06
LBO	784	46.033	0.103	70.52	1.427	0.071	77.66	0.070	0.531	46.28
Hostile	432	67.163	0.082	93.93	1.824	0.128	80.53	0.266	0.084	149.66
Friendly	10,620	8.584	0.173	18.80	0.432	0.015	32.23	0.016	0.577	10.44
Single bidder	10,324	9.544	0.143	20.23	0.753	0.014	32.71	0.018	0.529	11.69
Multiple bidder	728	25.757	0.205	70.35	0.863	0.197	68.66	0.096	0.327	97.43
Stock deals	3,344	2.672	0.811	5.89	0.568	0.102	37.14	-0.008	0.877	-5.49
Cash deals	4,112	12.401	0.211	27.40	0.420	0.104	35.93	0.048	0.311	28.79
Other deals	3,596	17.401	0.132	35.12	0.513	0.116	34.79	0.026	0.564	18.06
Cross border acquirer	1,748	18.275	0.269	36.41	0.476	0.305	32.94	0.024	0.759	11.87
Domestic acquirer	9,304	9.190	0.173	19.97	0.482	0.012	35.32	0.021	0.472	14.77
More regulated	2,840	7.490	0.389	33.12	0.458	0.110	52.81	0.021	0.595	36.20
Less regulated	8,212	11.787	0.132	21.43	0.494	0.023	31.77	0.019	0.578	10.34
1988-1995	2,592	-2.130	0.792	-13.19	0.152	0.516	29.65	-0.067	0.187	-71.39
1996-2001	5,260	13.868	0.125	31.66	0.648	0.017	44.26	0.067	0.121	44.20
2002-2006	3,200	16.444	0.238	21.60	0.509	0.162	26.25	0.019	0.696	9.51
Small target	5,784	0.670	0.909	3.34	0.161	0.157	40.26	0.019	0.633	16.35
Mid-size target	2,300	16.901	0.218	31.51	0.448	0.181	33.40	0.031	0.609	14.54
Large target	2,968	30.059	0.074	32.29	1.332	0.014	40.20	0.019	0.674	11.15
NYSE target	3,164	26.546	0.052	41.00	1.022	0.020	44.78	0.031	0.464	23.38
AMEX target	924	-9.673	0.529	-55.72	0.022	0.939	6.11	-0.005	0.962	-5.37
NASDAQ target	6,964	8.344	0.261	19.70	0.364	0.060	33.09	0.030	0.427	17.44

**Table 12 (cont.)**

Panel E: Blockholders' Net Purchases										
Sub-samples	N	# shares			\$ shares			% equity		
		ME	p-value	%ME	ME	p-value	%ME	ME	p-value	%ME
Merger	8,180	16.188	0.071	81.49	0.267	0.040	77.69	0.093	0.112	81.08
Tender offer	2,248	24.228	0.135	175.94	0.404	0.088	150.98	0.173	0.116	223.13
LBO	784	-38.047	0.250	-159.14	-0.510	0.308	-109.88	-0.155	0.516	-117.05
Hostile	432	-6.987	0.811	-93.68	-0.010	0.980	-5.05	-0.100	0.663	-172.40
Friendly	10,620	15.386	0.053	78.65	0.258	0.025	75.13	0.099	0.059	88.76
Single bidder	10,324	15.875	0.049	80.64	0.267	0.023	77.01	0.106	0.048	91.77
Multiple bidder	728	-4.800	0.843	-45.12	-0.029	0.932	-13.03	-0.162	0.311	-587.41
Stock deals	3,344	12.999	0.353	62.73	0.281	0.170	77.34	0.083	0.366	70.40
Cash deals	4,112	8.699	0.473	56.89	0.121	0.474	42.46	0.042	0.620	40.21
Other deals	3,596	23.268	0.100	106.17	0.365	0.084	97.24	0.152	0.087	141.36
Cross border acquirer	1,748	16.685	0.407	98.02	0.420	0.143	127.18	0.133	0.320	130.64
Domestic acquirer	9,304	14.564	0.082	74.77	0.221	0.071	65.01	0.083	0.132	75.22
More regulated	2,840	19.936	0.035	522.89	0.242	0.079	260.16	0.069	0.276	227.10
Less regulated	8,212	12.612	0.201	51.75	0.248	0.083	58.68	0.099	0.130	72.08
1988-1995	2,592	9.533	0.447	118.16	0.063	0.728	38.79	0.066	0.511	104.88
1996-2001	5,260	17.171	0.132	89.01	0.382	0.027	102.59	0.123	0.111	104.94
2002-2006	3,200	17.674	0.262	63.84	0.222	0.306	52.23	0.077	0.393	57.59
Small target	5,784	0.445	0.962	3.06	-0.002	0.985	-1.12	0.059	0.419	53.91
Mid-size target	2,300	28.687	0.099	134.08	0.464	0.079	113.18	0.123	0.278	95.02
Large target	2,968	31.415	0.081	119.90	0.567	0.058	96.89	0.123	0.175	132.00
NYSE target	3,164	22.372	0.155	104.47	0.315	0.207	71.71	0.123	0.156	133.45
AMEX target	924	28.081	0.269	173.77	0.460	0.222	155.67	0.126	0.513	128.49
NASDAQ target	6,964	9.847	0.294	53.45	0.201	0.118	67.30	0.074	0.264	62.13