

Saliency, Awareness, and the Real Consequence of Information Bundling[☆]

Tian Qiu^a

^a*Department of Finance & Quantitative Methods,
University of Kentucky, Lexington, KY 40506*

Abstract

Firms often bundle announcements of corporate events, such as dividend changes and repurchases, together with quarterly earnings news. This paper studies the real consequence of this disclosure practice in the context of the market for corporate control. I find bundled repurchase announcements significantly increase the announcer's likelihood of becoming a takeover target. Daily Bloomberg news readership data confirms increased awareness is a channel for this effect. Consistent with this channel, targets in bundling-induced takeovers are ex ante less visible. To facilitate causal inference, I use difference-in-differences and instrumental variable estimations to alleviate omitted variables and self-selection concerns.

Keywords: Disclosure Practice, Information Bundling, Saliency and Awareness, M&A
JEL Codes: G34, G35, M41

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Email address: tian.qiu@uky.edu (Tian Qiu)

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1. Introduction

Publicly traded firms often bundle the announcements of less anticipated corporate events, such as dividend changes and repurchase programs, together with prescheduled quarterly earnings news. In my sample, 28% of the repurchases are announced together with earnings. Previous literature has extensively documented the immediate market reactions to information bundling.¹ However, the real consequences of information bundling have not been well explored. This paper helps bridge the gap in the literature by examining the effect of information bundling on takeover, which is one of the most important real consequences for the shareholders of the firm. This research question is important because it would suggest, in addition to a short-run price impact on the stock price, a firm's disclosure practice has important long-run real effects.

In their survey of corporate top executives, [Brav, Graham, Harvey, and Michaely \(2005\)](#) show the belief of market misvaluation is regarded as the most important driver of repurchase decisions. Under this mindset, repurchase announcements could increase the perceived value of the firm in the eyes of potential acquirers and attract takeover. A firm can make a standalone repurchase announcement or bundle it with other corporate announcements. An acquirer who is already paying close attention to their targets would notice the repurchase news regardless of whether it is bundled. However, for a potential acquirer who does not yet have a set of targets in mind, a repurchase announcement bundled with wide-reaching and prescheduled quarterly earnings news is more salient and will receive greater awareness. A repurchase announcement is not drowned when bundled with earnings: As the three examples in [Figure 1](#) show, when bundled, repurchases are typically discussed in highly visible places and salient to the audience. Incorporating limited attention in their model, [Hirshleifer and](#)

¹Examples include [Kane, Lee, and Marcus \(1984\)](#), [Hoskin, Hughes, and Ricks \(1986\)](#), [Easton \(1991\)](#), [Conroy, Eades, and Harris \(2000\)](#), [Kaplan \(2014\)](#), [Segal and Segal \(2016\)](#), [Gaspar, Lescourret, and Wang \(2017\)](#), and [Lee and Zhu \(2020\)](#), among many others.

Teoh (2003) show higher salience induces greater awareness and alters perception. Adapting their model into the M&A framework, I hypothesize and find that bundling repurchase announcements with earnings increases awareness and results in higher likelihood of becoming a takeover target. The takeover attraction mechanism in this paper is different from Edmans, Goldstein, and Jiang (2012). Edmans et al. (2012) show persistent actual undervaluation, driven by market frictions such as mutual fund outflows, causes takeover. The focus of this paper is instead on the perceived value of the firm. Flow driven undervaluation can be precisely calculated and makes the target desirable to all potential acquirers. On the other hand, the effect of information bundling on perceived valuation varies depending on the information sets and utility functions of different acquirers. As a result of this distinction, the economic magnitude of the takeover attraction effect captured in this paper is smaller (one-third in size) than the one reported by Edmans et al. (2012).

Merger and Acquisition deals can be initiated by acquiring firms or investment banks. Bundling-induced awareness can increase takeover likelihood in both cases. In company-initiated deals, the executives of the acquiring firm are the main decision-maker in deal initiation. Managers may not be able to pay close attention to other firms on a daily basis because they have to tend to the operation of their own firms. In bank-initiated cases, the investment bankers are the main decision-maker in deal initiation (Bao and Edmans, 2011). Investment professionals have a large number of companies to keep track of as well as other activities to engage in. Consequently, they will prioritize their time for important prescheduled information events such as earnings announcements. In both of these cases, the bundled signals are more likely to be captured by the decision-makers than unbundled ones. Consistent with the channel, I find bundling-induced takeover deals have characteristics that indicate low ex ante awareness: They are more likely to be cross-border, diversifying, and

involve ex ante inconspicuous² targets.

Establishing a causal link between information bundling and takeover likelihood is empirically challenging due to two endogeneity concerns. First, time-invariant unobservable firm characteristics (omitted variables) associated with both high takeover vulnerability and the tendency to bundle could make firms that conduct bundled announcements inherently more vulnerable to takeovers. To address this omitted variable concern, I need to show there is indeed increased takeover vulnerability driven by bundled repurchase announcements. I construct a difference-in-differences (DiD) test comparing changes in short interest around bundled and standalone repurchase announcements. Even though the choice to bundle is endogenous to the firm, it is not systematically determined by the short sellers. Thus, the exogeneity requirement is likely satisfied in this setting from the short sellers' perspective. Target firms experience significant positive abnormal returns upon takeover announcements (Lang, Stulz, and Walkling, 1989; Servaes, 1991). Consequently, Meneghetti, Williams, and Xiao (2019) document an increase in takeover likelihood significantly limits informed short-selling activities. If bundled repurchase announcements increase takeover vulnerability, we should observe a reduction in short interest for these firms. Consistent with this prediction, I find significant reduction in short interest for bundling firms in the quarter following repurchase announcements. Tightening the causal link even further, in a triple-diff setting, I find the reduction in short interest is concentrated in firms that receive takeover bids in the following year. The results from this experiment suggest my finding is unlikely to be driven by unobservable firm characteristics that simultaneously affect bundling choice and latent takeover vulnerability.

The second endogeneity concern involves time-varying unobservable takeover threats and self-selection on bundling. This concern differs from the previous one in that it focuses on

²As modeled in Billett and Xue (2007).

the time-series fluctuation of a firm's takeover vulnerability and its influence on manager's information bundling decision. Prior literature suggests repurchase can be used as a takeover deterrence mechanism (Bagnoli, Gordon, and Lipman, 1989; Bagwell, 1991; Billett and Xue, 2007; Cheng and Zhang, 2012). To deter undesirable takeovers, a rational manager may choose to bundle repurchase announcements with earnings when the firm is most vulnerable to takeover threats. The parallel trends in the previous DiD test suggest that short sellers do not perceive bundling firms to be more vulnerable to a takeover prior to repurchase announcements. However, if managers have more information about the value of their firms than short sellers, the parallel trend may not rule out self-selection. To further alleviate this concern, I use the firm's previous bundling choice as an instrument for the current bundling decision. The local average treatment effect captured by this instrument is driven by the time-invariant characteristics of the firm and plausibly orthogonal to the contemporaneous takeover vulnerability. Empirically, the gap between an average firm's two repurchase announcements is greater than a year. The exclusion restriction is likely satisfied because previous bundling choice from a year ago should not be associated with the time-varying component of the firm's current takeover vulnerability. I continue to find takeover attraction effect of bundled repurchase announcements under this 2SLS specification. The result from this IV estimation further mitigates the self-selection concerns.

I apply a two-stage local treatment effect model to analyze the investor awareness channel. Using Bloomberg daily firm-level news readership data, I first show bundled repurchase announcements generate significantly higher awareness than standalone repurchase announcements. The economic magnitude of the increase in daily news readership due to bundling is comparable to the effect of a change in analyst's recommendation. In the second stage, I show takeover likelihood is higher for firms with higher bundling-induced investor awareness. Taken together, my findings show bundling significantly increases investor awareness, which in turn increases the takeover vulnerability.

This paper contributes to the literature on information bundling in financial reporting and disclosure by providing evidence on the real consequence of bundling. Given the popularity of this bundling practice, the literature has extensively studied its immediate market impact. [Kane et al. \(1984\)](#) show dividend changes announced concurrently with earnings serve as an additional signal regarding the firm’s operating performance. Consequently, the market reaction is stronger if the direction of dividend change matches the direction of the earnings surprise. Using an instrumental variable approach, [Kaplan \(2014\)](#) shows bundled dividend announcements reduce investor rational inattention and generate a greater immediate market reaction. Using a broad set of disclosures (dividends, stock splits, qualitative comments by officers, and details of operation) that are bundled with earnings, [Hoskin et al. \(1986\)](#) show the market reacts to the incremental information contained in these additional disclosures. Utilizing a DiD setting to establish causality, [Bliss, Partnoy, and Furchtgott \(2018\)](#) show that bundling good news with bad news (earnings restatements) can offset the immediate price declines caused by the restatement, while bundling bad news with earnings restatements exacerbates price declines. Using detailed trade-level data, [Lee and Zhu \(2020\)](#) show that active funds treat bundled news as an important source of information and are skilled at differentiating unexpected guidance news from the earnings news. The findings in this paper add to the literature by documenting the real consequences of information bundling. These findings also provide practical evidence regarding the real consequences of a company’s disclosure practice.

This paper also contributes to the literature on the interaction between repurchases and takeovers. The existing empirical literature focuses mainly on the takeover deterrence effect of repurchases. [Bagwell \(1991\)](#) shows, in the presence of heterogeneous investors and upward sloping supply curve, shares repurchased by the firm are sold by investors who value the stock least; therefore repurchases deter takeover by increasing takeover cost. [Billett and Xue \(2007\)](#) show firms that are more vulnerable to takeovers ex-ante repurchase more. My approach is

distinct from prior research in that I focus on the announcements of repurchases, while prior research focused on the level of actual repurchase. The level of the actual repurchase is more related to the takeover deterrence effect of repurchases because it is positively correlated with the cost of potential takeovers. Alternatively, repurchase announcements tie more closely to the takeover attraction hypothesis because the variation in repurchase announcement timing (bundled versus stand-alone) is associated with varying levels of investor awareness. My results suggest that bundled repurchase announcements generate greater awareness and are associated with an increased probability of receiving a takeover bid.

This paper proceeds as follows: In Section 2, I develop my hypothesis using a toy model directly adapted from [Hirshleifer and Teoh \(2003\)](#). In Section 3, I describe my data and sample construction. Section 4 reports analyses of the takeover attraction effect of bundled repurchase announcements. Section 5 concludes.

2. Hypothesis Development

2.1. Basic Setup

There are three dates in the model. At date 0, initial wealth is distributed and priors regarding the parameters are formed. At date 1, public information regarding the potential target firm is revealed. There are differing levels of salience based on how the information is disclosed (bundled or standalone). At date 2 the terminal value is realized and the firm liquidated. decision makers have mean-variance preferences,

$$E_1[C] - \frac{A}{2}var_1(C) \tag{1}$$

where C is the terminal consumption at date 2. subscript 1 denotes information available to investors at date 1. A is the coefficient of absolute risk aversion. I assume an initial wealth endowment of W^0 and zero initial endowment of ownership in the potential target firm. At date 1, decision maker can decide whether to acquire the potential target for price S_1 . The

position in the firm is denoted x . I denote the uncertain terminal payoff from acquiring the firm \tilde{S}_2 . Then the terminal consumption by the decision maker is

$$C = W^0 - x(\tilde{S}_2 - S_1) \quad (2)$$

Thus, the decision maker solves the constrained maximization problem

$$\max_x x(E_1[\tilde{S}_2] - S_1) - \frac{A}{2} \text{var}_1(x\tilde{S}_2) \quad (3)$$

Differentiating with respect to x and equating to zero yields

$$x^* = \frac{E_1[\tilde{S}_2] - S_1}{A \text{var}_1(\tilde{S}_2)} \quad (4)$$

Although not the focus of [Hirshleifer and Teoh \(2003\)](#), this setup actually generates many intuitive and empirically documented features of M&A. For instance, [Edmans et al. \(2012\)](#) show that undervaluation (negative shocks to S_1) causes an increase in takeover likelihood. [Bhagwat, Dam, and Harford \(2016\)](#) and [Nguyen and Phan \(2017\)](#) show increases in outcome uncertainty (positive shocks to $\text{var}_1(\tilde{S}_2)$) reduces acquisitiveness. [Graham, Harvey, and Puri \(2013\)](#), [Cain and McKeon \(2016\)](#), and [Zhao \(2013\)](#) show lower CEO risk aversion (smaller A) is associated with higher acquisitiveness. Different from these above mentioned papers, this paper studies the impact of the perceived value of \tilde{S}_2 on takeover likelihood. In this setup, as indicated in (4), a higher $E_1[\tilde{S}_2]$ increases takeover likelihood.

2.2. The Effect of Bundling and Awareness

Let $\psi = (\psi^1, \psi^2, \dots, \psi^K)$ be the public information set of the potential target firm at date 1. For example, ψ^1 could be the EPS from the previous quarter, and ψ^2 the sales growth in the past 12 months. There is a structural relation³ between ψ and the terminal cash flow c_2

³[Hirshleifer and Teoh \(2003\)](#) also include an additional vector $p = (p^1, p^2, \dots, p^N)$ to model the effect of information (dis)aggregation. This aspect is not the focus of this paper and is not modeled here for brevity.

at date 2, summarized as

$$\tilde{c}_2 = H(\psi^1, \psi^2, \dots, \psi^K) + \tilde{v}_2 \quad (5)$$

With $E[\tilde{v}_2] = 0$ and \tilde{v}_2 independent of ψ . Let element ψ^r be the repurchase announcement. Since repurchase announcements are the focus of this paper, I reduce the notation of the information set to $\psi = (\psi^{-r}, \psi^r)$ where ψ^{-r} is the subset that contains all elements other than the repurchase. The important feature in this setting is that some decision makers may not be fully aware of publicly available information. I denote the full-awareness expectation of the terminal cash flow as $S^F(\psi) \equiv E[\tilde{c}_2|\psi] = H(\psi^{-r}, \psi^r)$ and the limited-awareness expectation of the terminal cash flow $S^L(\psi') \equiv E[\tilde{c}_2|\psi'] = H(\psi^{-r}, (\psi^r)')$. Following [Hirshleifer and Teoh \(2003\)](#), I model unawareness by letting the inattentive decision maker set elements of ψ to simplified values. For instance, decision makers who are not aware of the repurchase announcement will simplify this element to $(\psi^r)' = 0$. Here $H(\psi)$ is increasing in ψ^r , because the belief of market misvaluation is regarded as a major reason for repurchasing ([Brav et al., 2005](#)). As a result, we have $S^F(\psi) > S^L(\psi')$. For a given announcement, there is a $\kappa^\phi \in [0, 1]$ chance that the decision maker is not aware of it. $\phi = \{b, s\}$ indicates whether the announcement is bundled (b) or standalone (s). Acquirers who are closely tracking the targets they already have in mind will always receive the signal regardless of bundling. In this case we have $\kappa^b = \kappa^s = 0$ and $E_1^\phi[\tilde{S}_2] = S^F(\psi)$. For potential acquirers without specific targets in mind, because bundling increases awareness, we have $\kappa^b < \kappa^s$. The decision maker's perceived terminal value of acquisition is the linear combination of the full-awareness and limited-awareness expectations, expressed as

$$E_1^\phi[\tilde{S}_2] = (1 - \kappa^\phi)S^F(\psi) + \kappa^\phi S^L(\psi') \quad (6)$$

And the difference in perceived value between bundled and standalone announcements is

$$\Delta E_1[\tilde{S}_2] = E_1^b[\tilde{S}_2] - E_1^s[\tilde{S}_2] = (\kappa^s - \kappa^b)[S^F(\psi) - S^L(\psi')] > 0 \quad (7)$$

This result suggests bundling increases takeover likelihood because the increased awareness has a positive impact on $E_1[\tilde{S}_2]$. Additionally, the effect should be stronger for targets with lower ex ante awareness. Finally, this result is generalizable to cases in which the decision maker needs to choose from multiple potential target firms each with a similar ψ^{-r} .

3. Data and Sample Construction

Bundled repurchases are becoming popular in recent decades: Since 2004, about 28% of repurchases are announced together with earnings. Because of significant regulatory changes in 2004 regarding repurchases (SEC Rule 10b-18), I focus on the repurchases announced between 2004 and 2017 for the analysis in this paper. The repurchase announcements sample ends in 2017 and I use 2018 as the last full-year to collect data on takeovers. I obtain firm-level financial accounting data from Compustat. To avoid look-ahead bias, I make sure the information from Compustat (determined using the reporting date variable, “datadate”) is available prior to the repurchase announcement. The unit of observation is a firm-year. Following conventional screening, I exclude firm-year observations with negative book value equity, share price below five dollars, or total assets below five million. I also exclude financial and public utility firms (SIC code starts with 48, 49, or 6), because takeovers in these industries are highly regulated (Edmans et al., 2012). Finally, firms not listed on NYSE, AMEX, or NASDAQ (Compustat exchange code 11, 12, or 14) are also excluded. Firm-level characteristics included in regressions are winsorized at the top and bottom 1% level (except indicator variables) and are described in the appendix (Table A1). Panel A of Table 1 provides summary statistics for these variables. An average firm in my sample has market equity of \$5.35 billion, 11% ROA, 19% leverage, \$351 million in cash and equivalents, 24% net PPE to total assets, Market to Book (MtB) ratio of 4.31, and 10% annual sales growth.

Repurchase announcement data is from Securities Data Corporation (SDC). To focus on open market repurchases, I screen using SDC “Technique Code” and retain the announcements

that have code equals “OP” (open market). A repurchase announcement is coded as bundled if it is announced on the same day as the earnings announcement. Earnings dates are obtained from Compustat’s quarterly dataset, using variable “RDQ”. Although uncommon (less than 4% of my sample), a firm can announce multiple repurchases in a given year. I conduct a robustness check by excluding firm-year observations with more than one repurchase announcement and report result in Table 4. There is one caveat regarding the repurchase announcement data: SDC could list multiple board-authorized repurchases under a single deal number⁴. I assign an additional indicator for these announcements made subsequent to initial authorization as “follow-on”. I include follow-on announcements in my sample for the purpose of completeness, but my main results are stronger if they are excluded. Takeover data is also from SDC. Because I only observe repurchases made by publicly traded firms, only deals with US public target are included. To ensure a deal would result in a change of corporate control, I restrict the sample to deals in which the acquirer owns less than 50% of target shares prior to and would own more than 50% after the deal. I do not treat an observation as a takeover if the acquirer and the target are the same company. In the finalized sample, 22% of the firm-year observations announce repurchases, and the unconditional takeover likelihood for the full sample is 5.9%.

I explore the differences in firm characteristics between no-repurchase, standalone-repurchase, and bundled-repurchase firms in Panels B & C of Table 1. In panel B, I first compare firm-level characteristics between firm-years that announce repurchase and those that do not. Consistent with conventional perception, repurchasing firms are significantly larger, have higher ROA, and hold more cash. There are also statistically significant difference on leverage and NPPE, but the economic magnitudes of those differences are small. In panel C, I compare firm-level characteristics between firm-years that announce standalone

⁴Appendix figure A1a provides an example for such incident in SDC, and Figure A1b provides an example for the “follow-on” type announcement corresponding to SDC data.

repurchase and those that announce bundled repurchase. These two groups of firms have similar size, ROA, MtB, and sales growth. Bundled-repurchase firms hold about 10% more cash than standalone-repurchase firms. There are also statistically significant differences on leverage and NPPE, but the economic magnitudes are small. Overall, these two groups have similar characteristics.

4. The Takeover Attraction Effect of Information Bundling

4.1. Univariate Results

I start analyzing the takeover attraction effect of information bundling from the univariate results. In Panel A of Table 2, I compare the likelihood of receiving a takeover bid in year $t+1$ between firm-year observations with bundled repurchase announcements and all other firm-year observations. Notice the control group here includes both firm-year observations with standalone repurchase announcements as well as firm-year observations without any repurchase announcements. Compared to all other firm-year observations (unconditional takeover likelihood of 5.76%), firm-year observations with bundled repurchases are 2.3% more likely to become a takeover target in the following year. A potential concern regarding the comparison in Panel A is that firms that repurchase could be fundamentally different from firms that do not. For instance, firms that repurchase could be more mature or have more excess cash than firms that do not. To address this concern, I compare the likelihood of receiving a takeover bid in year $t+1$ between firm-year observations with bundled repurchase announcements and firm-year observations with standalone repurchase announcements in Panel B. Compared to firm-year observations with standalone repurchase announcements (takeover likelihood of 5.32%), firm-year observations with bundled repurchases are 2.74% more likely to become a takeover target.

To further analyze the dynamics of this takeover attraction effect, Figure 2 traces out the difference in cumulative takeover frequency between bundled repurchase firms and standalone

repurchase firms by quarter for eight quarters. There is a small (about 78 basis points) yet statistically significant immediate effect in the first quarter following the repurchase. The difference in takeover likelihood four quarters after repurchase announcements is about 2.8% and continues to grow until the sixth quarter, where the cumulative takeover likelihood for bundled repurchase firms is about 5% greater than standalone repurchase firms. Finally, the effect flattens out after the sixth quarter. Overall, univariate results in this section suggest information bundling is associated with higher takeover likelihood, and the analysis of the dynamics from Figure 2 suggests the effect could last for six quarters after the announcement.

I also study the differences in deal characteristics between bundling-induced deals and other deals. The results are reported in Figure 3. Bundling induced deals are 9.88% more likely (p-value < 0.01) to be cross-border, and 9.59% more likely (p-value = 0.08) to be diversifying. Because acquirers are ex ante less likely to be aware of firms from different countries/industries, these two statistics support the awareness channel for the takeover attraction effect. Investment bankers frequently use financial accounting data to screen for potential takeover targets. The awareness channel is more important if the firms are not obvious targets based on observable financial accounting data. With this intuition, I construct an “inconspicuous” index following [Billett and Xue \(2007\)](#)⁵ and sort firms into ex ante takeover vulnerability quartiles. A firm is inconspicuous if it falls in the lowest quartile of takeover vulnerability. I find targets in bundling-induced deals are 6.83% more likely (p-value = 0.02) to be inconspicuous. This result also support the awareness channel for the takeover attraction effect. Finally, bundling-induced takeover bids are 4.65% more likely to be withdrawn, but the difference is not statistically significant (p-value = 0.12).

⁵See [Billett and Xue \(2007\)](#) Table 2. I follow their model and use the coefficients to predict ex ante takeover vulnerability.

4.2. Multivariate Results

To examine the takeover attraction effect of information bundling in a multivariate setting, I estimate the following linear probability model:

$$Target_{i,t+1} = \beta_1 \times Bundled_{i,t} + \beta_2 \times Firm\ Level\ Controls_{i,t} + FEs + \epsilon_{i,t} \quad (8)$$

And report regression results in Table 3. The unit of observation is a firm-year. Subscript “i” indicates the firm and “t” indicates the year. The dependent variable *Target* indicates the firm receives takeover bid in year t+1. It takes a value of one if the firm receives takeover bid(s) in year t+1 and zero otherwise. The independent variable of interest (*Bundled*) takes a value of one if the firm announced bundled repurchase in year t and zero otherwise. In all models, I cluster standard errors at the firm level. The first two columns use the full sample, and last two columns use the subsample of firm-year observations that made repurchase announcements. Column 1 shows that bundling is associated with a significantly higher probability of receiving a takeover bid. The effect is also economically meaningful: Controlling for firm-level characteristics, announcing bundled repurchases is associated with 2.8% increase in takeover probability from the baseline unconditional probability of 5.9%. The coefficient on the second variable (*Repurchase*) indicates that standalone repurchases do not affect takeover likelihood. Firm-level control variables also provide additional predictability. For instance, larger firms and firms with higher ROA are less likely to become takeover targets. Firms with higher leverage are more likely to become takeover targets, potentially due to the undervaluation caused by financial stress. Firms that hold more cash are more likely to become takeover targets, potentially due to the undervaluation caused by agency problem. Controlling for all other variables, firms with higher sales growth are more likely to become takeover targets. In column 2, I include both year fixed-effects and industry (2-digit SIC) fixed-effects and find the coefficient on *Bundled* decreases to 2.6%, but is still significant at the 1% level. Columns 3 and 4 only include observations that announced repurchase in the year,

and the inference is unchanged: Compared to firm-year observations that conduct standalone repurchase announcements, bundling increases the takeover likelihood by 2.8%-3.4%.

4.3. Robustness Checks

In this subsection I conduct robustness checks on the main finding from the previous subsection and report results in Table 4. Specifically, I re-estimate equation (8) with various permutations on clustering, fixed effects, functional form, and subsamples. For brevity, I only tabulate the coefficients and standard errors for the variable of interest (“Bundled”). Row 1 of Table 4 serves as a benchmark and reports the same results from columns 2 and 4 of Table 3. Row 2 repeats the same estimation except the standard errors are double-clustered by firm and year. I observe a slight increase in standard errors, but the inference is unchanged. Row 3 reports results from using industry \times year fixed effects to account for time-varying industry-level shocks that could simultaneously affect repurchases and industry-wide merger waves such as changes in profitability of an industry. According to row 3, after taking into account industry-level time-varying shocks, announcing bundled repurchase announcements increases takeover likelihood by 2.7%. Row 4 reports results from using firm & year fixed effects. By construction, this specification picks up the within-firm variation in bundling choice and compares the takeover likelihood of the same firm after a bundled repurchase announcement and a standalone repurchase announcement. In other words, firm-specific unobservables are netted out in this specification. With firm fixed-effects, the takeover attraction effect of information bundling is 2.3% and is significant at the 1% level. Row 5 reports results from only including observations with above within-year-median market equity. Row 6 reports results from only including observations with below within-year-median market equity. Consistent with smaller firms have lower ex ante awareness, the takeover attraction effect is twice as big in small firms than large firm. Row 7 reports marginal effects from conditional logit estimations. The results from this row indicate that the main finding is not

driven by a specific functional form. Row 8 reports results using completed deal indicator as the outcome variable. Row 9 reports results by not treating follow-on repurchases as new announcements. Row 10 reports results by excluding observations that made more than one repurchase announcements in a given year. The main finding is robust to these three alterations in outcome variable definition and sampling choice.

4.4. Omitted Variables & DiD Estimation

There are two major endogeneity concerns regarding my finding. The first concern is based on time-invariant unobservable characteristics (omitted variable bias). The argument is if firms that bundle repurchase announcements with earnings are also firms that are more likely to be acquired, then what I capture could be a firm-level latent characteristic (high unobservable takeover likelihood) instead of the effect of information bundling on takeover probability. To alleviate the omitted variables concern, I use the dynamics of short interests around repurchase announcements to highlight the change in takeover vulnerability. Short interest is a good proxy for the unobservable “true” level of takeover vulnerability in this context for two important reasons. First, takeover vulnerability is a crucial piece of information for short sellers. Takeover targets receive a significant increase in stock price around takeover announcements. Because short sellers hold short positions, takeover announcements cause them drastic losses. Consequently, short interest should react negatively to an increase in takeover vulnerability (Meneghetti et al., 2019). Thus, if information bundling increases takeover vulnerability, one should expect to find a relative decrease in short interest in firms that announce bundled repurchases. Second, even though the bundling decision is made by the firm, it is highly unlikely to be driven by the influence of short sellers. Thus, the firm’s bundling decision is plausibly exogenous to the short selling activities. This condition allows me to conduct a clean difference-in-differences experiment comparing the changes in short interests after bundled and standalone repurchase announcements. I first plot the

month-by-month difference in short interest around the repurchase announcements in Figure 4, using the month of announcement as the benchmark. Notice that the monthly changes in short interest are not statistically different from zero for all months prior to the repurchase announcements. Thus, the parallel trend condition is not violated for this DiD experiment. The lack of difference in the first month immediately after the announcement also confirms the change in short selling behavior is not driven by the earnings news itself. Interestingly, short positions decrease gradually in the period from one month after to three months after the repurchase announcements for firms that announce bundled repurchases.⁶ This result indicates that shortly after the bundled repurchase announcements, short sellers start to have access to private information about takeover rumors which lead to their exit before takeovers actually take place.

I then examine the effect on short interest in a regression framework using the model:

$$\begin{aligned} \Delta SI_{i,-1 \text{ to } k} &= \beta_1 \times \text{Bundled}_{i,t} + \beta_2 \times \text{CAR}_{i,t} \\ &+ \beta_3 \times \text{Controls}_{i,t} + \text{FEs} + \epsilon_{i,t}, \\ k &= \{2, 3\} \end{aligned} \tag{9}$$

And reported results in Table 5. The unit of the dependent variable is one basis point of short interest. In column 1 (column 2), I regress the changes in short interest between one month before and two months (three months) after the repurchase announcements on the indicator variable for bundling, announcement CAR, and all firm-level control variables used in Table 3. These regression results show a smooth decrease in short positions in the second and third month following bundled repurchase announcements. From the month before repurchase announcements to the second (third) month after, the short interests decrease by 7.9 (15.2) basis points. There are many factors that contribute to the variation in short

⁶I do not include post-announcement periods longer than three months because the effect could be contaminated by another earnings announcement.

interest. To further highlight the impact of change in takeover vulnerability, I implement a triple-difference experiment on top of the DiD setting:

$$\begin{aligned} \Delta SI_{i,-1 \text{ to } k} &= \beta_1 \times \text{Bundled}_{i,t} + \beta_2 \times \text{Bundled}_{i,t} \times \text{Target}_{i,t+1} + \beta_3 \times \text{Target}_{i,t+1} \\ &+ \beta_4 \times \text{CAR}_{i,t} + \beta_5 \times \text{Controls}_{i,t} + \text{FEs} + \epsilon_{i,t}, \end{aligned} \tag{10}$$

$$k = \{2, 3\}$$

With the additional layer being the *Target* indicator that takes a value of one if the firm becomes a takeover target in the following year.⁷ Results from the triple-difference experiment are reported in column 3 and column 4 of Table 5. Notice here the takeover attraction effect is concentrated in the firms that announce bundled repurchase and become subsequent takeover targets. Take column 3 for example, *Bundled* indicator itself is not associated with a significant decrease in short interest. However, for bundling firms that become takeover targets later, there is on average a 44 bps⁸ decrease in short interest. Thus, the reduction in short interest is indeed driven by an increase in takeover likelihood. Taken together, results in this section indicate the takeover attraction effect of information bundling is not driven by omitted variables.

4.5. Self-Selection & IV Estimation

In addition to the omitted variables concern addressed in the previous section, bundling is also subject to a self-selection concern. Specifically, it is a concern that managers make bundled announcements when the firm is more likely to be taken over in the near future. If firms choose to bundle repurchase announcements with earnings announcements when the time-varying unobservable “true” takeover probabilities are high, then what I capture could be the unobservable contemporaneous probability of takeover rather than an increase in takeover probability. It is a plausible concern because the managers have more insider

⁷Measured using a 365 calendar-day window following the report day of the corresponding short interest from Compustat.

⁸A 9% decrease from the baseline of about 5 percentage points.

information about the firm and could strategically choose the timing of the announcement for their own benefit. I address this concern using the bundling choice of the firm’s previous repurchase announcement as an instrument. In this setting, the previous bundling choice influences current bundling choice through firm time-invariant characteristics that are plausibly orthogonal to the time-varying component of the takeover vulnerability. As summarized in Panel B of Table 6, the time gap between two repurchase announcements is greater than a year. Thus, the exclusion restriction is likely to be satisfied because prior choice of bundling from more than a year ago is not likely to be correlated with the time-varying component of the current level of takeover vulnerability. I then estimate the effect of repurchases on takeover probability using a 2SLS model:

$$\begin{cases} \text{Bundled}_{i,t} = \beta_1 \times \text{Bundled Last Time} + \beta_2 \times \text{Controls}_{i,t} + FEs + \epsilon_{i,t} \\ \text{Target}_{i,t+1} = \beta_3 \times \widehat{\text{Bundled}}_{i,t} + \beta_4 \times \text{Controls}_{i,t} + FEs + \epsilon_{i,t} \end{cases} \quad (11)$$

And report results in Table 6. According to the first stage results from columns 1 & 3 in Table 6, bundling in the previous announcement increases the probability of bundling in the current announcement by about 45% (t-stat around 36). In other words, prior bundling decision has substantial explanatory power for current choice to bundle, alleviating the weak instrument concern.⁹ Columns 2 & 4 in Table 6 show the second stage have similar economic magnitude (about 2.6%-2.7% increase in takeover probability) as the un-instrumented results from the previous section and is statistically significant at the 10% level. Overall, the instrumental variable approach provides support to alleviate the self-selection concern.

4.6. The Awareness Channel

For (7) to hold, one important condition is that bundling should increase investor awareness ($\kappa^s > \kappa^b$). In this section, I provide empirical evidence to support this assumption. Specifically,

⁹The F-statistic is greater than 100, significantly larger than the Stock-Yogo threshold.

I use a two-stage local treatment effect model to show higher investor awareness is a potential channel for the takeover attraction effect of information bundling:

$$\begin{cases} \text{Investor Attention}_{i,t} = \beta_1 \times \text{Bundled}_{i,t} + \beta_2 \times \text{Controls}_{i,t} + FE_s + \epsilon_{i,t} \\ \text{Target}_{i,t+1} = \beta_3 \times \widehat{\text{Investor Attention}}_{i,t} + \beta_4 \times \text{Controls}_{i,t} + FE_s + \epsilon_{i,t} \end{cases} \quad (12)$$

To show the takeover attraction effect is driven by increases in investor awareness, it is necessary to have a variable that precisely measures investor awareness. [Ben-Rephael, Da, and Israelsen \(2017\)](#) show Bloomberg daily news readership data captures the awareness level of investors. [Ben-Rephael, Carlin, Da, and Israelsen \(2019\)](#) show that corporate executives are also active on Bloomberg terminals. Following [Ben-Rephael et al. \(2017\)](#), I use Bloomberg daily news readership to examine the difference in investor attention between bundled and standalone repurchase announcements. Because this Abnormal Investor Awareness (AIA) data start at 2010, my sample is reduced to 2,828 repurchase announcements (998 bundled, 1830 standalone). Columns 1 & 3 of Table 7 shows bundled repurchases are associated with 1.26 - 1.28 notches higher AIA (significant at 1% level) on a 5-notch scale. The magnitude is economically meaningful: As a benchmark, [Ben-Rephael et al. \(2017\)](#) show that analyst recommendation changes boost AIA by about 1.12 notches. Columns 1 & 3 of Table 7 also shows that the magnitude of abnormal return is also positively correlated with the level of investor awareness. This is intuitive, as the magnitude of abnormal return proxies for the importance of the news. Finally, controlling for all other variables, investors pay less attention to the “follow-on” type of repurchase announcements.

Using the coefficient from the first stage, I calibrate the predicted level of AIA (\widehat{AIA}) driven by bundling. In the second stage (columns 2 & 4 of Table 7), the coefficient on \widehat{AIA} suggests a one-notch increase in bundling-induced investor awareness increases the firm’s takeover likelihood by 2.6%. Taken together, the results in this section show that bundling increases awareness, which in turn increases the takeover likelihood.

5. Conclusion

Public firms often bundle the announcements of less anticipated corporate events, such as dividend changes and repurchase programs, together with quarterly earnings announcements. Adding on to the large literature that examines the short-run effect on market reaction of information bundling, this paper analyzes the real consequences of information bundling. Results from this paper suggest undervaluation signals receive higher investor attention when they are bundled with earnings news. Consequently, this increase in investor awareness attracts takeovers: Firms that make bundled repurchase announcements are more likely to become takeover targets. Finally, both a DiD experiment and an IV experiment suggest the effect is likely causal. Results in this paper suggest, in addition to a short-run price impact in the stock market, a firm's disclosure practice also has a long-run real effect.

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DOWJONES

| **Newsires**

Rue21 1Q Profit Rose 21%; Unveils \$50M Stock Buyback Plan

269 words

24 May 2012

ACCO Brands Corporation Reports Third Quarter 2015 Results; Announces Additional **\$100 Million Share Repurchase Authorization**

Oct 28, 2015, 07:00 ET from ACCO Brands Corporation

Beam Reports Second Quarter Results

- Sales Continue to Grow Faster than Market with Strong Global Performance for Bourbon
- Innovations Across Categories Add to Quarterly Top-Line Growth
- Company Reaffirms Full-Year Earnings Target and **Announces Share Repurchase Authorization**

August 08, 2013 07:30 AM Eastern Daylight Time

Figure 1
Examples of Bundled Repurchase Announcements

This figure provides three examples (Rue21, ACCO Brands, and Beam) of bundled repurchase announcements from my sample. Source: Factiva.

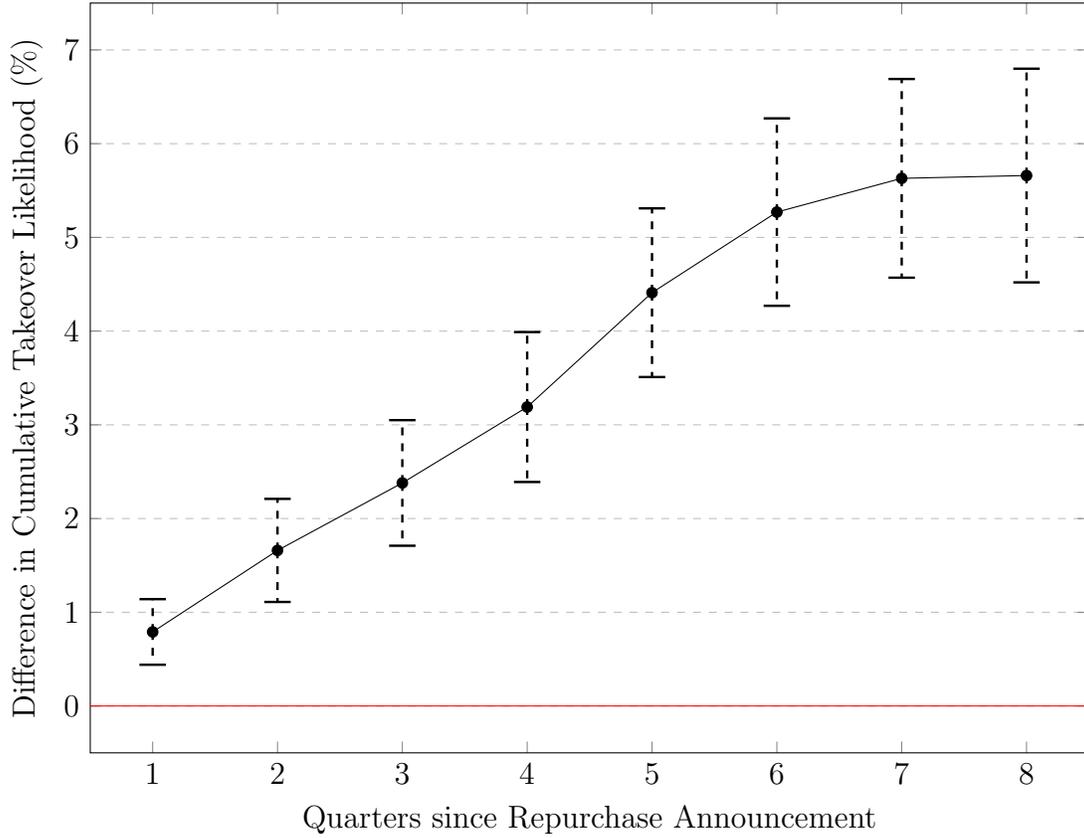


Figure 2

Difference in Cumulative Takeover Frequency by Quarter

This figure plots the difference in cumulative takeover frequency between bundled and standalone repurchasers by quarter following the announcement. The circles are point estimates and the capped lines indicate 95% confidence intervals.

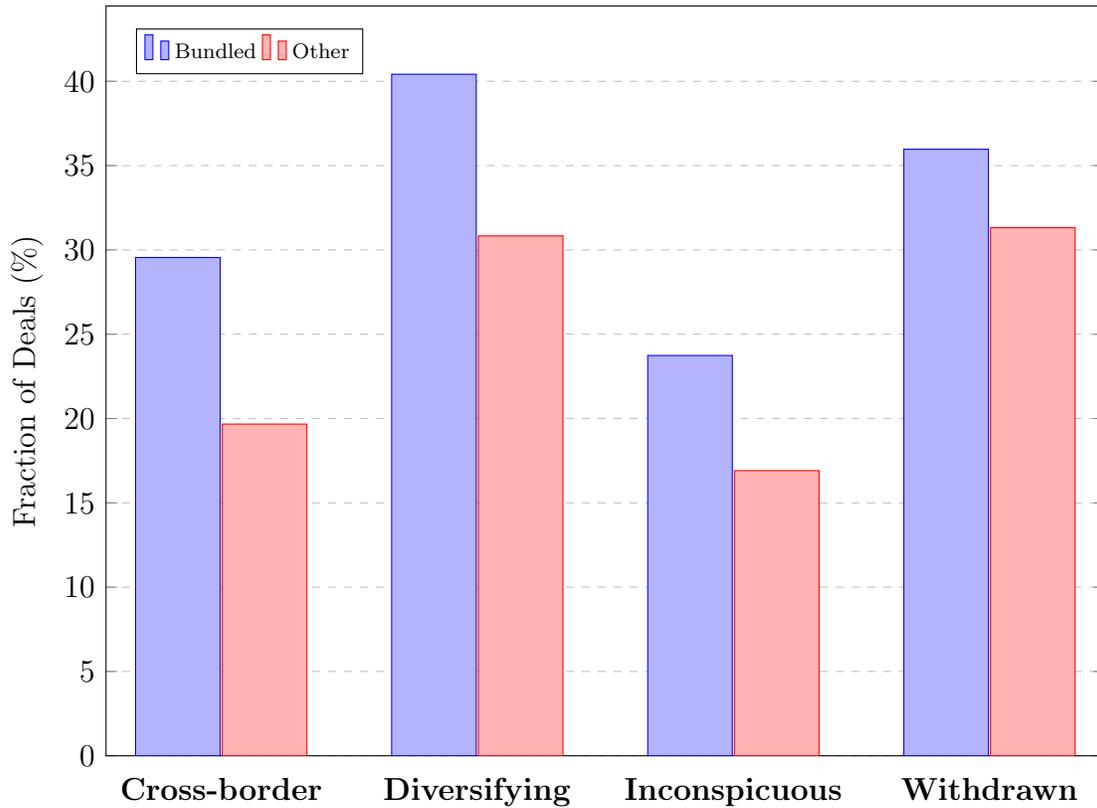


Figure 3
Deal Characteristics

This figure plots deal characteristics for takeovers involving bundled repurchase announcements (in blue) against those that do not (in red). The y-axis is the fraction (%) of deals that fall into the category. Cross-border indicates non-US acquirer. Diversifying indicates target and acquirer operates in different SIC industries. Inconspicuous is based on ex ante takeover vulnerability model from [Billett and Xue \(2007\)](#). A target is inconspicuous if it falls in the lowest takeover vulnerability quartile. Withdrawn indicates the deal is eventually discontinued.

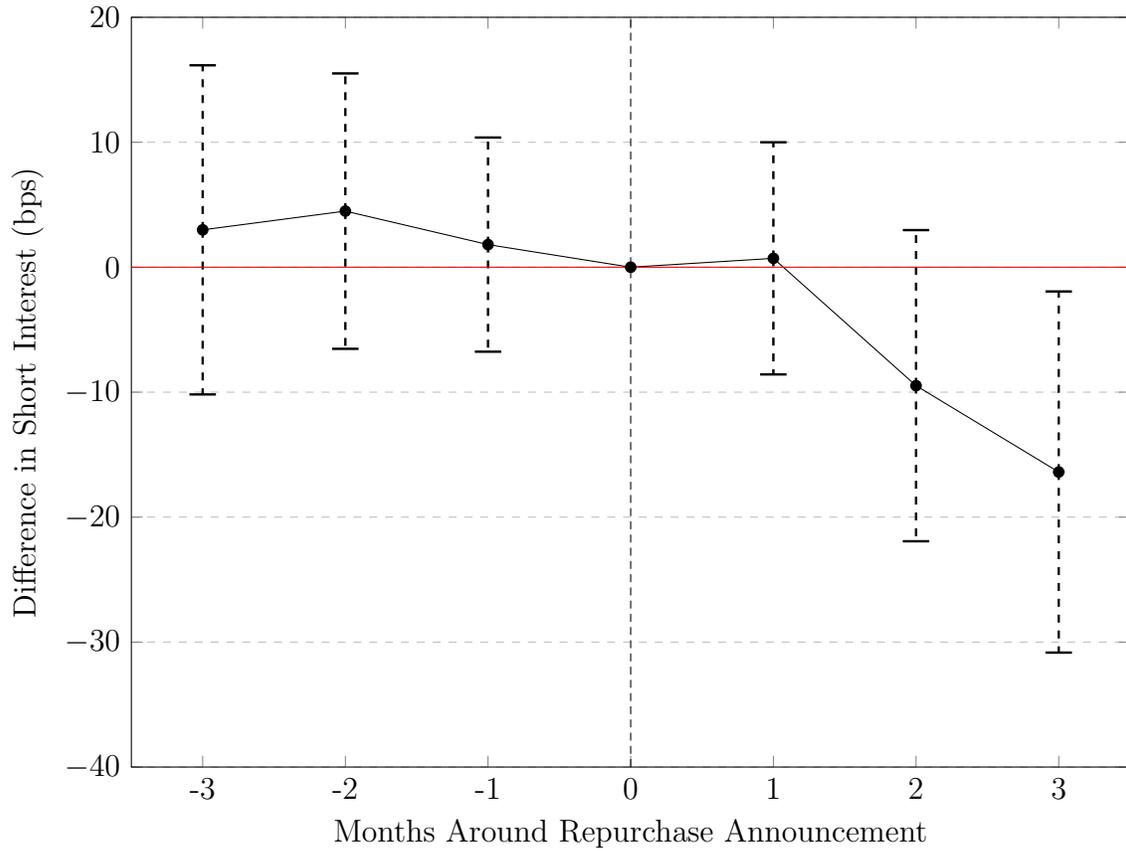


Figure 4
Short Interest around Repurchase Announcements

This figure plots the difference in monthly short interests between bundled and standalone repurchase announcements using a [-3 months, +3 months] window around repurchase announcements. The month of announcement (month 0) is the benchmark month. The circles are point estimates and the capped lines indicate 95% confidence intervals.

Table 1
Summary Statistics

This table provides summary statistics. Panel A provides summary statistics for the whole sample. Panel B provides comparison between firm-years with repurchase announcements and those without. Panel C provides comparison between firm-years with bundled repurchase announcements and those with standalone repurchase announcements. The sample period is 2004-2017. The unit of observation is a firm-year. All continuous control variables are winsorized at top and bottom 1% level. Variables are explained in detail in Appendix Table A1. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

Panel A

Variable	N	Mean	Median	S.D.	P5	P25	P75	P95
Market Equity (\$Million)	28,093	5354.35	871.09	22019.18	66.62	303.93	2770.49	19636.29
ROA	28,093	0.11	0.12	0.15	-0.13	0.07	0.17	0.28
Leverage	28,093	0.19	0.15	0.18	0.00	0.01	0.31	0.54
Cash (\$Million)	28,093	351.19	83.96	760.25	2.24	23.47	267.87	1849.00
NPPE	28,093	0.24	0.16	0.23	0.02	0.07	0.34	0.77
Market to Book (MtB)	28,093	4.31	2.34	64.79	0.83	1.49	3.80	9.88
Sales Growth	28,093	0.10	0.08	0.33	-0.23	0.00	0.18	0.48

Panel B

Variables	No Repurchase	Repurchase	Diff
	N = 21,913	N = 6,180	
Market Equity (\$Million)	4092.06	9830.18	-5738.13***
ROA	0.10	0.15	-0.05***
Leverage	0.19	0.17	0.02***
Cash (\$Million)	286.31	581.23	-294.91***
NPPE	0.25	0.22	0.03***
Market to Book (MtB)	4.37	4.11	0.26
Sales Growth	0.10	0.09	0.01

Panel C

Variables	Standalone	Bundled	Diff
	N = 4,456	N = 1,724	
Market Equity (\$Million)	9890.35	9674.66	215.69
ROA	0.15	0.15	0.00
Leverage	0.18	0.17	0.01***
Cash (\$Million)	565.77	621.18	-55.41**
NPPE	0.23	0.20	0.03***
Market to Book (MtB)	4.10	4.11	-0.01
Sales Growth	0.09	0.09	0.00

Table 2
Bundling and Takeover Probability (Univariate)

This table reports results from t-tests of takeover frequency in year t+1 by repurchase announcement status. The unit of observation is a firm-year. Panel A compares takeover likelihood between observations with bundled repurchase announcements and all other observations. Panel B compares takeover likelihood between observations with bundled repurchase announcements and observations with standalone repurchase announcements.

Panel A: Bundled Repurchase vs. All Other Observations

	Takeover Frequency	t-stat	N
Bundled	8.06%		1,724
All Other Obs	5.76%		26,369
Diff	2.30%	3.42	28,093

Panel B: Bundled Repurchase vs. Standalone Repurchase

	Takeover Frequency	t-stat	N
Bundled	8.06%		1,724
Standalone	5.32%		4,456
Diff	2.74%	3.72	6,180

Table 3
Bundling and Takeover Probability (Multivariate)

I model the effect of information bundling on takeover likelihood using linear probability model. The unit of observation is a firm-year. Dependent variable (*Target*) equals one if the firm receive takeover bid in year t+1 and zero otherwise. *Bundled* equals one if the firm's repurchase announcement made in year t is bundled with earnings news and zero otherwise. All control variables are explained in detail in Appendix Table A1. In parentheses are robust standard errors clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

Variables	(1) Target	(2) Target	(3) Target	(4) Target
Bundled	0.027*** (0.008)	0.026*** (0.007)	0.034*** (0.008)	0.028*** (0.008)
Repurchase	-0.003 (0.004)	-0.001 (0.004)		
Ln(Market Equity)	-0.007*** (0.001)	-0.007*** (0.001)	-0.006** (0.002)	-0.011*** (0.003)
ROA	-0.043*** (0.012)	-0.025** (0.013)	-0.015 (0.039)	-0.005 (0.042)
Leverage	0.018** (0.009)	0.039*** (0.009)	0.016 (0.021)	0.035 (0.022)
Ln(Cash)	-0.000 (0.001)	0.004*** (0.001)	-0.001 (0.003)	0.004 (0.003)
NPPE	0.005 (0.007)	-0.000 (0.010)	0.018 (0.018)	-0.013 (0.024)
MtB	0.000 (0.000)	-0.001 (0.000)	0.000 (0.001)	-0.000 (0.001)
Sales Growth	0.028*** (0.006)	0.017*** (0.006)	0.017 (0.017)	-0.007 (0.018)
Sample	Full	Full	Repurchase	Repurchase
Year FE	-	Yes	-	Yes
Industry FE	-	Yes	-	Yes
N	28,093	28,092	6,180	6,178
R²	0.003	0.011	0.058	0.021

Table 4
Robustness Checks

This table reports results from robustness checks. In parentheses are robust standard errors clustered by firm, except for row 2. Row 1 records the coefficient from columns (2) & (3) from Table 3 as benchmark. Row 2 repeats the same estimation except the standard errors are double-clustered by firm and year. Row 3 reports results from using industry \times year fixed effects. Row 4 reports results from using firm & year fixed effects. Row 5 reports results from only including observations with above within-year-median market equity. Row 6 reports results from only including observations with below within-year-median market equity. Row 7 reports marginal effects from conditional logit estimations. Row 8 reports results using completed deal indicator as the outcome variable. Row 9 reports results by not treating follow-on repurchases as new announcements. Row 10 reports results by excluding observations that made more than one repurchase announcements in a given year. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

		Sample	
		Full	Repurchase
1	Benchmark	0.026*** (0.007)	0.028*** (0.008)
2	Cluster by Firm & Year	0.026** (0.010)	0.028*** (0.009)
3	Industry \times Year FE	0.027*** (0.007)	0.031*** (0.011)
4	Firm FE & Year FE	0.023*** (0.008)	0.017** (0.008)
5	Above Median Size	0.020** (0.009)	0.019** (0.009)
6	Below Median Size	0.042*** (0.015)	0.053*** (0.017)
7	Conditional Logit	0.024*** (0.006)	0.027*** (0.007)
8	Completed Deals	0.016*** (0.006)	0.018*** (0.006)
9	Alternative Sample 1	0.043*** (0.010)	0.044*** (0.010)
10	Alternative Sample 2	0.027*** (0.008)	0.030*** (0.008)

Table 5
Dynamics of Short Interest around repurchase Announcements

Short interest (SI) is the fraction of common shares shorted. Change in short interest is the difference in short interest between 1 month before and 2 (3) months after the repurchase announcement. *Bundled* equals one if the repurchase announcement is bundled with earnings news and zero otherwise. *Target* equals one if the firm receive takeover bid in the 365 calendar-day window following the report date of the short interest and zero otherwise. *CAR* (Cumulative Abnormal Return) is obtained through WRDS event-study suite. All control variables are explained in detail in appendix. In parentheses are robust standard errors clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

Variables	(1) $\Delta SI_{-1 \text{ to } 2}$	(2) $\Delta SI_{-1 \text{ to } 3}$	(3) $\Delta SI_{-1 \text{ to } 2}$	(4) $\Delta SI_{-1 \text{ to } 3}$
Bundled	-7.954** (3.990)	-15.230*** (5.691)	-5.172 (4.108)	-11.574** (5.896)
Bundled \times Target			-43.698*** (15.688)	-55.384*** (21.320)
CAR	-97.357*** (32.184)	-105.174** (44.285)	-97.540*** (32.165)	-105.522** (44.202)
Target			24.217** (11.246)	25.905* (15.706)
Control Variables	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	5,620	5,591	5,620	5,591
R^2	0.019	0.026	0.021	0.027

Table 6
Instrumental Variable Approach

In Panel A, I model the effect of information bundling on takeover likelihood using a 2SLS model. This subsample is based on firms that announced multiple (> 1) repurchases in period 2004-2017. *Bundled Last Time* equals one if the firm's previous repurchase announcement is bundled with earnings news and zero otherwise. *Target* equals one if the firm receive takeover bid in year $t+1$ and zero otherwise. All control variables are explained in detail in appendix. Panel B reports average calendar days between two repurchase announcements categorized by total repurchase announcements made by the firm. For example, *Announcement* category equals 2 indicates the firm made two repurchase announcements in the sample. The *Firms* column reports number of firms that fall in the category. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

Panel A: IV Estimation

Variables	(1) Bundled	(2) Target	(3) Bundled	(4) Target
$\widehat{Bundled}$		0.026* (0.015)		0.027* (0.016)
Bundled Last Time	0.466*** (0.013)		0.441*** (0.013)	
Controls Variables	Yes	Yes	Yes	Yes
Year FE	-	-	Yes	Yes
Industry FE	-	-	Yes	Yes
N	5050	5050	5050	5050
R²	0.214	0.004	0.233	0.004

Panel B: Days between Announcements

Announcements	Firms	Days
2	236	777
3	186	659
4	162	624
5	119	553
> 5	319	443

Table 7**Investor Awareness as the Channel for Takeover Attraction**

I analyze the channel of the takeover attraction effect using a 2SLS model. *AIA* is the abnormal investor awareness measure from Bloomberg. *CAR* (Cumulative Abnormal Return) is obtained through WRDS event-study suite. All control variables are explained in detail in appendix. Robust standard error clustered by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level.

Variables	(1) AIA	(2) Target	(3) AIA	(4) Target
\widehat{AIA}		0.027*** (0.009)		0.024** (0.010)
Bundled	1.261*** (0.065)		1.279*** (0.065)	
<i>CAR</i>	3.968*** (0.627)	0.047 (0.143)	4.176*** (0.625)	0.042 (0.146)
Follow-on	-0.195*** (0.062)	0.002 (0.009)	-0.165*** (0.061)	0.001 (0.010)
Control Variables	Yes	Yes	Yes	Yes
Year FE	-	-	Yes	Yes
Industry FE	-	-	Yes	Yes
N	2828	2828	2826	2826
R^2	0.214	0.004	0.226	0.004

Latest Completed Date	Latest Auth. Date	Initial Auth. Date	Date Repurchase Authorized By Board	Deal Number	Purpose Code	Source of Funds Code	Status Code	Technique Code	Transaction Type	Nation	CUSIP
03/31/2017	05/15/2017	07/30/2002	07/30/2002 06/11/2003 04/01/2004 07/01/2004 11/01/2004 05/11/2005 09/24/2007 02/26/2008 05/06/2008 08/04/2008 02/19/2009 02/19/2010 08/05/2010 12/31/2010 05/09/2011 11/05/2013 08/05/2014 02/08/2016 05/15/2017	1315692157	ESV	UN	P	OP	Authorization	US	404609

(a)



The Hackett Group Announces \$5 million Increase To Share Repurchase Program Authorization

May 15, 2017 02:54 PM Eastern Daylight Time

MIAMI--(BUSINESS WIRE)--The Hackett Group, Inc. (NASDAQ: HCKT), a global strategic advisory and business transformation and technology consulting firm, announced today that its Board of Directors increased the authorization under its share repurchase program by an additional \$5 million.

Under the share repurchase plan, The Hackett Group may buy back shares of its outstanding common stock either on the open market or through privately negotiated transactions subject to market conditions and trading restrictions. This share repurchase program does not obligate the company to repurchase any shares and may be modified, suspended, or terminated by the company at any time.

(b)

Figure A1
Caveat Regarding the Repurchase Announcement Data

Table A1
Variable Description

Firm-level control variables are winsorized at top and bottom 1% level, with the exceptions of indicator (or categorical) variables, predicted variables, CAR, $|CAR|$, and SI.

Variable	Definition
ROA	Return (Compustat OIBDP) over assets (Compustat AT)
Leverage	Total debt (Compustat DLTT + DLC) over total assets (Compustat AT)
Ln(Cash)	Natural logarithm of cash (Compustat CHE)
Ln(ME)	Natural logarithm of inflation adjusted market equity
NPPE	Net property, plant, and equipment (Compustat PPENT) divided by total assets (Compustat AT)
MtB	Market value of equity divided by book value of equity
Sales Growth	Current year sales(Compustat SALE) minus last year sales divided by last year sales
AIA	Bloomberg abnormal investor attention
Target	Equals to one if the firm received takeover bid and zero otherwise
Bundled	Equals to one if the firm announced bundled repurchase and zero otherwise
Bundled Last Time	Equals to one if last announcement was bundled and zero otherwise
$\widehat{Bundled}$	Predicted propensity to bundle announcement
CAR	3-day ([-1, +1]) cumulative abnormal return around announcement estimated using market model
$ CAR $	Absolute value of CAR
Follow-on	Equal to one if the announcement is an addition to existing repurchase program and zero otherwise
SI	Short interest, equals the number of shares shorted divided by the number of shares outstanding