Counterpoised Disclosure: Evidence from the Biotechnology Industry

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ABSTRACT: This paper examines the causes and effects of counterpoised disclosures, defined as a concurrent, voluntary dissemination of information intended to mitigate adverse consequences of a mandatory disclosure. To capture mandated disclosures, we use the setting of 8-Ks issued by biotechnology firms to disclose material milestones of a drug's development, such as product-specific regulatory decisions by the Food and Drug Administration (FDA). We formulate and empirically support three predictions. First, we document that managers are more likely to include counterpoised disclosures—specifically, information about other drugs under development—in 8-Ks revealing negative mandatory information (e.g., an FDA rejection) relative to 8-Ks revealing positive mandatory information (e.g., an FDA approval). Second, we confirm that negative market reactions to the release of negative signal 8-Ks are attenuated for those including counterpoised disclosures. Third, we document that counterpoised disclosure appears consistent with informational rather than opportunistic motivations, as drugs receiving this disclosure treatment exhibit *ex post* higher likelihoods of subsequent FDA approval relative to drugs that do not.

Keywords: counterpoised disclosure; 8-K; biotechnology firms; voluntary disclosures

Data Availability: All data are collected from publicly-available sources.

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1. Introduction

This paper examines the causes and effects of providing counterpoised disclosures, which we define as the concurrent, voluntary dissemination of information, intended to mitigate the consequences of a mandatory disclosure. We explore this issue in the context of Form 8-K filings by biotechnology firms regarding major milestones of drugs under development, which are mandated disclosures revealing material updates on a specific drug's progress toward marketability (e.g., Heitzman, Wasley, and Zimmerman 2010). We investigate whether a firm is more likely to include a counterpoised disclosure in its 8-K filing—that is, voluntary dissemination of information about other products in its portfolio—when the material disclosure reflects a negative as opposed to a positive signal regarding a drug under development. We then assess the equity market consequences of this disclosure strategy by examining whether counterpoised disclosure attenuates any negative market reactions to the 8-K release. Finally, we evaluate whether this disclosure strategy appears consistent with informational rather than opportunistic motivations by comparing the relative *ex post* success in regulatory approval for drugs receiving versus not receiving counterpoised disclosure.

We use the biotechnology industry as a powerful setting to assess these issues for several reasons. The first is this industry's product development. The process is long (averaging over ten years from conception to market), highly structured, and overseen by a regulator. The Food and Drug Administration (FDA) provides necessary approval for all drugs to continue across the three major clinical phases of development, before ultimately granting approval for market launch. The second regards the financing of drug development by biotech firms. Critically, most firms lack substantial (or, often, any) internal sources of funding (Enache, Li, and Riedl 2022), making them highly dependent on repeated access to capital markets for the funds necessary for successively

more expensive phases of development. In addition, typical financial signals (such as revenue or profits) often are nonexistent for such firms, causing updates on drug development to be these firms' primary information releases. Combined, these effects create strong incentives to provide relevant information regarding the progress of drugs under development to market participants. The third regards firms' product portfolios, which typically are concentrated and on related therapies. Thus, most biotechnology firms also face strong incentives to help market participants understand any informational spillover effects of one drug onto the related products in their portfolios. Moreover, the biotech industry is economically relevant with over 500 publicly traded firms representing over $1 trillion of market capitalization.[1]

We leverage these institutional features and use the issuance of 8-Ks by biotechnology firms to examine the role of counterpoised disclosure. The Securities and Exchange Commission (SEC) mandates an 8-K filing when a firm has material information to disclose to the equity market. For biotechnology firms, updates on key milestones in their products' development represent material information, which require disclosure through timely 8-K issuance (Noh, So, and Weber 2019). We partition these 8-K releases into two groupings: negative signals, wherein individual drugs receive an FDA rejection and/or the firm discontinues product development; and positive signals, wherein individual drugs gain FDA approval and/or the firm commits to ongoing development. Both situations represent material updates on a drug's development warranting the issuance of an 8-K filing. Thus, our setting offers a mandated disclosure (i.e., specific milestone information regarding a particular drug, denoted as a "signal drug"), with a voluntary component (additional information regarding other drugs under development, denoted as "non-signal drugs")

[1] See Beyond Borders: EY Biotechnology Report 2022 (page 37): https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/life-sciences/ey-beyond-borders-2022-report-v11-web-hires.pdf.

(e.g., Bagnoli and Watts 2007). We define counterpoised disclosure as capturing the voluntary dissemination of previously disclosed information on the non-signal drugs.

We derive three predictions regarding counterpoised disclosure in this setting. First, we predict that firms issuing 8-Ks with negative signals face stronger incentives to provide counterpoised disclosure relative to those issuing 8-Ks with positive signals. Restated, 8-Ks with negative signals are more likely to include additional disclosures regarding other products under development. The incentives to do so relate to mitigating any adverse effects associated with the release of negative signals; these incentives are magnified as the concentrated product portfolios suggest likely negative information spillovers to firms' other products. This leads to our second prediction, that any negative market reaction to the negative signal 8-K is attenuated for those 8-Ks including a counterpoised disclosure. Restated, the counterpoised information about the non-signal drugs helps investors to recalibrate the spillover implications, potentially offseting some of the negative effects regarding the signal drug. Finally, we assess whether managers engage in counterpoised disclosure for informational as opposed to opportunistic motivations. We predict that, if driven by managers incorporating private information to facilitate investor price formation, non-signal drugs receiving counterpoised disclosure are more likely to exhibit subsequent FDA approval relative to those not receiving counterpoised disclosures.

Using a sample of 8-K filings by biotechnology firms over 2005–2020, we provide empirical evidence consistent with all three predictions. First, we document that 8-Ks revealing a negative signal are more likely to include counterpoised disclosure about other products under development, relative to 8-Ks revealing a positive signal. This suggests that managers strategically provide counterpoised disclosure conditional on the signal within their mandated disclosure in the 8-K filing. Second, we document substantial negative market reactions for those firms issuing 8-

Ks with negative signals, confirming the release of previously unknown negative product information. More importantly, we find attenuated market reactions for those negative signal 8-Ks that include a counterpoised disclosure. These results provide evidence of offsetting market effects to the disclosure strategy, consistent with rational behavior by managers in their disclosure choices. Finally, we provide evidence that non-signal drugs receiving counterpoised disclosure are *ex post* more likely to receive subsequent FDA approval relative to those that do not. This appears consistent with managers using counterpoised disclosure for informational motivations, and suggests that managers *ex ante* identify and select for counterpoised disclosure those drugs within their portfolios having higher probabilities to progress to the market.

These findings are robust to specifications including firm fixed effects to accommodate (unobservable) firm-specific attributes. We also document lower short-term stock return volatility after the 8-K filing for firms providing counterpoised disclosure, suggesting such disclosures also reduce perceived risk. We conduct pre- and post-window stock return analyses, confirming neither leakage of information in the days preceding, nor price reversion in the days following, the 8-K release. Findings also are robust to expanding the sample of 8-Ks to incorporate a broader set of positive and negative signals by including other important product information updates. Finally, descriptive data reveal firms reporting negative signals use fewer disclosure channels, are more likely to report the signal in the 8-K's second half, and disclose more about the non-signal drug.

This paper makes four contributions. First, our findings answer calls in Blankespoor, DeHaan, and Marinovic (2020) for additional research to understand the role of dissemination in regulatory filings. We document that biotech firms use dissemination of previously revealed product information (i.e., counterpoised disclosure) through 8-K filings for other products to facilitate investor recalibration of informational spillovers across their portfolio of drugs under

development. Second, the results support the predictions of Einhorn (2005) and Ebert, Simons, and Stecher (2017) by documenting that managers selectively choose to offer additional disclosures when revealing a negative signal. Third, our findings complement research in the biotechnology setting (Ely, Simko, and Thomas 2003; Guedj and Scharfstein 2004; Guo, Lev, and Zhou 2004; Guedj 2005; Hand 2005; Xu, Magnan, and André 2007; Callen, Gavious, and Segal 2010; Enache et al. 2022). Specifically, our results reveal that a particular disclosure strategy (counterpoised disclosure) affects market perceptions, and appears to reflect informational motivations. Related, while prior research on pro forma earnings provides evidence broadly consistent with manager opportunistism (e.g., Doyle et al., 2003; Doyle and Soliman, 2005; Entwistle et al., 2005; Landsman et al., 2007; Frankel et al., 2011; Isidro and Marques, 2011; Jennings and Marques, 2011; and Brown et al., 2011), the findings are limited regarding non-financial metrics. Accordingly, we complement this research by assessing disclosures relating to non-financial metrics (including number and stages of products in the portfolio. Finally, we contribute to research on firms' disclosure channels to provide information to investors, particularly 8-K filings (Carter and Soo 1999; Pinsker 2006; Lerman and Livnat 2010; Segal and Segal 2016; Noh et al. 2019; Rawson, Twedt, and Watkins 2020). Our biotechnology 8-K setting provides strong identification by focusing on a product-level signal versus more general firm-level settings such as in earnings announcements.

Section 2 presents the setting, prior literature, and hypothesis development. Section 3 discusses the research design. Section 4 details the sample selection, and Section 5 reports the empirical results. Section 6 presents additional analyses, and Section 7 concludes.

2. Setting, Hypothesis Development, and Prior Literature

2.1. Setting

This paper uses the setting of the biotechnology industry, which centers on drug development. In the United States, drug development undergoes a regulated multi-phase testing process, with each individual phase requiring approval by the FDA. After achieving proof of concept in the preclinical phase (i.e., testing on non-human subjects), firms submit an investigational new drug (IND) application to the FDA for clinical testing (i.e., testing on human subjects). If approved, the product enters the clinical stages, structured successively as: Phase 1, with testing on a small group of healthy human volunteers to assess safe dosage level and method of delivery; Phase 2, using 50–300 patients to evaluate the product's effectiveness, short-term side effects, and optimal therapeutic doses; and Phase 3, using up to 3,000 patients to determine its safety, efficacy, and interactions with comorbidities. On passing Phase 3, the product can be manufactured and marketed. The FDA approves or rejects a product at each phase, providing its decision to the firm in a private communication. Thus, FDA approval is required before a drug can proceed to the next phase of development. A firm also can decide based on its private information (such as clinical trial information) to discontinue a product and preempt an anticipated rejection by the FDA.

Several other industry characteristics are relevant. First, biotech firms generally have highly concentrated product portfolios, averaging seven drugs under development for our sample. This suggests that key product milestones, such as an FDA approval/rejection or the firm's decision to continue/discontinue a product, likely represent material information about the risk, growth, survival, and profitability of such firms.[2] Second, a firm's product portfolio is often on

[2] In addition, drug development is typically a long process, averaging over ten years from product application to FDA approval. As such, information on milestones (e.g., FDA approval or denial at key phases) is critical to investors to assess the firm's prospects (Van Norman 2016).

related therapies (e.g., treatments for heart disease), with similar clinical trial profiles (e.g., patients with high blood pressure), and applying similar technologies (e.g., mRNA or CRISPR). Thus, critical information releases regarding one product's success or failure likely have perceived or actual spillover effects for other products under development: that is, the cash flow implications of one product typically exhibit nonzero correlations with the firm's other products. Third, biotech firms typically lack internal sources of capital, with many having no product revenues due to products not yet reaching marketability. Thus, most biotechnology firms must maintain access to capital markets, which are the primary source of needed capital to complete product development (Guo et al. 2004; Enache et al. 2022). Given the long development times, most firms access capital on a repeated basis, and the products progress through increasingly expensive phases of development. Collectively, these characteristics create incentives for biotech firms to adopt disclosure strategies to facilitate their ongoing access to capital markets.

We test our hypotheses using the issuance of 8-K filings reflecting key product milestones. Our product-level 8-Ks provide strong identification, as the mandated signal for a specific drug (e.g., the FDA approval or rejection decision) can be directly linked to the 8-K disclosure. This differs from other firm-level disclosure settings having signals and disclosure reflective of general firm performance (e.g., Rawson et al. 2020), which reduces identification, as well as settings using traditional financial metrics like revenue and earnings (Miller 2002; Merkley 2014), which differ in being subject to an audit process.

In the biotechnology setting, the receipt of an FDA approval or rejection of a drug under development warrants a mandated 8-K filing for three reasons. First, most biotech firms have concentrated product portfolios, leading regulatory information on any particular drug under development to represent a material event. Second, once management receives information from

the FDA, it effectively is inhibited from communication with investors to avoid violating selective disclosure rules. This provides strong incentives for biotech firms to rapidly disclose this information to allow ongoing communications with their investor base.[3] Third, biotech firms are incentivized to disclose this information immediately to minimize litigation risk, characterized as high within this industry (Francis, Philbrick, and Schipper 1994; Kim and Skinner 2012). Similarly, a biotech firm's decision to continue or discontinue a product's development into a major phase also warrants an 8-K filing, as the decision also represents material information.[4]

Accordingly, we use 8-K filings by biotech firms, announcing a strong negative or positive signal about a specific drug under development, to proxy for a mandated material information release. We denote as a strong negative signal an FDA rejection of a drug and/or the firm's decision to discontinue its development. We denote as a strong positive signal an FDA approval of a drug into the next phase and/or a firm's decision to continue its development.[5]

[3] To further confirm that 8-K filings by biotech firms are mandated, we collect data from the FDA orange and purple books, which report the FDA approval dates (versus the 8-K issuance dates). We match 55 products in our sample to these data. For all 55, the firm releases the 8-K within five days of the FDA decision, with the majority (60%) made known within one day. Both are consistent with rapid, timely releases of information.

[4] We appreciate valuable discussions with an anonymous chief financial officer of a publicly-traded biotech firm, an anonymous SEC regulator, an anonymous Big 4 healthcare audit lead partner, and an anonymous law firm partner specializing in biotech issues regarding how major product development milestones for a drug typically represent material information events necessitating 8-K filings.

Note there are two primary exceptions when such milestones would not constitute material information: (1) if the firm has a large drug portfolio, leading any specific drug's development to be immaterial vis-à-vis its overall portfolio; and (2) if the drug is early stage (e.g., preclinical), suggesting that its economic impact on the firm is minimal. Results are unchanged to re-estimating all analyses excluding firms having a large drug portfolio (defined as 10+ drugs under development, $N = 25$), as well as excluding all preclinical drugs under development ($N = 15$).

[5] Once the firm learns of the FDA's approval or rejection of a product at a particular phase of development, it must disclose this decision truthfully to its investors. Such decisions can be confirmed *ex post* and could lead to significant monetary or reputational penalties if the firm misrepresents this information. Thus, we view the likelihood of management falsely disclosing a result to be very low.

2.2. Prior Literature and Hypothesis Development

Our paper builds on two streams of literature. First, we build on theoretical disclosure literature (e.g., Dye 1986; Lundholm 1988; Kirschenheiter 1997; Bertomeu, Vaysman, and Xue 2021), including two particular papers. Ebert et al. (2017) posits that a firm with a negative (positive) signal has incentives—reflecting stock price maximization—to reveal offsetting information (not to reveal other information). The model is one of disaggregation, using earnings as the signal. In our biotech setting, the aggregated signal is the collective probability of the drug portfolio succeeding to market, which is highly relevant given concentrated product portfolios typically focused on similar therapies (e.g., neurodegenerative disease), clinical trial profiles (e.g., patients with Alzheimers), and technologies (e.g., CRISPR). As such, drugs under development share (potentially high) correlations regarding probability of success. Further, capital is raised at the firm not the drug level. Our setting applies to Ebert et al., as biotech firms can disaggregate the portfolio probability of success by discussing other drugs under development. Einhorn (2005) presents a model (see Case C) where a privately informed, risk-neutral manager tries to maximize the firm's share price. The manager observes two private signals: one requiring disclosure (mandatory signal), and one which the manager can choose to disclose (voluntary). The model posits that the manager is more likely to provide additional voluntary disclosure, conditional on the private signal being less favorable.

Second, we contribute to the literature examining the causes and consequences of information dissemination. Blankespoor et al. (2020) discusses dissemination as the use of additional disclosure channels to convey either previously- or concurrently-released information, with dissemination intended to reduce information processing costs. Blankespoor et al. (page 27) notes limited research on the role of regulatory filings as dissemination channels, and calls for

further research to understand when and how such channels are used, and the effects they have on decision outcomes such as equity pricing.

Our paper builds on both literatures. We first provide evidence regarding the predictions of Ebert et al. (2017) and Einhorn (2005) by assessing if biotech firms having to disclose unfavorable privately observed signals use additional information—counterpoised disclosure—to separate themselves from firms with even worse information. Our study also answers Blankespoor et al (2020) by contributing to the dissemination literature through examination of whether and how firms use particular regulatory filings (8-Ks) as dissemination channels for product level disclosures. Our analyses reflect three primary predictions.

First, we examine whether managers condition the provision of counterpoised disclosure based on the sign of the mandated signal necessitating the 8-K filing. We denote the drug necessitating the 8-K issuance as the "signal drug," and posit that disclosure incentives differ by whether the signal for this drug is negative or positive. Negative signals—such as an FDA rejection—can lead to significant adverse effects like large stock price declines and reduced access to capital markets for other products under development. Again, these effects can be compounded by perceived spillovers onto other drugs under development. As such, the expected adverse effects create incentives to provide additional information beyond that solely relating to the signal drug: namely, information regarding other drugs under development, which we denote "non-signal drugs." We posit that firms disclose non-signal drug information to mitigate the adverse impact of the negative signal (e.g., Dye 1986). Doing so can attenuate negative informational spillovers onto other drugs in the portfolio, as well as minimize reputational effects to the manager or firm, due to the repeated nature of accessing capital markets as part of product development.

For biotechnology firm 8-K filings, other disclosures include information on other products under development. We denote such information as *counterpoised disclosures*, defined as information about non-signal drugs, disseminated in the same 8-K with information about a signal drug for which negative news (such as its discontinuation) is revealed, with the intent to mitigate any adverse consequences of this required disclosure. This leads to the following hypothesis:

HYPOTHESIS 1. *8-K filings reflecting negative signals about a drug under development are more likely to include a counterpoised disclosure relative to those reflecting positive signals about a drug under development.*

To provide a benchmark, we compare the use of counterpoised disclosure in 8-K filings revealing negative signals against those revealing a positive signal. This holds the 8-K filing (and thus the disclosure channel) constant. In addition, as the firms are filing 8-Ks for both negative (i.e., FDA rejection) and positive (i.e., FDA approval) signals, this suggests that the included information for both filings crosses the firm's perception of material information.

Second, we examine the market consequences of counterpoised disclosure. Biotech firms face incentives to mitigate any adverse effects (such as stock price declines) arising from mandated disclosure of negative signals. Accordingly, we examine whether the release of a counterpoised disclosure attenuates any negative stock price reaction arising from the announcement of a negative signal. As biotech firms often lack product revenue (79% of sample firms) and report losses (75%), investors likely value firm based on other information—most prominently, updates on product development. If counterpoised disclosure leads investors to reweight expected spillover implications toward other drugs within its development pipeline, it provides offsetting information to mitigate the revelation of the negative news. Restated, we expect that 8-Ks revealing a negative signal, but also providing counterpoised disclosures, exhibit an attenuated market reaction relative to those that do not. This leads to the following hypothesis:

HYPOTHESIS 2. *The inclusion of a counterpoised disclosure in an 8-K filing revealing a negative signal about a drug under development leads to an attenuated (less negative) market reaction to that 8-K.*

Third, we assess whether counterpoised disclosure reflects informational or opportunistic motivations. Prior literature on bundling does not assess these effects, due to inherent challenges in measuring the *ex post* validity of the bundled signals. Of note, our product level setting allows strong identification to assess whether the counterpoised disclosure is credible or not, through the observed subsequent success of drugs through the regulatory approval process. In particular, we assess the relative success rates for those drugs receiving counterpoised disclosure versus those that do not. If managers use counterpoised disclosure for informational reasons, this would be consistent with their using private information to selectively highlight drugs within their portfolios that have the strongest probability of success. This leads to the following hypothesis:

HYPOTHESIS 3. *If counterpoised disclosure reflects on average informational rather than opportunistic motivations, products receiving counterpoised disclosure in an 8-K filing will exhibit a higher subsequent FDA approval rates relative to those that do not.*

We note several sources of tension in these three expectations. Regarding Hypothesis 1, managers may not adopt a counterpoised disclosure strategy if they lack sufficient non-signal drug information to provide a significant update to investors; this is compounded by the short window (typically several days) in which the signal drug 8-K must be released.[6] Related, managers face substantial reputational or litigation costs to overstating the potential development of other drugs or understating any negative spillover effects. Regarding Hypothesis 2, counterpoised disclosure may not attenuate any negative market reactions if these disclosures are already priced by the

[6] The combination of a recurring communication cycle (i.e., quarterly conference calls) and a concentrated product portfolio also suggests that managers' ability to withhold information for long periods of time is limited in this biotechnology setting relative to more general firm-level information (e.g., Kothari et al. 2009). The lack of product revenue and earnings for typical biotechnology firms strongly suggests that analysts and investors focus their information gathering on status updates regarding the firm's product portfolio.

market. Further, the market may perceive counterpoised disclosure to be non-credible (i.e., cheap talk) and place a low (or even zero) weight on it. Regarding Hypothesis 3, opportunistic incentives (D'Souza, Ramesh, and Shen 2008) may drive counterpoised disclosure strategies, leading non-signal drugs receiving counterpoised disclosure to exhibit similar (or even lower) subsequent approval relative to those not receiving counterpoised disclosure.

Finally, we note three key differences between our setting and the prior literature on bundling (e.g., Hutton, Miller, and Skinner 2003; Wasley and Wu 2006; Merkley 2014; Billings and Cedergren 2015; Segal and Segal 2016; Bliss, Partnoy, and Furchtgott 2018). First, bundling typically relates to the issuance of two separate media (such as two separate 8-Ks), suggesting the presentation of two different material events. Our setting centers on a single material event for a specific drug, with dissemination of other information that (by itself) does not warrant its own filing. Second, bundling typically focuses on the timing of disclosure, wherein managers know the news in advance and choose both the disclosure timing as well as whether to bundle it with other signals. For example, Segal and Segal (2016) examines whether firms strategically time the disclosure of positive versus negative news, finding that firms release negative news when investor attention is low (e.g., after trading hours or on the last trading day of the week). In our setting, FDA decisions on drug development are unanticipated and the firm must release the information within several days, leaving little room for strategic timing.[7] Third, papers on bundling concentrate on firm-level information mostly related to earnings (e.g., earnings forecasts,

[7] In addition, Segal and Segal (2016) measures voluntary and mandatory disclosures based on the tone of the news and summarizes the disclosures at the firm-year based on all 8-Ks in a given year. The paper defines mandatory disclosure (voluntary disclosure) as the difference between the number of positive and negative words in all other 8-K sections (Item 8.01) scaled by the total number of words in the corresponding sections (within Item 8.01). Our paper focuses on the product-level disclosure within specific 8-K filings, allowing measurement of the magnitude of disclosure of each product in an 8-K and, more importantly, the firms' disclosure conditional on the sign of the received FDA signal. Finally, Segal and Segal includes all industries, while our paper uses a single industry (biotech). The single industry setting provides stronger identification of the economic incentives (e.g., additional capital raising and managing information spillovers across products) motivating any observed disclosure behavior.

announcements, or restatements). Our setting of product-level 8-K filings enhances identification by linking the economic outcome (e.g., FDA decision) to the disclosure (8-K for that product). Related, our setting uses a disclosure subject to *ex post* verification (as investors can observe the subsequent success or failure of the counterpoised disclosure product); prior papers on bundling generally cannot do this analysis due to inherent challenges in operationalizing *ex post* validation of the bundled disclosure.

3. Research Design

We test our three hypotheses using the setting of 8-K filings for biotech firm's drugs under development. SEC regulations mandate 8-K filings when the firm has material information to communicate to its investors: for biotech firms, 8-Ks provide material updates regarding specific milestone information of drugs under development. The 8-K filing (and the related press release typically linked to it) provides a focused information release targeting a specific product, offering strong identification between the material signal for the product (e.g., FDA rejection or approval decision) and its related disclosure within the 8-K. Related, it also enables clear identification of the counterpoised disclosure: any information about other drugs under development.[8]

Critically, the use of biotechnology 8-K filings also provides a benchmark sample. Specifically, we expect that firms revealing negative signals (i.e., a specific drug's FDA rejection or its discontinued development) in the 8-K face strong incentives to provide counterpoised disclosure: these represent our treatment group. We use as our benchmark group, those 8-Ks

[8] We do not use other disclosure channels (such as the earnings announcement, Form 10-K filing, or conference call), which usually cover the full range of a firm's products and operations.

issued by biotechnology firms disclosing a positive signal (i.e., either a drug's approval by the FDA or a decision to continue its development into the next phase).

3.1. Managerial Provision of Counterpoised Disclosure

We examine managers' provision of counterpoised disclosure using the following equation:

$$8K\_Discl_{jt} = \alpha_0 + \boldsymbol{\beta_1 Neg\_Signal}_{jt} + \beta_2 Size_{jt-1} + \beta_3 Prod\_Number_{jt-1} + \beta_4 AvgProdDiscl_{jt-1} + \beta_5 MTB_{jt-1} + \beta_6 ROE_{jt-1} + Quarter\ or\ Firm\ FE + \varepsilon_{jt}. \quad (1)$$

Throughout, we denote the "signal drug" as firm *j*'s drug at time *t* necessitating the 8-K filing to disclose either the product's FDA rejection or approval, or the firm's explicit decision to discontinue or continue the drug's development. We denote any other firm *j* drugs discussed in the same 8-K as "non-signal drugs."

The dependent variable, $8K\_Discl_{jt}$, is one of two proxies measuring firm *j*'s counterpoised disclosure at time *t* within the 8-K filing. First, $8K\_Ind\_NonSignalDrug_{jt}$ is an indicator variable equal to one if firm *j* mentions in its 8-K filing *t* any non-signal drugs, and zero otherwise; thus, this variable captures whether a firm discusses non-signal drugs in the 8-K filing. We estimate this analysis using a logistic regression. Second, $8K\_RelativeDiscl_{jt}$ is firm *j*'s average disclosure score for the non-signal drugs in the 8-K filing *t* less that for the signal drug; thus, this variable captures the extent to which a firm discusses non-signal drugs in the 8-K filing.[9] The disclosure scores follow Guo et. al. (2004) and Enache et. al. (2022), reflecting a disclosure index for each product mentioned in the firm's 8-K filing (see Appendix B). If no other drug is mentioned in the 8-K, the average disclosure score for the non-signal drugs equals zero. This provides a relative disclosure score, with larger values reflecting higher voluntary disclosure in the 8-K filing for the

[9] Untabulated results are robust to alternatively defining $8K\_RelativeDiscl_{jt}$ as a scaled measured (i.e., firm *j*'s average disclosure score for the non-signal products in the 8-K filing *t* divided by that for the signal product).

non-signal drugs as compared with the signal drug. As $8K\_RelativeDiscl_{jt}$ is a continuous variable, this analysis uses ordinary least squares regressions.

Neg_Signal_{jt} is our treatment variable (bolded), defined as an indicator variable equal to one if the 8-K reveals a negative signal, and zero if it reveals a positive signal. We define a negative signal as when the FDA rejects a product and/or the firm discontinues its development; we define a positive signal as when the FDA approves a product and/or the firm explicitly indicates intentions to continue its development. Appendix C provides examples. Following Hypothesis 1, we predict a positive coefficient on Neg_Signal_{jt}. That is, we expect 8-K filings revealing negative product-level signals are more likely to include additional information about non-signal drugs (counterpoised disclosures), relative to those reporting positive signals.

We include the following control variables. Firm size ($Size_{jt-1}$) is measured as firm *j*'s total assets at the end of the quarter $t - 1$. Prior research finds that larger firms provide higher levels of disclosure (Lang and Lundholm 1993), suggesting a positive predicted sign. However, prior research in the biotechnology setting documents higher disclosure for smaller firms due to stronger incentives to reduce information asymmetry, suggesting a negative predicted sign (Enache et al. 2022). Accordingly, we do not predict the coefficient sign. $Prod\_Number_{jt-1}$ is the number of drugs under development by firm *j* per its annual report for year $t - 1$. As firms with more diverse product portfolios are more likely to have other drugs to discuss, and thus have greater flexibility to provide counterpoised disclosure, we predict a positive coefficient. $AvgProdDiscl_{jt-1}$ is the average product disclosure score (based on Guo et al. 2004 and Enache et al. 2022) across all drugs from firm *j*'s 10-K filing for year $t - 1$; this proxies for the firm's overall product-level disclosure policy. If product-level disclosure is complementary across alternative disclosure channels such as the 10-K and 8-K, the predicted sign is positive. Alternatively, if firms using the 10-K as their

primary disclosure channel and provide less information via other channels (i.e., a substitutional effect), the predicted sign is negative. MTB_{jt-1} is firm *j*'s market-to-book ratio, measured at the end of year $t - 1$, to proxy for the firm's growth and financial risk. As higher MTB_{jt-1} can capture either higher growth opportunities and/or lower financial risk, the predicted sign is positive or negative. We also include ROE_{jt-1} to proxy for profitability, defined as firm *j*'s net income divided by total book value of equity at the end of the quarter $t - 1$.[10] We expect firms with higher profitability to have lower incentives to provide counterpoised disclosure, as those firms have internal resources to continue the development of the remaining product portfolio. Hence, the predicted sign is negative. Finally, we include fiscal quarter or firm fixed effects to control for average changes in disclosure that occur over time or that are specific to a given firm.[11]

3.2. Investor Reaction to Counterpoised Disclosure

We examine short-term equity market consequences of counterpoised disclosure as follows:

$$\begin{aligned} 3Day\_CAR_{jt} = \alpha_0 + \beta_1 Neg\_Signal_{jt} + \beta_2 8K\_Discl_{jt} \; + \; & \boldsymbol{\beta_3 Neg\_Signal_{jt} \times 8K\_Discl_{jt}} \\ + \beta_4 Size_{jt-1} + \beta_5 Prod\_Number_{jt-1} + \beta_6 AvgProdDiscl_{jt-1} + \beta_7 MTB_{jt-1} & \\ + \beta_8 \, ROE_{jt-1} + Quarter \text{ or } Firm \; FE + \varepsilon_{jt}. & \qquad (2) \end{aligned}$$

The dependent variable is $3Day\_CAR_{jt}$, the three-day abnormal return for firm *j* centered on the announcement date *t* of the 8-K release. We derive abnormal returns by subtracting the value-weighted market return for the same three-day period.[12]

Neg_Signal_{jt} is defined as above. For 8-Ks with negative signals, we expect a negative main effect of Neg_Signal_{jt}: i.e., the reduced or eliminated possibility of a drug progressing to

[10] Untabulated results across all specifications are unchanged to replacing *ROE* with return on assets.

[11] Note that we estimate both logistic and OLS specifications, with and without firm fixed effects, to accommodate potential issues arising from the incidental parameters problem (Neyman and Scott 1948; Lancaster 2000). Untabulated results also are robust to using year fixed effects.

[12] Results are unchanged to market adjusting using an equal-weighted or a three-factor model approach.

market leads to negative equity price revisions. $8K\_Discl_{jt}$ is our measure of counterpoised disclosure, measured as above using $8K\_Ind\_NonSignalDrug_{jt}$ or $8K\_RelativeDiscl_{jt}$. Our primary treatment variables are the interactions of Neg_Signal_{jt} x $8K\_Ind\_NonSignalDrug_{jt}$ or Neg_Signal_{jt} x $8K\_RelativeDiscl_{jt}$. Hypothesis 2 argues that counterpoised disclosure—that is, disseminating information about other products under development (i.e., non-signal drugs) in the same 8-K filing—will attenuate the negative market reaction to 8-Ks announcing negative news about the signal drug. Accordingly, our predicted sign on both interaction coefficients is positive. The control variables, their predicted signs, and the fixed effects are as defined previously.

3.3. Informational versus Opportunistic Motivations

Finally, we examine whether counterpoised disclosure appears consistent with informational versus opportunistic motivations using the following equation:

$$DrugProgress_{dt} = \alpha_0 + \beta_1 \boldsymbol{Counterpoised\_Drug_{dt}} + Firm\ FE + \varepsilon_{dt}. \quad (3)$$

While the unit of analysis for the previous Equations (1) and (2) was the 8-K filing, the unit of analysis for Equation (3) is the individual drug. Thus, the dependent variable, *DrugProgress*, measures the extent to which drugs successfully progress through subsequent FDA approval using two proxies. First, $Advance_{dt}$ is an indicator variable equal to one if drug *d* in development at the time of 8-K filing *t* for the signal drug exhibits any progress in its development (i.e., FDA approval into a subsequent phase of development), and zero otherwise. Second, $StageDiffs_{dt}$ is the change in the phase of development for non-signal drug *d* in development at the time of 8-K filing *t* to a

future point in time (defined in two ways, as discussed below), scaled by the initial stage code.[13] Thus, *Advance* (*StageDiffs*) captures whether (the extent to which) a drug advances.

The treatment variable is $Counterpoised\_Drug_{dt}$, an indicator variable equal to one if non-signal drug *d*, which is under development at the time of 8-K filing *t*, is mentioned in that 8-K filing (i.e., receives counterpoised disclosure), and zero otherwise. We also include firm fixed effects to control for unobservable firm characteristics driving product advancement: note that this provides a within firm, within 8-K analysis. Under Hypothesis 3, if managers use counterpoised disclosure for informational motivations (i.e., to inform about those non-signal drugs under development, which the managers believe *ex ante* to have higher probabilities of success), then the predicted coefficient on *Counterpoised_Drug* is positive.

Two research design choices unique to this analysis warrant discussion. First, implementation requires a look forward period to assess a given drug's progress. We use two alternative windows: both start from the signal drug 8-K filing, and go through either (i) the end of 2020 (denoted as "All Periods") or (ii) the subsequent ten years (denoted as "Within Ten Years"). Using "All Periods" comprehensively includes all periods and may better accommodate the lengthy and variable drug development process. Using "Within Ten Years" holds fixed the length of time in which the drug can progress, which reduces variation due solely to the length of time considered.[14] Second is the reference sample to include. We start by including all 8-K filings from our primary sample, which also include a counterpoised disclosure (i.e., having some drugs receiving counterpoised disclosure is a necessary condition). We then include only non-signal drugs (i.e., we exclude signal drugs), as the managerial choice to provide counterpoised disclosure

[13] Following prior literature (Guo et al. 2004), we use the following stage code values at the time of the 8-K filing to calculate *StageDiff*: preclinical is assigned a value of 1, 3, or 5, depending on where the drug is within the preclinical phase; Phase 1 (2) [3] is assigned a value of 10 (20) [30]; and FDA approval is assigned a value of 40.

[14] Untabulated results are robust to using either five- or seven-year windows.

inherently involves selection among only non-signal drugs. We examine two alternative portfolios of non-signal drugs: (i) those drugs named in either an earnings announcement or another 8-K filing within +/–180 days surrounding the issuance of the signal drug's 8-K (denoted the "Material Information Sample"); and (ii) all drugs named in the firm's most recent 10-K preceding the signal drug 8-K filing (denoted the "Full Portfolio Sample"). The Material Information Sample focuses on those drugs, which have sufficient informational updates warranting their inclusion in key firm disclosures, focusing the comparison on presumably the most material drugs in the firm's portfolio. The Full Portfolio Sample includes all drugs in the firm's portfolio, without regard to any individual drug's materiality or stage of development.

4. Sample Selection and Descriptive Statistics

We begin with publicly listed biotechnology firms on the major exchanges from 2005–2020. Due to hand-collection costs, we randomly select 10% of available firms, restricted to firms with drugs under development.[15] We gather product-level signal information, product-related disclosures, and the number of products mentioned in each 8-K filing. We include only those 8-Ks reflecting either an FDA decision (i.e., an approval or rejection) or an explicit indication by the firm regarding a specific drug (i.e., to continue or discontinue its development).[16] We collect firm characteristics from Compustat and market information from CRSP. The final sample includes 307 8-K filings across 60 unique biotech firms.

Table 1 Panel A, presents descriptive statistics. $8K\_Ind\_NonSignalDrug_{jt}$ exhibits a mean of 0.199 (i.e., 19.9% of sample 8-Ks include counterpoised disclosures). This mean varies across

[15] We compare firm attributes (such as size and profitability) across our sample versus all available biotechnology firms on Compustat. Consistent with random sampling, untabulated results reveal no significant differences.

[16] To ensure stronger identification, we exclude any 8-Ks having more than one product signal disclosure.

negative (43.2%) versus positive (16.0%) signal 8-Ks, consistent with Hypothesis 1. The mean of $8K\_RelativeDiscl_{jt}$ (–0.236) is negative, showing that 8-Ks provide more disclosure about the signal versus non-signal drugs, as expected. Of note, $8K\_RelativeDiscl_{jt}$ reveals a less negative mean for 8-Ks with negative signals (–0.095) relative to those with positive signals (–0.260), again consistent with Hypothesis 1. The mean of Neg_Signal_{jt} is 0.143, indicating that 14.3% of observations are of a negative signal (i.e., an FDA rejection or drug discontinuation).[17] The control variables reveal characteristics typical of biotechnology firms: smaller size (average total assets of $682 million), concentrated product portfolios (approximately seven drugs under development), high market-to-book ratios (mean of 5.794), and negative *ROE* (mean of –24.6%).

[Insert Table 1 near here]

Panel B presents the correlations. There are significantly positive correlations between Neg_Signal_{jt} and $8K\_Ind\_NonSignalDrug_{jt}$ (0.239) and $8K\_RelativeDiscl_{jt}$ (0.289), consistent with negative signal 8-Ks being more likely to include counterpoised disclosures relative to positive signal 8-Ks. The correlation between $8K\_Ind\_NonSignalDrug_{jt}$ and $8K\_RelativeDiscl_{jt}$ is 0.567, reflecting moderately overlap. Other correlations suggest no multi-collinearity concerns.[18]

5. Empirical Results

5.1. Managerial Provision of Counterpoised Disclosure

Table 2 presents the empirical results. Columns (1)–(3) report the logistic regressions for three alternative specifications using $8K\_Ind\_NonSignalDrug_{jt}$ as the dependent variable. We find

[17] The higher proportion of observations having positive signals (85.7%) relative to negative signals (14.3%) is expected. In particular, a given drug progressing successfully through multiple phases of development will have multiple positive signals (e.g., from Phase 1, Phase 2, etc.), while a drug not progressing (e.g., being rejected by the FDA) will typically experience a negative signal only once.

[18] The highest correlation is between *MTB* and *ROE* at 0.504. Untabulated tests of variance inflation factors (VIFs) suggest no multi-collinearity issues within any specifications (with all VIFs < 2).

significantly positive coefficients on Neg_Signal_{jt} in the reduced form equation in Column (1) (1.303, *p*-value = 0.00), and in the regression including the control variables and quarter fixed effects in Column (2) (1.508, *p*-value = 0.00). Column (3) presents a regression including firm fixed effects to control for unobservable firm characteristics (i.e., to consider that counterpoised disclosure decision may be endogenous), providing an effective within-firm design.[19] The coefficient on Neg_Signal_{jt} remains significantly positive (1.562, *p*-value = 0.02).

[Insert Table 2 near here]

In Column (3), among the control variables, we find the predicted positive coefficients for *Prod_Number* (0.151, *p*-value = 0.09), and negative coefficients for $Size_{jt}$ (–0.001, *p*-value = 0.09), MTB_{jt} (–0.052, *p*-value = 0.01), and ROE_{jt} (–0.465, *p*-value = 0.09). The results suggest that firms with more drugs under development are more likely to provide counterpoised disclosures, and firms that are larger, have higher growth, or with more profitability are less likely to do so.

Columns (4)–(6) present OLS results using $8K\_RelativeDiscl_{jt}$ as the dependent variable. The coefficients of Neg_Signal_{jt} again are consistently significantly positive across the reduced form regression of Column (4) (0.165, *p*-value = 0.00), regression with control variables and quarter fixed effects in Column (5) (0.165, *p*-value = 0.00), and that with controls and firm fixed effects in Column (6) (0.160, *p*-value = 0.00). These results show that 8-Ks with negative signals provide higher levels of counterpoised disclosures for the non-signal drugs, as compared with 8-Ks with positive signals.[20] The coefficients on $AvgProdDiscl_{jt}$ and MTB_{jt} are significantly negative.

Overall, the evidence in Table 2 supports Hypothesis 1. The results are consistent with managers being more likely to provide counterpoised disclosures about non-signal drugs in 8-K

[19] Note that this estimation is quite conservative, as the sample *N* is about 300 and the firm fixed effects exceeds 50.

[20] We conduct similar tests using as our treatment variable *Pos_Signal* (defined as an indicator variable equal to one if firms receive FDA approval on product phase change, and zero otherwise). Untabulated results provide similar inferences: firms are less likely to provide counterpoised disclosure in their 8-Ks when having positive signals.

filings announcing negative signals (i.e., FDA rejection or product discontinuation), as compared with those announcing positive signals (i.e., FDA approval or continuation of its development).

5.2. Investor Reaction to Counterpoised Disclosure

Table 3 presents results of the short-window investor reaction to counterpoised disclosure within the sample 8-Ks. Panel A presents results focusing on negative news 8-Ks, with Columns (1)–(3) present results using $8K\_Ind\_NonSignalDrug_{jt}$ (i.e., whether the firm discusses other drugs in its 8-K). As expected, Neg_Signal_{jt} is significantly negative across all three columns, revealing sizable three-day market declines of 22% (holding all else constant) for firms announcing an FDA rejection or discontinuation of a drug under development.[21] Of note, the coefficient on $Neg\_Signal_{jt} \times 8K\_Ind\_NonSignalDrug_{jt}$ is significantly positive using the reduced form regression of Column (1) (0.143, *p*-value = 0.03), that with controls and quarter fixed effects in Column (2) (0.155, *p*-value = 0.03), and that with controls and firm fixed effects in Column (3) (0.116, *p*-value = 0.10). These results reveal an attenuated market reaction for negative signal 8-Ks that also include counterpoised information about other non-signal drugs.

[Insert Table 3 near here]

Similar results attain in Columns (4)–(6) using $8K\_RelativeDiscl_{jt}$ (i.e., the relative disclosure of any non-signal drugs versus the signal drug). Of note, we find significantly positive coefficients on $Neg\_Signal_{jt} \times 8K\_RelativeDiscl_{jt}$ in the reduced form equation in Column (4) (0.158, *p*-value = 0.06) and the regression with controls and quarter fixed effects in Column (5)

[21] We conduct an untabulated univariate descriptive analysis to benchmark the considerable negative market reactions to these 8-Ks. We find that the mean three-day market reactions to our sample 8-K product announcements on positive and negative signals are 6% and –12%, respectively, compared with 2% across all non-product 8-K announcements and –1% across all earnings announcements; results are similar using median and absolute returns. Overall, this provides evidence that our 8-K selection process focuses on major product announcements, and that our chosen 8-Ks qualify as material information requiring disclosure.

(0.150, *p*-value = 0.08). This coefficient is again positive but insignificant in the regression with controls and firm fixed effects in Column (6) (0.126, *p*-value = 0.18). The control variable coefficients are generally insignificant.[22]

As an additional analysis, we also assess the effects focusing on the positive news 8-Ks. Panel B presents the market reaction conditional on firm's reporting positive signal 8-Ks with counterpoised disclosure. As expected, we find a significantly positive main effect on *Pos_Signal*, indicating a large positive market reaction for 8-Ks revealing positive news about a signal drug. Of note, we find marginally negative coefficients on Pos_Signal_{jt} x $8K\_Ind\_NonSignalDrug_{jt}$ as well as on Pos_Signal_{jt} x $8K\_RelativeDiscl_{jt}$. Interestingly, these latter coefficients suggest on offsetting negative market reaction to positive news 8-Ks, which include counterpoised disclosure; that is, providing counterpoised disclosure within a positive signal 8-K appears to dilute the main positive market effect. This latter effect is consistent with credibility concerns: additional information (such as more disclosure of non-signal drugs in the context of a positive news 8-K for a signal drug) can lead users to question the validity of the disclosure (e.g., Feltovich, Harbaugh and To 2002).

Overall, the analyses support Hypothesis 2: the negative market reaction to a negative signal 8-K filing is attenuated when counterpoised disclosures on their other drugs is included.

[22] As robustness tests, we confirm that the Table 2 and 3 results are unchanged to including the following other control variables: (i) the firm's quarterly R&D expenditures to control for its aggregate level of innovation; (ii) the signal product's stage of development, measured as an indicator variable equal to one if the product is in an early stage of development (before Phase 3), and zero otherwise (defined as Phase 3); (iii) the firm's product revenue; (iv) the number of days between the 8-K filing and earnings announcement to control for the delay between information releases across the two disclosure channels; (v) the log of analyst following to control for the firm's information environment; (vi) monthly return volatility to control for firm-level risk; (vii) the firm's change in sales to control for growth; (viii) the change in cash to control for the firm's need for liquidity; and (ix) unexpected earnings (quarter *t* actual earnings less that from quarter $t - 1$, deflated by total assets) to control for earnings surprise in the investor reaction analyses. We note that the consistency to adding these firm-level controls is not surprising as our previous analyses are robust to including firm fixed effects.

5.3. Informational versus Opportunistic Motivations

We next assess whether inclusion of counterpoised disclosure is consistent with informational versus opportunistic motivations. Table 4 Panel A presents descriptive statistics across the two previously discussed samples: the Material Information and Full Portfolio samples. Consistent with managers providing counterpoised disclosure due to informational motivations, we find that counterpoised non-signal drugs are more likely to receive subsequent FDA approval relative to non-signal drugs not receiving counterpoised disclosure. Using the Material Information sample in Columns (1)–(2), 35% of counterpoised drugs advance versus 22% for non-counterpoised drugs. Similar differences obtain across each of the univariate statistics.

Panel B presents a regression framework. Focusing on the Material Information sample, Columns (1)–(2) present results using all periods as the look ahead period. We find a significantly positive coefficient on *Counterpoised_Drug* using either the dependent variable of *Advance* (0.936; *p*-value = 0.08) or *StageDiffs* (0.722; *p*-value = 0.04). Similar results obtain in Columns (3)–(4) using the ten year look ahead, as well as using the Full Portfolio sample in Columns (5)–(8).

Overall, the results support Hypothesis 3. Specifically, non-signal drugs selected by managers to receive counterpoised disclosure exhibit higher *ex post* subsequent FDA approval relative to non-signal drugs not receiving counterpoised disclosure. These results appear consistent with managers adopting counterpoised disclosure strategies for informational as opposed to opportunistic motivations.

[Insert Table 4 near here]

6. Additional Analyses

6.1. The Effect of Counterpoised Disclosure on Stock Return Volatility

Section 5.2 documents that firms filing negative news 8-Ks with counterpoised disclosure exhibit attenuated negative stock returns relative to those that do not. We next examine whether counterpoised disclosure also affects subsequent short-term stock return volatility (i.e., the second moment of stock returns). If counterpoised disclosure reduces risk perceptions regarding the firm's drug portfolio, we predict lower subsequent volatility for firms filing negative news 8-Ks including counterpoised disclosure. The regression approach follows Equation (2), except the dependent variable is stock return volatility (*Ret_Vol5Day*), measured as the standard deviation of daily stock returns over days (+1, +5) following the signal drug 8-K filing.

Table 5 presents the results. As expected, the main effect reveals higher short-window volatility for firms filing negative news 8-Ks, reflected in the significantly positive coefficients on *Neg_Signal*. More importantly, we document that firms issuing negative news 8-Ks including counterpoised disclosure exhibit lower volatility, reflected in significantly negative coefficients on *Neg_Signal* x *8K_Ind_NonSignalDrug* (2 of 3 regressions), as well as on *Neg_Signal* x *8K_RelativeDiscl* (3 of 3 regressions). Overall, the results are consistent with attenuated return volatility for negative news 8-Ks including counterpoised disclosure relative to those without.

[Insert Table 5 near here]

6.2. Pre- and Post-Event Investor Reaction to Counterpoised Disclosure

We next examine the market reaction to counterpoised disclosure using pre- and post-event windows surrounding the signal drug 8-K release. The pre-window identifies whether any information leakage occurs regarding the 8-K product news: this is important to ensure that our

event windows fully capture the new product-related information. The post-window assesses whether the previously documented investor reactions exhibit reversion: this is important to confirm whether the observed market reactions reflect sustained pricing effects.

We assess the pre-window using as the dependent variable *CAR_Pre (–5, –2)*, the abnormal market reaction (defined as previously using a value-weighted market adjustment) for days (–5, –2) preceding the 8-K release. The specification follows Equation (2) including firm fixed effects. If no information leakage occurs, we expect insignificant coefficients on both the main effect of *Neg_Signal* and its interactions with *8K_Ind_NonSignalDrug* and *8K_RelativeDiscl*. Confirming these expectations, Table 6 Columns (1) and (2) reveals that we fail to find significant coefficients on either the main effect or the interactions.

[Insert Table 6 near here]

We then assess the post-window using as the dependent variable *CAR_Post (2, 5)*, the abnormal market reaction for days (+2, +5) following the 8-K release. Again, the specification follows Equation (2). If no price reversion occurs, we again expect insignificant coefficients on both the main effect of *Neg_Signal* and its interactions with *8K_Ind_NonSignalDrug* and *8K_RelativeDiscl*. If price reversion occurs, we predict that the previously observed market effects for days (–1, +1) will reverse, leading to a positive (negative) coefficient on the main effect (interaction). Columns (3) and (4) present the results. As previously, we fail to find significant coefficients on the main effect or on either interaction.[23]

Overall, the results of these analyses are consistent with no information leakage preceding, nor any price reversal following, the release of the sample 8-Ks.

[23] We note that the Table 6 results are a failure to reject the null, and thus subject to alternative explanations such as a lack of power. Nonetheless, we highlight that our Table 3 investor reaction results are highly significant on both the main effect and the interactions while using the same sample, suggesting power is not a primary issue. Untabulated results are unchanged to alternative pre- and post-event window lengths.

6.3. Expanded Sample

To assess the robustness of the results to a wider distribution of signals, we next expand the definition of positive and negative signals. Specifically, we redefine as signal products those that receive not only FDA approval or denial, but also FDA decisions on other material matters. Thus, positive signals now reflect FDA approval of product phase advancement, FDA acceptance of a phase advancement application, and positive FDA voting regarding product approval. Negative signals now include FDA rejection, discontinuation of a drug, FDA decision to put a product on hold, temporary discontinuation of product development, and issuance of an FDA response letter regarding product approval. This expands our 8-K sample to 393 observations.[24] Untabulated results are unchanged. For the managerial provision of counterpoised disclosure (Table 2), we continue to find that firms are more likely to provide counterpoised disclosure in negative signal relative to positive signal 8-Ks, across all specifications. For the investor reaction analyses (Table 3), we again find attenuated equity market reactions for 8-Ks with counterpoised disclosure across all specifications.[25]

6.4. Descriptive Statistics for the Negative and Positive Signal Samples

Finally, we exploit the richness of our setting by collecting descriptive data decomposing the 8-K filings into the negative (N = 44) and positive signal observations (N = 263). Table 7 Panel A presents data on the drivers of the 8-K signal. 27% (24%) of negative (positive) signal

[24] Expanding the sample increases power, and allows assessment of how extensively counterpoised disclosures occur within the full distribution of 8-Ks relating to product updates. However, expanding the sample may lead to noisier estimation to the extent that counterpoised disclosure primarily occurs within the most material announcements regarding FDA decisions or firm product continuation/cancellation decisions.

[25] We note that the attenuated market reactions appear directionally smaller relative to the primary results, consistent with the largest attenuating effects occurring within the most material 8-K filing announcements.

observations relate to an FDA rejection (FDA approval), and the remainder to the firm's discontinuation (73%) or continuation (76%) of the product. Panel B presents data on the disclosure channels. The negative signal sample is more likely to issue only an 8-K (25%) relative to the positive signal sample (9%), consistent with incentives to downplay negative relative to positive signals by using limited disclosure channels (i.e., only an 8-K, as opposed to jointing issuing an 8-K and press release). Further, across both 8-K and press releases, the negative signals are more likely to discuss other drugs.[26] Negative signals also are less likely to be mentioned in subsequent earnings announcements (48%) relative to positive signals (84%). Panel C presents textual data on the positioning of the signal: 41% of negative (21% of positive) signal observations are reported in the second half of the 8-K, consistent with incentives to downplay the negative signal. Panel D presents data on the average counterpoised disclosure score across five categories, with average values higher for the negative signal observations for 3 of 5 categories (product specification, target disease, and clinical trial), equal for one (market information), and lower only for one (perhaps not surprisingly, future plans). Overall, the descriptive data appears consistent with higher counterpoised disclosures coinciding with negative signal observations.

[Insert Table 7 near here]

7. Conclusion

This paper examines counterpoised disclosures, defined as concurrent dissemination of information to mitigate the consequences of mandatory disclosures. We use the biotechnology setting, wherein firms face incentives to maximize stock prices due to repeated access to capital

[26] Firms issuing press releases concurrently with filing the 8-K could differ from those not issuing press releases. In untabulated tests, we re-estimate our analyses using only firms issuing press releases, and the results are unchanged.

markets to fund drug development. We examine 8-K filings revealing milestone information about a drug under development, capturing either a negative (i.e., FDA rejection or discontinued of the drug's development) or a positive signal (i.e., FDA approval or firm continuation of development). We hypothesize that the incentives to provide counterpoised disclosure are accentuated for firms wishing to mitigate any adverse effects arising from the mandated revelation of a negative signal. Accordingly, we predict that 8-Ks with negative signals are more likely to include counterpoised disclosures relative to those with positive signals, that 8-Ks providing counterpoised disclosures will exhibit attenuated market reactions if revealing a negative signal, and that if counterpoised disclosure reflects informational motivations, non-signal drugs receiving counterpoised disclosure will exhibit a higher probability of subsequent FDA approval relative to those that do not.

Empirical results support all three predictions. We find that negative signal 8-Ks are more likely to include counterpoised disclosure about other products under development relative to positive signal 8-Ks. In addition, negative signal 8-Ks including a counterpoised disclosure exhibit attenuations of the main negative stock market effects. Finally, the counterpoised disclosure strategy appears consistent with informational motivations, as the counterpoised drugs exhibit higher subsequent progress in their product development relative to non-counterpoised drugs. Overall, our results appear consistent with the predictions that managers having private negative signals that must be disclosed face incentives to provide additional information to investors (e.g., Einhorn 2005; Ebert et al. 2017). Further, our evidence is consistent with managers adopting rational disclosure strategies, as the counterpoised disclosure appears to attenuate the negative market reaction that occurs coincident with announcing the negative signal. Finally, our results appear consistent with informational versus opportunistic motivations driving this disclosure.

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Appendix A. Variable Definitions

Variable	Definition
Dependent Variables	
8K_Ind_NonSignalDrug	Indicator variable equal to one if firm *j* mentions in its 8-K filing *t* any non-signal drugs (i.e., other products in its development pipeline besides the signal drug), and zero otherwise
8K_RelativeDiscl	Firm *j*'s average disclosure score calculated (based on Guo et al. 2004 and Enache et al. 2022) for the non-signal products in the 8-K filing *t*, less the same for the signal product
3Day_CAR	Firm *j*'s three-day abnormal return (using value-weighted market return adjustment) centered on the announcement date of the 8-K filing *t*
Advance	Indicator variable equal to one if drug *d* from 8-K filing *t* exhibits any progress in its development (i.e., approved to move onto a subsequent phase of development by the FDA) either until 2020 or within the ten-year span after the 8-K release, and zero otherwise
StageDiffs	Difference in phase of development for drug *d* from 8-K filing *t*, scaled by the initial stage code, either until 2020 or within the ten-year span after the 8-K release
RetVol_5Day	Firm *j*'s standard deviation of daily returns, measured over days (+1, +5), where day 0 is the announcement date of the 8-K relating to the signal drug.
CAR_Pre (–5, –2)	Firm *j*'s market-adjusted stock return measured over days (–5, –2) preceding the announcement date of the 8-K filing *t* relating to the signal product
CAR_Post (2, 5)	Firm *j*'s market-adjusted stock return over days (+2, +5) following the announcement date of the 8-K filing *t* relating to the signal product
Treatment Variables	
Neg_Signal	Indicator variable equal to one if the signal product for firm *j* has a negative signal (i.e., FDA rejection or firm discontinuation) disclosed in the 8-K filing *t*, and zero if it has a positive signal (i.e., FDA approval or firm initiation of the next phase of development)
Pos_Signal	Indicator variable equal to one if the signal product for firm *j* has a positive signal (i.e., FDA approval or firm initiation of the next phase of development) disclosed in the 8-K filing *t*, and zero if it has a negative signal (i.e., FDA rejection or firm discontinuation)
Counterpoised_Drug	Indicator variable equal to one if the drug *d* from 8-K filing *t* is mentioned as a counterpoised product, and zero if the drug is not mentioned in the same 8-K as a counterpoised product but also is under development by the firm at the time of the 8-K issuance
Control Variables	
Size	Firm *j*'s total assets at the beginning of the quarter *t*
Prod_Number	Number of products under development for firm *j* as disclosed in its annual report in the previous year $t-1$

AvgProdDiscl	Average product disclosure score (based on Guo et al. 2004 and Enache et al. 2022) across all products for firm *j* as collected from its annual report in the previous year $t - 1$
MTB	Firm *j*'s market value of equity divided by book value of equity at the end of quarter $t - 1$
ROE	Firm *j*'s net income divided by equity at the end of quarter $t - 1$

Appendix B. Measurement of Product Disclosure Index

Disclosure Question	Point Assignment
I. Product Specifications	
1. How does the product work?	(3, 2, 1, or 0 points for three, two, one, or no sentences)
2a. Why is it better than previous products?	(2 = name mentioned; 1 = no name mentioned; 0 = no discussion)
2b. Why is it better than competing products?	(2 = name mentioned; 1 = no name mentioned; 0 = no discussion)
3. What is the chemical/biological structure?	(2 = chemical compound; 1 = general discussion; 0 = not mentioned)
Subtotal I = total scores of (1 + max (2a, 2b) + 3) **[maximum = 7]**	
II. Target Disease	
1. What diseases does the product treat?	(2 = disease name mentioned; 1 = disease name not mentioned; 0 = no discussion)
2. What are other possible uses of the product?	(2 = disease name mentioned; 1 = disease name not mentioned; 0 = no discussion)
Subtotal II = total scores of (1 + 2) **[maximum = 4]**	
III. Clinical Trials	
1. Number of patients	(1 = given; 0 = absent)
2. Patients information (with what diseases)	(1 = given; 0 = absent)
3. Doses (amounts) used in the clinical trial	(1 = given; 0 = absent)
4. Method used in the clinical trial	(1 = given; 0 = absent)
5. Treatment schedule (duration or frequency)	(1 = given; 0 = absent)
6. Trial results	(3 = detailed pros/cons, numbers; 2 = general, numbers; 1 = brief, no numbers; 0 = none)
Subtotal III = total scores of (1 + 2 + 3 + 4 + 5 + 6) **[maximum = 8]**	

IV. Future Plans	
1a. Any plan to try the product on new diseases?	(2 = disease name mentioned; 1 = no name mentioned; 0 = no discussion)
1b. Any plan to use with other products?	(2 = name mentioned; 1 = no name mentioned; 0 = not mentioned)
2. Future plan for clinical trials:	
2a. Planned date	(1 = mentioned; 0 = not mentioned)
2b. Number of patients for the planned trial	(1 = mentioned; 0 = not mentioned)
2c. Patient info/disease for the planned trial	(1 = mentioned; 0 = not mentioned)
2d. Duration	(1 = mentioned; 0 = not mentioned)
2e. Method	(1 = mentioned; 0 = not mentioned)
3. Possible alliance	(2 = name mentioned; 1 = no name mentioned; 0 = not mentioned)
Subtotal IV = total scores of (max (1a, 1b) + 2a + 2b + 2c + 2d + 2e + 3) **[max = 9]**	

V. Market Information	
1. Number of patients affected by the disease	(1 = mentioned; 0 = not mentioned)
2. Number of incidents (market size)	(1 = mentioned; 0 = not mentioned)
Subtotal V = total scores of scores (1 + 2) **[maximum = 2]**	

Overall disclosure score **= sum of Subtotals I–V**
Scaled disclosure score **= overall disclosure score divided by** **30 (for products in or beyond the clinical trials phase) or** **22 (for products not yet in clinical trials, which exclude the 8 points for Category III)**

This appendix illustrates the measurement of the disclosure index (based on Guo et al. 2004 and Enache et al. 2022), which is used to define the variables *8K_RelativeDiscl* and *AvgProdDiscl*. Disclosures are measured over five categories: *Product Specifications*, *Target Disease*, *Clinical Trials*, *Future Plans*, and *Market Information*. The variable is scaled to vary between zero and one.

Appendix C. Examples of Positive and Negative Signals in Sample 8-Ks

Positive Signal Examples

Affymax (8-K filing from July 16, 2007)–*Product Continuation*

https://www.sec.gov/Archives/edgar/data/1158223/000110465907054053/a07-19563_1ex99d1.htm

"Affymax, Inc. (Nasdaq: AFFY) today announced that it plans to initiate Phase 3 clinical studies with Hematide™ in chronic renal failure patients following recent discussions with the United States Food and Drug Administration (FDA) on the design of the Phase 3 clinical trial program."

Acorda (8-K filing from January 22, 2010)–*FDA Approval*

https://www.sec.gov/Archives/edgar/data/1008848/000110465910002620/a10-2356_1ex99d1.htm

"Acorda Therapeutics, Inc. (Nasdaq: ACOR) today announced that it has received marketing approval from the U.S. Food and Drug Administration (FDA) for AMPYRA™ (dalfampridine), an oral treatment to improve walking in patients with multiple sclerosis (MS)."

Negative Signal Examples

InterMune (8-K filing from March 5, 2007)–*Product Discontinuation*

https://www.sec.gov/Archives/edgar/data/1087432/000089161807000135/f28033exv99w1.htm

"InterMune, Inc. (Nasdaq: ITMN) today announced that it has discontinued the Phase 3 INSPIRE clinical trial evaluating Actimmune® (interferon gamma-1b) in patients with idiopathic pulmonary fibrosis (IPF) based upon the recommendation of the study's independent data monitoring committee (DMC).… Although we are disappointed by this result with Actimmune®, we remain committed to addressing the significant unmet medical need in IPF with pirfenidone through our Phase 3 CAPACITY program. A positive treatment effect of pirfenidone on lung function has been supported in several Phase 2 studies and in a Phase 3 study as recently reported by Shionogi & Co., Ltd. We also are focused on advancing our novel hepatitis C virus product candidate, ITMN-191. In collaboration with our partner Roche, our Phase 1a study of ITMN-191 is proceeding as planned."

Cephalon (8-K filing from August 9, 2006)–*FDA Rejection*

https://www.sec.gov/Archives/edgar/data/873364/000110465906053389/a06-17824_18k.htm

"On August 9, 2006, the Company announced that is has received a letter from the FDA stating that the Company's supplemental new product application for SPARLON, a proprietary dosage form of modafinil for the treatment of attention-deficit/hyperactivity disorder in children and adolescents, is not approvable."

Table 1. Descriptive Statistics and Correlations: Sample for Managerial Provision and Investor Reaction Analyses

Panel A: Descriptive Statistics (*N* = 307)

	Median	Mean	Standard Deviation		Median	Mean	Standard Deviation
Dependent Variables				**Treatment Variable**			
8K_Ind_NonSignalDrug	0	0.199	0.400	*Neg_Signal*	0	0.143	0.351
Neg_Signal (*N* = 44)	0	0.432	0.501				
Pos_Signal (*N* = 263)	0	0.160	0.367	**Control Variables**			
8K_RelativeDiscl	–0.267	–0.236	0.200	*Size*	138.338	682.044	2,657.445
Neg_Signal (*N* = 44)	–0.083	–0.095	0.175	*Prod_Number*	6.000	7.286	4.387
Pos_Signal (*N* = 263)	–0.267	–0.260	0.194	*AvgProdDiscl*	0.306	0.328	0.133
3Day_CAR	0.002	0.003	0.137	*MTB*	4.092	5.794	18.297
				ROE	–0.123	–0.246	1.036

Panel B: Correlations (*N* = 307)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	*8K_Ind_NonSignalDrug*	1							
(2)	*8K_RelativeDiscl*	**0.567**	1						
(3)	*3Day_CAR*	–0.062	–0.071	1					
(4)	*Neg_Signal*	**0.239**	**0.289**	**–0.424**	1				
(5)	*Size*	–0.046	0.058	–0.062	**0.171**	1			
(6)	*Prod_Number*	0.045	**0.142**	0.031	0.022	**0.309**	1		
(7)	*AvgProdDiscl*	0.001	**–0.193**	–0.027	–0.050	**–0.219**	**–0.449**	1	
(8)	*MTB*	–0.088	–0.092	–0.055	–0.028	0.013	**–0.239**	**0.212**	1
(9)	*ROE*	0.282	–0.024	0.049	0.067	0.058	0.085	**–0.137**	**–0.504**

Notes: This table provides descriptive statistics (Panel A) and correlations (Panel B) for the variables used in the analyses of the managerial provision and investor reaction to counterpoised disclosure. The sample includes 307 Form 8-K filings over 2005–2020, representing 60 unique biotechnology firms. In Panel B, the values in bold indicate significance at the 10% level. All variables are defined in Appendix A.

Table 2. Managerial Provision of Counterpoised Disclosure

Dependent Variable:		***8K_Ind_NonSignalDrug*** **(Logistic Regressions)**			***8K_RelativeDiscl*** **(OLS Regressions)**		
		(1)	(2)	(3)	(4)	(5)	(6)
Intercept		–1.578 ***	–1.820 **	–3.759 *	–0.260 ***	–0.197 ***	–0.289 **
		(0.00)	(0.02)	(0.71)	(0.00)	(0.00)	(0.08)
Neg_Signal	**+**	**1.303 *****	**1.508 *****	**1.562 ****	**0.165 *****	**0.165 *****	**0.160 *****
		(0.00)	**(0.00)**	**(0.02)**	**(0.00)**	**(0.00)**	**(0.00)**
Size	+ / –		–0.001 *	–0.001 *		–0.001	0.001
			(0.02)	(0.09)		(0.25)	(0.58)
Prod_Number	+		0.050	0.151 *		0.003	0.001
			(0.24)	(0.09)		(0.46)	(0.90)
AvgProdDiscl	+ / –		0.438	0.735		–0.224 *	–0.232 **
			(0.78)	(0.85)		(0.06)	(0.04)
MTB	+ / –		–0.020 *	–0.052 **		–0.001 *	–0.002 ***
			(0.07)	(0.01)		(0.07)	(0.00)
ROE	–		–0.431 **	–0.465 *		–0.023 *	–0.018
			(0.00)	(0.09)		(0.06)	(0.36)
Fixed effects			Quarter	Firm		Quarter	Firm
N		307	307	307	307	307	307
Pseudo/Adjusted R^2		0.043	0.107	0.254	0.081	0.114	0.337

Notes: This table presents regression results examining the managerial provision of counterpoised disclosure within biotechnology firms' Form 8-K filings. Across all columns, "signal drug" refers to the product for which the 8-K is issued, due to an Food and Drug Administration (FDA) approval or rejection or a firm decision to continue or discontinue a drug; "non-signal drug" refers to any other drug discussed in the same 8-K filing.

The dependent variable in Columns (1)–(3) is *8K_Ind_NonSignalDrug*, an indicator variable equal to one if the firm mentions a non-signal drug in the 8-K relating to the signal drug, and zero otherwise. The regressions are logistic regressions. The dependent variable in Columns (4)–(6) is *8K_RelativeDiscl*, the average disclosure score for the non-signal drug in the 8-K filing less that for the signal drug. The regressions are ordinary

least squares (OLS) regressions. The treatment variable (bolded) across all columns is *Neg_Signal*, an indicator variable equal to one if the signal drug has a negative signal disclosed in the 8-K (an FDA rejection and/or a firm discontinuation), and zero if it has a positive signal (an FDA approval and/or an announcement of ongoing development).

p-values are presented in parentheses, and standard errors are clustered by firm. ***, **, and * represent significance at the 0.01, 0.05, and 0.10 level, respectively, based on the indicated one- or two-tailed test of significance. All other variables are defined in Appendix A.

Table 3. Investor Reaction to Counterpoised Disclosure

Panel A. Negative Signal 8-Ks

Dependent Variable:		***3Day_CAR* (Around 8-K Announcement)**					
		(1)	(2)	(3)	(4)	(5)	(6)
Intercept		0.030 ***	0.029	0.187 *	0.033 **	0.043	0.162 **
		(0.00)	(0.43)	(0.05)	(0.02)	(0.30)	(0.04)
Neg_Signal	–	–0.221 ***	–0.228 ***	–0.210 ***	–0.159 ***	–0.154 ***	–0.158 ***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
8K_Ind_NonSignalDrug	?	–0.019	–0.026	–0.005			
		(0.17)	(0.16)	(0.76)			
Neg_Signal* x *8K_Ind_NonSignalDrug	**+**	**0.143 ** **	**0.155 ** **	**0.116 * **			
		(0.03)	**(0.03)**	**(0.10)**			
8K_RelativeDiscl	?				0.022	0.020	0.066
					(0.58)	(0.63)	(0.19)
Neg_Signal* x *8K_RelativeDiscl	**+**				**0.158 ***	**0.150 ***	**0.126**
					(0.06)	**(0.08)**	**(0.18)**
Size	+ / –		0.001	0.001		0.001	0.001
			(0.67)	(0.29)		(0.91)	(0.23)
Prod_Number	+		0.001	–0.003		0.001	–0.004
			(0.67)	(0.22)		(0.91)	(0.14)
AvgProdDiscl	+ / –		–0.023	0.042		–0.030	0.058
			(0.71)	(0.65)		(0.65)	(0.57)
MTB	+ / –		–0.001	–0.001		–0.001	–0.001
			(0.76)	(0.10)		(0.79)	(0.23)
ROE	+		0.010 *	0.001		0.007	–0.001
			(0.08)	(0.95)		(0.29)	(0.96)
Fixed effects			Quarter	Firm		Quarter	Firm
N		296	296	296	296	296	296
Adjusted R^2		0.204	0.205	0.361	0.183	0.180	0.355

Panel B. Positive Signal 8-Ks

Dependent Variable:		***3Day_CAR* (Around 8-K Announcement)**					
		(1)	(2)	(3)	(4)	(5)	(6)
Intercept		–0.173 ***	–0.215 ***	–0.088	–0.103 **	–0.124 **	–0.035
		(0.01)	(0.01)	(0.16)	(0.02)	(0.03)	(0.32)
Pos_Signal	+	0.204 ***	0.222 ***	0.236 ***	0.135 ***	0.143 ***	0.172 ***
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
8K_Ind_NonSignalDrug	?	0.083	0.100	0.092			
		(0.32)	(0.24)	(0.36)			
Pos_Signal* x *8K_Ind_NonSignalDrug	**+**	**–0.102**	**–0.131 ***	**–0.108**			
		(0.11)	**(0.06)**	**(0.13)**			
8K_RelativeDiscl	?				0.326 **	0.335 **	0.336 **
					(0.04)	(0.04)	(0.05)
Pos_Signal* x *8K_RelativeDiscl	**+**				**–0.308 ***	**–0.314 ***	**–0.275 ***
					(0.06)	**(0.06)**	**(0.09)**
Size	+ / –		0.001	0.001		0.001	0.001
			(0.33)	(0.20)		(0.36)	(0.16)
Prod_Number	+		0.002	0.001		0.001	–0.001
			(0.29)	(0.39)		(0.40)	(0.49)
AvgProdDiscl	+ / –		0.056	0.118		0.045	0.129
			(0.26)	(0.15)		(0.29)	(0.13)
MTB	+ / –		–0.001	–0.001		–0.001	–0.001
			(0.18)	(0.15)		(0.23)	(0.29)
ROE	+		0.020 *	0.005		0.020	0.006
			(0.05)	(0.26)		(0.06)	(0.23)
Fixed effects			Quarter	Firm		Quarter	Firm
N		301	301	301	301	301	301
Adjusted R^2		0.156	0.179	0.391	0.166	0.184	0.405

Notes: This table presents the regression results of the investor reaction to counterpoised disclosure withinfirms' Form 8-K filings. Across all columns, "signal drug" refers to the product for which the 8-K is issued, due to either an FDA approval or rejection or a firm decision to continue or discontinue a product, and "non-signal drug" refers to any other product discussed in that same 8-K filing.

Panel A (Panel B) presents results focusing on the sample of negative (positive) signal 8-Ks. The dependent variable across all columns is *3Day_CAR*, the three-day market-adjusted stock return centered on the announcement date of the 8-K relating to the signal drug.

In Panel A Columns (1)–(3), the treatment variable is the interaction of *Neg_Signal* x *8K_Ind_NonSignalDrug*. In Columns (4)–(6), the treatment variable is the interaction of *Neg_Signal* x *8K_RelativeDiscl*. *Neg_Signal* is an indicator variable equal to one if the signal drug has a negative signal disclosed in the 8-K (an FDA rejection and/or firm discontinuation), and zero if it has a positive signal (an FDA approval and/or an announcement of ongoing development). *8K_Ind_NonSignalDrug* is an indicator variable equal to one if the firm mentions a non-signal drug or drugs besides the signal drug in its 8-K filing, and zero otherwise. *8K_RelativeDiscl* is the average disclosure score for the non-signal drugs less that for the signal drug, all assessed within the 8-K filing for the signal drug.

In Panel B Columns (1)–(3), the treatment variable is the interaction of *Pos_Signal* x *8K_Ind_NonSignalDrug*. In Columns (4)–(6), the treatment variable is the interaction of *Pos_Signal* x *8K_RelativeDiscl*. *Pos_Signal* is an indicator variable equal to one if the signal drug has a positive signal disclosed in the 8-K (an FDA approval and/or firm continuation), and zero if it has a negative signal (an FDA rejection and/or a firm discontinuation).

p-values are presented in parentheses, and standard errors are clustered by firm. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively, based on the indicated one- or two-tailed test of significance. All other variables are defined in Appendix

Table 4. Counterpoised Disclosure and Informational versus Opportunistic Motivations

Panel A. Descriptive Statistics

	Material Information Sample (*N* = 120)		**Full Portfolio Sample (*N* = 165)**	
	Advance	***StageDiffs***	***Advance***	***StageDiffs***
	(1)	(2)	(3)	(4)
	Mean	Mean	Mean	Mean
Counterpoised_Drug:				
0	22%	0.214	23%	0.370
1	35%	0.281	41%	0.463

Panel B. Regression Results

	Material Information Sample				**Full Portfolio Sample**			
Look Ahead Period:	**All Periods**		**Within Ten Years**		**All Periods**		**Within Ten Years**	
Dependent Variable:	***Advance***	***StageDiffs***	***Advance***	***StageDiffs***	***Advance***	***StageDiffs***	***Advance***	***StageDiffs***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
***Counterpoised_Drug* (+)**	**0.936 ***	**0.722 ****	**0.936 ***	**0.722 ****	**1.207 ***	**0.964 ****	**1.207 ***	**0.954 ****
	(0.08)	**(0.04)**	**(0.08)**	**(0.04)**	**(0.08)**	**(0.05)**	**(0.08)**	**(0.05)**
Intercept	–0.936	–8.426	–0.936	–8.427	–1.179 ***	–1.598 **	–1.179 ***	–1.576 **
	(0.15)	(1.00)	(0.15)	(1.00)	(0.00)	(0.01)	(0.00)	(0.01)
Fixed effects	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
N	95	120	95	120	136	165	136	165
Pseudo R^2	0.103	0.137	0.103	0.140	0.092	0.161	0.092	0.153

Notes: This table presents analyses assessing whether counterpoised disclosures reflect informational versus opportunistic motivations. Panel A provides descriptive statistics. Panel B presents regression results with Columns (1)–(4) using the *Material Information Sample*, and Columns (5)–(8) using the *Full Portfolio Sample*. The *Material Information Sample* includes all non-signal drugs, which are discussed in either an earnings

announcement or other 8-K filing with +/– 180 days of the signal drug 8-K filing. The *Full Portfolio Sample* includes all non-signal drugs, as derived from the 10-K filing immediately preceding the signal drug 8-K filing.

Across both panels, *Advance* is an indicator variable equal to one if the drug exhibits any progress in its development (i.e., approved to move onto a subsequent phase of development by the Food and Drug Administration) either until 2020 ("All Periods") or within the ten-year span after the signal drug 8-K filing ("Within Ten Years"), and zero otherwise. *StageDiffs* is the difference in phase of development of the non-signal drug, scaled by the initial stage code, and is coded either until 2020 ("All Periods") or within the ten-year span after the 8-K release ("Within Ten Years"). *Counterpoised_Drug* is an indicator variable equal to one if the non-signal drug is mentioned in the signal drug 8-K filing as a counterpoised product, and zero if the drug is not mentioned in the signal drug 8-K filing.

p-values are presented in parentheses, and standard errors are clustered by firm when applicable. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively, based on the indicated one- or two-tailed test of significance. All other variables are defined in Appendix A.

Table 5. Additional Analyses: The Effect of Counterpoised Disclosure on Return Volatility

Dependent Variable:		***RetVol_5Day***					
		(1)	(2)	(3)	(4)	(5)	(6)
Intercept		0.043 ***	0.032 **	–0.021	0.049 ***	0.034 *	0.004
		(0.00)	(0.06)	(0.63)	(0.00)	(0.07)	(0.90)
Neg_Signal	+	0.087 **	0.086 ***	0.045 *	0.039 **	0.032 **	0.010
		(0.02)	(0.01)	(0.05)	(0.05)	(0.04)	(0.32)
8K_Ind_NonSignalDrug	?	0.001	–0.005	–0.005			
		(0.90)	(0.69)	(0.79)			
Neg_Signal* x *8K_Ind_NonSignalDrug	–	**–0.069 ***	**–0.061 ***	**–0.037**			
		(0.07)	**(0.07)**	**(0.15)**			
8K_RelativeDiscl	?				0.024	0.034	0.033
					(0.35)	(0.19)	(0.42)
Neg_Signal* x *8K_RelativeDiscl	–				**–0.145 *** **	**–0.184 ** **	**–0.121 *** **
					(0.01)	**(0.02)**	**(0.01)**
Size	+ / –		–0.001 **	0.001		–0.001 **	0.001
			(0.02)	(0.18)		(0.04)	(0.37)
Prod_Number	–		–0.001	–0.001		–0.001	–0.001
			(0.36)	(0.34)		(0.38)	(0.39)
AvgProdDiscl	+ / –		0.060	–0.002		0.073	0.010
			(0.25)	(0.97)		(0.18)	(0.83)
MTB	+ / –		–0.001	–0.001		0.001	0.001
			(0.28)	(0.64)		(0.33)	(0.80)
ROE	+		0.008	0.001		0.011	0.003
			(0.21)	(0.86)		(0.15)	(0.18)
Fixed effects			Quarter	Firm		Quarter	Firm
N		300	300	300	300	300	300
Adjusted R^2		0.089	0.144	0.675	0.078	0.144	0.678

Notes: This table presents additional analyses of short-window return volatility to counterpoised disclosure within firms' Form 8-K filings. Across all columns, "signal drug" refers to the product for which the 8-K is issued, due to an FDA approval or rejection or a firm decision to continue or discontinue a product, and "non-signal drug" refers to any other product discussed in that same 8-K filing.

The dependent variable across all columns is *RetVol_5Day*, the standard deviation of daily returns, measured over days (+1, +5), where day 0 is the announcement date of the 8-K relating to the signal drug. In Columns (1)–(3), the treatment variable is the interaction of *Neg_Signal* x *8K_Ind_NonSignalDrug*. In Columns (4)–(6), the treatment variable is the interaction of *Neg_Signal* x *8K_RelativeDiscl*. *Neg_Signal* is an indicator variable equal to one if the signal drug has a negative signal disclosed in the 8-K (an FDA rejection and/or firm discontinuation), and zero if it has a positive signal (an FDA approval and/or an announcement of ongoing development). *8K_Ind_NonSignalDrug* is an indicator variable equal to one if the firm mentions a non-signal drug or drugs besides the signal drug in its 8-K filing, and zero otherwise. *8K_RelativeDiscl* is the average disclosure score for the non-signal drugs less that for the signal drug, all assessed within the 8-K filing for the signal drug.

p-values are presented in parentheses, and standard errors are clustered by firm. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively, based on the indicated one- or two-tailed test of significance. All other variables are defined in Appendix A.

Table 6. Additional Analyses: Pre- and Post-Event Investor Reaction to Counterpoised Disclosure

	Dependent Variable			
	CAR_Pre (–5, –2)		***CAR_Post (2, 5)***	
Variable	(1)	(2)	(3)	(4)
Intercept	–0.016 (0.70)	–0.021 (0.59)	–0.077 (0.04) **	0.064 (0.07) *
Neg_Signal	–0.013 (0.14)	–0.002 (0.87)	–0.030 (0.16)	–0.007 (0.64)
8K_Ind_NonSignalDrug	0.004 (0.78)		0.001 (0.94)	
8K_RelativeDiscl		0.014 (0.60)		–0.002 (0.96)
Neg_Signal* x *8K_Ind_NonSignalDrug	**0.014 (0.51)**		**0.033 (0.38)**	
Neg_Signal* x *8K_RelativeDiscl		**0.050 (0.31)**		**0.077 (0.28)**
Size	–0.000 (0.27)	–0.000 (0.33)	0.000 (0.21)	0.000 (0.14)
Prod_Number	–0.000 (0.69)	–0.001 (0.51)	–0.002 (0.10) *	–0.003 (0.04) **
AvgProdDiscl	0.014 (0.72)	0.016 (0.68)	–0.061 (0.23)	–0.063 (0.26)
MTB	–0.000 (0.37)	–0.000 (0.25)	–0.000 (0.75)	–0.000 (0.66)
ROE	0.000 (0.01) **	0.007 (0.35)	–0.002 (0.00) ***	–0.002 (0.00) ***
Fixed effects	Firm	Firm	Firm	Firm
N	296	296	296	296
Adjusted-R^2	0.054	0.059	0.147	0.145

Notes: This table presents additional analyses of the investor reaction to counterpoised disclosure within firms' Form 8-K filings within the pre- and post-event windows. Across all columns, "signal drug" refers to the product for which the 8-K is issued, due to either an FDA approval or rejection or a firm decision to continue or discontinue a drug, and "non-signal drug" refers to any other drugs discussed in that same 8-K filing.

The dependent variable in Columns (1)–(2) is *CAR_Pre (–5, –2)*, our proxy for the pre-event window. It is defined as the market-adjusted stock return measured over days (–5, –2) preceding the announcement date of the 8-K relating to the signal product. The dependent variable in Columns

(3)–(4) is *CAR_Post (2, 5)*, our proxy for the post-event window. It is defined as the market-adjusted stock return over days (+2, +5) following the announcement date of the 8-K relating to the signal product.

In Columns (1) and (3), the treatment variable is the interaction of *Neg_Signal* x *8K_Ind_NonSignalDrug*. In Columns (2) and (4), the treatment variable is the interaction of *Neg_Signal* x *8K_RelativeDiscl*. *Neg_Signal* is an indicator variable equal to one if the signal drug has a negative signal disclosed in the 8-K (an FDA rejection and/or firm discontinuation), and zero if it has a positive signal (an FDA approval and/or an announcement of ongoing development). *8K_Ind_NonSignalDrug* is an indicator variable equal to one if the firm mentions a non-signal drug or drugs besides the signal drug in its 8-K filing, and zero otherwise. *8K_RelativeDiscl* is the average disclosure score for the non-signal drugs less that for the signal drug, all assessed within the 8-K filing for the signal drug.

p-values are presented in parentheses, and standard errors are clustered by firm. ***, **, and * represent significance at the 0.01, 0.05, and 0.1 level, respectively, based on the indicated one- or two-tailed test of significance. All other variables are defined in Appendix A.

Table 7. Additional Analyses: Descriptive Statistics for the Negative and Positive Signal Samples

	Negative Signal (*N* = 44)	Positive Signal (*N* = 263)
Panel A: Drivers of Signal		
FDA denial or approval of drug	12 (27%)	62 (24%)
Drug discontinuation or advancement	32 (73%)	201 (76%)
Panel B: Disclosure Channels		
8-K only	11 (25%)	24 (9%)
Other drugs discussed in 8-K	4 (9%)	9 (3%)
Concurrently issued press release	33 (75%)	236 (90%)
Other products discussed in press release	13 (30%)	38 (14%)
Mentioned in subsequent earnings announcement	21 (48%)	221 (84%)
Panel C: Positioning of Signal within 8-K		
First half of 8-K filing	26 (59%)	208 (79%)
Second half of 8-K filing	18 (41%)	55 (21%)
Panel D: Counterpoised Disclosure Detail		
Product specification	0.006	0.005
Target disease	0.019	0.010
Clinical trial	0.016	0.011
Future plans	0.006	0.008
Market information	0.001	0.001

Notes: This table presents additional descriptive data relating to the Form 8-K observations, partitioned into those revealing negative signals (i.e., a drug rejected by the FDA and/or discontinued by the firm; $N = 44$) and positive signals (i.e., a drug approved by the FDA and/or for which the firm explicitly indicates it will continue development; $N = 263$). Panel A presents data on the drivers of the signal. Panel B presents data on the disclosure channels used. Panel C presents data on the positioning of the signal within the 8-K. Panel D presents the scores for the five disclosure categories for the non-signal drugs (i.e., the drug for which the company provides counterpoised disclosure in an 8-K).