

Redacting Information at the Initial Public Offering

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Abstract

Almost 40% of firms redact information from their IPO filings. These firms exhibit characteristics consistent with needing to protect proprietary information from rivals. Redacting firms experience seven percentage points greater underpricing, but starting two years out they earn greater abnormal stock returns than non-redacting firms. Furthermore, redacting insiders, who initially sell their shares at a slower rate, catch up to non-redacting insiders. The returns are consistent with redacting firms' greater relative post-IPO profitability. The results illustrate tradeoffs in balancing firms' capital needs, pre-IPO owners' liquidity needs, investors' needs for information to price securities, and firms' needs to protect proprietary information.

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Going public is a transformational event that can dramatically alter a firm's information environment. At a minimum, accessing public capital markets pre-commits firms to mandatory disclosure requirements as prescribed in U.S. Securities and Exchange Commission (SEC) rules. Regulations stipulate that firms must publicly file certain financial details and non-financial information, such as existing material agreements, that could otherwise be kept confidential if the firm remained private. These requirements are intended to provide value-relevant information to investors and ensure a well-functioning capital market. Moreover, under certain conditions a firm might find it beneficial to divulge additional information beyond what is legally required (Verrecchia, 1983 and 2001; Healy and Palepu, 2001; Beyer et al, 2010).

While both mandatory and voluntary disclosure at the initial public offering can facilitate the placement of shares and a favorable sales price by reducing information asymmetries, it can also result in competitive harm by revealing sensitive or proprietary information to potential rivals (Bhattacharya and Ritter, 1983; Maksimovic and Pichler, 2001; Tang, 2012). In Brau and Fawcett's (2006) survey of CFOs 33% of respondents indicate strong views that disclosing information to competitors is a key consideration in choosing to remain private.¹ Even firms with these concerns may eventually find that needs for liquidity, access to capital, currency for acquisitions, or publicity lead them to access the public capital markets.

Our paper illustrates how firms that decide to go public navigate the potentially adverse effects of disclosing proprietary information. Prior work has primarily studied information production either by the firm and its advisers or by potential investors in the bookbuilding process (Easley and O'Hara (2004); Hanley and Hoberg, 2010; Loughran and McDonald, 2014). In contrast, we examine an unexplored, yet widely-used, technique at the initial public offering (IPO) where the SEC permits firms to request confidential treatment for proprietary information contained in various material agreements a firm has

¹ Consistent with this notion, Chemmanur, He and Nandy (2010) find that firms in more competitive environments, with lower capital intensity, and greater information asymmetry are more likely to stay private.

entered. If granted, the firm can redact selected information from the public filing, such as pricing terms, trade secrets, or purchase requirements, from the agreement to shield sensitive information from competitors. A byproduct of this process is that investors, attempting to price the firm's stock, also cannot observe the information.^{2,3} By definition, these agreements contain material information that should be relevant in investors' valuation of stocks.⁴ Thus, firms weighing the redaction decision at the IPO must also consider the effects of this choice on pricing and selling the securities.

We find that nearly 40% of firms that conduct initial public offerings (IPOs) between 1996 and 2011 redact information from one or more material agreements filed with their registration statements.⁵ In five of the 16 sample years, 50% or more of IPO firms redact, and in no sample year is the proportion less than 25%. Thus, large proportions of firms choose to redact information at the IPO stage, and yet, we know little about the factors driving this choice or the redacting firms' initial stock pricing and subsequent returns and performance. Given the importance of going public in a firm's evolution and its role in driving economic growth (see e.g., Doidge et al., 2013), understanding the reasons for and the impact of redacting information is important. This paper begins to fill this gap.

Much of the prior literature examines managers' choices to increase disclosure to reduce information asymmetries, which can lower the cost of capital (Merton, 1987), increase liquidity (Verrecchia, 2001), and enhance access to new capital (Myers and Majluf, 1984). Disclosure has other benefits such as enhancing monitoring capability (Bushee and Noe, 2000; Duchin et al, 2010) and potentially discouraging competition (Darrough and Stoughton, 1990; Harris, 1998). Thus, the prevalence of redaction at the IPO stage is

² See the Appendix for a more complete description for requesting a confidential treatment order at the IPO.

³ Part of the new regulation stemming from the 2012 JOBS Act provides firms a way to delay publicly filing their registration statement to protect sensitive information from competitors longer. The difference in our setting is that the redacted terms from material agreements generally never become public.

⁴ Heitzman, Wasley, and Zimmerman (2010) discuss what the term *material* means for firms filing with the SEC. Such agreements include licensing, purchasing, manufacturing, leases, joint ventures, and various others.

⁵ This proportion is significantly higher than the 25% for non-IPO firms reported in Verrecchia and Weber (2006). One potential reason is that firms are more likely to have valuable proprietary information at the stage at which they go public.

particularly striking given that it potentially *reduces* information about firm prospects (Verrecchia and Weber, 2006), which is already limited due to the paucity of historical financial information. The propensity to redact at the IPO also seems to stand in contrast with studies that find disclosure quantity and quality is higher for seasoned firms that raise more external capital (Frankel, McNichols and Wilson, 1995; Lang and Lundholm, 1996, 2000; Marquardt and Wiedman, 1998).

There are two broad hypotheses about why firms redact information at the IPO. First, a firm could redact to protect valuable information that bestows a competitive advantage over its rivals (Verrecchia, 1983; Gertner, Gibbons and Scharfstein, 1988; Verrecchia and Weber, 2006). Indeed, Graham, Harvey, and Rajgopal (2005) find that revealing sensitive information to competitors is a major concern when managers set disclosure policies. Second, managers may attempt to use redaction improperly to shield negative information from investors (e.g., disadvantageous pricing terms on a key contract), and thereby manipulate signals about their firm's true value (Grossman and Hart, 1980; Healy and Palepu, 2001).⁶ The SEC should approve redaction requests only for proprietary information, but if the approval process is imperfect, a lemons problem could result in which investors find it difficult to ascertain which firms are redacting proprietary information versus negative information (Akerlof, 1970).⁷

We find that redacting IPO firms engage in more research and development (R&D), are smaller and younger, and more likely to conduct Regulation D (private equity) offerings than non-redacting IPO firms. Redacting IPO firms also have lower market share and tend to operate in more competitive product markets based on the fluidity measure developed in Hoberg, Phillips, and Prabhala (2014). We find that 63% of redacting firms have venture capital backing compared to 29% of non-redacting firms; a potential explanation of this is that the types of high-growth firms in which VCs invest could also derive the most

⁶ The two hypotheses are not mutually exclusive. Some firms could use redacting properly while other firms use redacting improperly. Moreover, even a given firm could redact some information properly and attempt to hide other negative information at the same time. Thus, the two hypotheses should be viewed as pertaining to the predominant or average effects for the sample.

⁷ See Thompson (2011) for more details about the SEC's process of evaluating confidential treatment orders.

benefit from redacting proprietary information. Thus, redacting firms have characteristics consistent with a need to protect proprietary information from rivals. We cannot rule out the improper use of redacting by some firms, but as we discuss later, insider selling and stock return results also are not consistent with the improper redaction hypothesis.

Even if properly used, redaction could affect IPO pricing. Loughran and McDonald (2013) note that firms going public generally have limited operating histories, low prior earnings, and high growth options. Restrictions on information production ahead of public offerings imply that the registration statement often provides the preponderance of information about a firm's future prospects. Firms face a choice regarding the detail and nature of the information they reveal in the filings (aside from that mandated by the SEC). Added disclosure potentially lessens information asymmetries and enables the firm to sell shares at a more favorable price (Diamond and Verrecchia, 1991), but it can also reveal proprietary information to competitors, which could reduce firm value. Even if investors know the redacted information is of the proprietary type, not knowing the redacted details can increase the variance of their forecasts. Moreover, Chemmanur and Fulghieri (1999) argue that potential investors compensate for their information production costs by offering lower prices for the issuer's shares. In our setting, redacting information likely increases information asymmetry and thus information production costs. We thus hypothesize that redacting firms experience greater underpricing.

We find that redacting firms exhibit greater underpricing than non-redacting firms, consistent with the hypothesis that redaction increases uncertainty and information production costs. The magnitude, an additional seven percentage points of underpricing, is economically large and suggests that redaction is a first order determinant of underpricing (the overall sample mean underpricing is 21%). If firms choose to redact optimally to protect the value of proprietary information, the seven percentage points they give up on IPO shares can be viewed as a lower bound on the value of the proprietary information.

Viewed another way, the greater underpricing of redacting firms implies that they have a greater first-day stock return than non-redacting firms. A key question is whether the near-term price adjustments fully reflect the value of the proprietary information. If redacting and non-redacting firms are correctly valued soon after the IPO, and if insiders sell based on whether they believe they are getting full value of their shares, then there should be no difference in relative sales between insiders at redacting and non-redacting firms. In contrast, if the redacted proprietary information leaves redacting firms undervalued for a significant period post IPO, then insiders at redacting firms would sell proportionately fewer shares than their counterparts at non-redacting firms in the near-term post-IPO period. The latter outcome would imply a liquidity cost to pre-IPO owners of redacting firms.

Consistent with a period of undervaluation, insiders at redacting firms sell their shares at a significantly slower pace than their counterparts at non-redacting firms; this result holds for the first 24 months of the post-IPO period. By the 36th month, redacting insiders catch up in their sales relative to non-redacting insiders. The pattern of insider sales is consistent with an analysis of abnormal returns. Abnormal returns for redacting firms do not differ from those for non-redacting firms in the first 24 months of the post-IPO period, but between the 24th and 36th months, redacting firms generate significantly positive abnormal returns of 1.80% per month and outperform non-redacting firms by 0.67% per month.

Consistent with redaction reflecting a competitive advantage that continues into the post-IPO period, redacting firms are significantly more profitable than their industry peers in each of the first three years post-IPO. In contrast, redacting firms have lower sales-to-assets ratios in each of the first three years post-IPO. The very nature of redaction makes it difficult to identify precise channels through which the effects operate, but these post-IPO performance results suggest that redacting firms possess advantages on the efficiency (expense) side rather than on the sales side.

Thus, redacting firms exhibit superior accounting performance as soon as the first post-IPO year, but investors take significant time before fully incorporating the value of redacted proprietary information into firms' share prices.⁸ It is as if investors take a “show us the money” approach in valuing the effects of redacted information, consistent with redaction increasing uncertainty and information production costs.

Our paper ties together elements from several strands of literature to shed light on the tradeoffs firms make in balancing firms' capital needs, pre-IPO owners' liquidity needs, investors' needs for information to price securities, and firms' needs to protect proprietary information from rivals. Our results demonstrate how SEC rules help firms manage these tradeoffs by shielding information from competitors while still accessing the public capital markets. Our paper builds on work by Chemmanur, He, and Nandy (2010) that examines how product market concerns relate to the decision to go public.

Asymmetric information and the consequent uncertainty underpin a substantial part of the literature on IPO underpricing. Our work adds to this literature by documenting redaction as a previously unexplored source of asymmetric information and uncertainty among large fractions of IPO firms, and by showing its economically large effect on underpricing and thus, on the cost of capital for IPO firms. The underpricing redacting firms experience may compensate investors for greater information production costs created by redaction (Chemmanur, 1993; Subrahmanyam and Titman, 1999; Sherman and Titman, 2002).

We also complement work by Hanley and Hoberg (2010) and Loughran and McDonald (2014) that examines information in the prospectus and underpricing. They examine the tradeoff of increased disclosure on pricing and the potential costs (effort and revealing proprietary information to competitors). If the firm does not reveal information, investors must choose whether to invest in learning the information. In our analysis, the information content in the material agreements is already known by the firm and its advisors,

⁸ We searched but were unable to find instances where firms report the information that was previously redacted. Thus, we infer that investors draw positive information from the firms' reported earnings and other information.

so they are not producing new information. Instead, they must decide whether redacting the information is too costly from a pricing perspective. Redacting likely increases uncertainty and the cost of determining value by investors during the bookbuilding process.

Our work adds to the literature on disclosure and proprietary information by studying non-disclosure choices by firms seeking capital at a time when asymmetric information levels are likely already high. We show that non-disclosure has economically large effects on IPO pricing, and that it takes investors a significant time period to impound the redacted information into share prices. Thus, our work supports the notion that firms bear the costs of withholding information (Beyer et al, 2010) and also implies a liquidity cost as insiders at redacting firms delay selling some of their shares until stock prices better reflect the value of redacted proprietary information. Furthermore, our results imply that firms may choose not to disclose information that results in competitive harm even when it increases the costs of raising capital (Verrecchia, 1983; Verrecchia and Weber, 2006).

The collective prior theoretical and empirical work is mixed on the question of whether a more competitive product market environment results in more or less disclosure. To the extent that the product fluidity measure developed by Hoberg et al (2014) captures potential competition, rather than current or historical competition, our results show how this dimension of competition affects disclosure decisions for firms engaged in important capital raising events. This finding adds insight into the type of competitive environment that affects disclosure decisions.

The remainder of the paper is organized as follows. Section I of the paper describes the sample and summary statistics. In Section II we compare firm, industry and offering characteristics across redacting and non-redacting firms. In Section III we examine the relation between IPO underpricing and redacting. In Section IV, we compare post-IPO accounting performance, stock return performance, and insider sales for redacting and non-redacting firms. Section V concludes.

I. Sample Generation and Description

In this section, we first discuss the IPO sample construction and the datasets used for our analyses. We describe how we identified whether firms redacted information from material agreements filed as part of the registration process. We then provide information on the time and industry characteristics of the final sample. Lastly, we present information on the amount and types of agreements that are redacted.

A.1. Sample Generation

We generate an initial sample from the Securities Data Company (SDC) New Issues Database, and then apply the following criteria for inclusion in the sample. First, we require that the offering is for common stock by a U.S.-based private company and listed on a U.S. exchange. To ensure sufficient information on redaction and post-issue performance the issue date must occur during the period 1996 to 2011. This screen yields 4,937 observations. Second, the offering must be a firm commitment and not an American Depositary Receipt or Share, leaving 4,589 observations. Third, we exclude reverse leveraged buyout, real estate investment trust, closed-end fund limited partnership, unit investment trust, tracking stock issue, limited partnership, or rights issue, reducing the sample to 3,291 observations. Fourth, we drop two-tranche and simultaneous international offerings, which reduces the sample to 2,634 observations. Fifth, the issue must have an offering price of \$5 or more. This requirement leaves 2,591 observations. Sixth, requiring all issues to have an SIC code, symbol, filing date, and closing date produces 2,555 observations.

We further require that the firms have financial and pricing information available from Compustat and CRSP, which yields 2,351 firm observations. The sample size falls to 2,294 when we require information from SDC on: underwriter-related characteristics (i.e., reputation, leading manager names and

the count of leading managers)⁹, venture capital (VC) backing, shares' overhang, leading auditors' and lawyers' names, offering amount and offering price, and type of registration form submitted to the SEC. When we require the issuer's age at the time of the public offering using the Field-Ritter dataset of company founding dates and information Thomson Reuters Insider Trading database, our sample size remains the same.

To examine the effect of proprietary information costs we use four competition measures: entry costs, market size, market share, and product substitutability (Karuna 2007), which reduces the observations to 2,231. Our main measure of the competitive landscape uses the product fluidity measure developed by Hoberg, Phillips and Prabhala (2014) that we obtain from Hoberg's website.¹⁰ We match a total of 2,199 observations and base our analysis on this sample.

To determine whether firms redact information from their material contracts at the IPO, we employ a computer program to search their registration statements for the term "confidential treatment."¹¹ Thus, each firm must have a registration statement (S-1/S-1/As, SB-2/SB-2/As, or F-1/F-1/As filings) available on the SEC's EDGAR. Starting in May 2008, the SEC began releasing filings related confidential treatment orders as a CT ORDER in addition to noting these orders in financial filings. To maintain consistency in our sample generation process, we continue to use registration statements to identify redacting firms even after May 2008. We then match these firms to the final sample of 2,199 IPO issuers identified above.

To be classified as a redacting firm, the issuer must have redacted or omitted portions of at least one material agreement by the last registration statement. We hand-check the initial and the amended related registration documents to verify that the SEC granted a confidential treatment order to redact information

⁹ We use Jay Ritter's underwriter reputation rankings dataset that contains available information up to and including year 2011. For any calendar year(s) that an underwriter showed missing reputation information, we use the average reputation value of the rest of the years with available data.

¹⁰ This data can currently be found at Gerald Hoberg's webpage at: <http://www.rhsmith.umd.edu/industrydata/>

¹¹ We further checked any filings with the term "confidential" appearing in the exhibits of their registration statements to ascertain whether they had requested confidential treatment of key items from their material contracts.

from one or more material contracts, which are listed as Exhibit 10.XX, where XX is an index from 1 to the number of these types of exhibits the firm files. We find two instances where the issuer initially indicated it would redact information, but did not. We further find 253 instances where the firm did not initially disclose it would redact information, but subsequently omitted portions of at least one material agreement. Based on this process our final sample contains 875 redacting firms and 1,324 non-redacting firms. We are able to hand-collect the total number of Exhibit 10s and the number of redacted Exhibits 10s for 873 out of the total 875 IPOs with redacted information.

Next, we gather information Regulation D private offerings. These registrations represent the main alternative equity-financing path available to firms that allows limited information disclosure by the issuer. Using the SEC's EDGAR database, we gather the number of Regulation D equity and equity-linked offerings three calendar years before and three calendar years after the firm's IPO issue date. Specifically, we collect all REGDEX documents for the period of 1/1/1996 to 3/15/2009 and then retrieve all Form D filings up to 12/31/2011.

We conduct analyses of post-IPO accounting performance, stock returns, and insider sell decisions. Insider trading data are from the Thomson Reuters Insider Trading database. Sample sizes for the analyses vary based on the survival of IPO firms as independent entities; in all analyses, we use the maximum sample size available, and where relevant and possible, address survival bias issues directly.

A.2. Time and Industry Distribution of Sample

Table I contains the distribution of our sample by the year of the IPO issuance date. The highest concentration of firms going public occurs in the years 1996 and 1997, which is consistent with prior work showing high IPO volume during this time period (Loughran and Ritter, 2002 and Ritter and Welch, 2002). The lowest incidence of IPO issuances occurs in 2001 and 2002 following the technology stock crash, and in 2008 and 2009 just after the financial crisis.

We next investigate the frequency of firms that redact information from material agreements provided as at Exhibit 10. Redacting firms as a percentage of total IPO volume ranges from a low of 26% in 1996 to a high of 65% in 2007, and represent 39% of the sample over the entire time period. In five of the 15 sample years, 50% or more IPO firms redact information, and in no sample year is the proportion less than 26%. Thus, a significant proportion of firms seek confidential treatment in all sample years, which is striking given the importance attributed to asymmetric information in the literature on the underpricing of IPOs. It does illustrate, however, that firms value the opportunity to redact information from their material agreements at the IPO.

Using the two-digit SIC industry classification we compute the industry affiliation for our sample to ascertain whether certain industries request confidential treatment more than others. For brevity we present only the top ten industries for both the redacting and non-redacting subsamples. As shown in Table II, redacting firms are more concentrated with approximately 80% of them occurring in the top ten industries, whereas non-redacting firms have approximately 61% occurring in their top ten industries. There is significant overlap in the industries with the two subsamples sharing six of the same top industries including: Business Services, Electronic and Other Electric Equipment, Instruments & Related Products, Miscellaneous Retail, Communications, Engineering & Management Services. Other top industries for redacting firms include high technology industries such as Chemical & Allied Products, Health Services, and Engineering & Management Services. Overall, the results in Table II suggest that the decision to redact information from contracts is unlikely to be solely an industry effect, but we control for industry effects in our later tests.

A.3. Frequency and Types of Contracts Redacted

For each redacting firm, we collect information on the total number of exhibits with material agreements, the number of those exhibits with redacted information, and then the ratio of those two values.

We further examine each redacted exhibit to classify the type of material agreement contained in that exhibit. We form seven categories of agreements: (i) *Customer/ supplier*; (ii) *License/royalty*; (iii) *Peer*; (iv) *Research/consulting*; (v) *Credit/leasing*; (vi) *Employment*; and (vii) *Stockholder*.¹²

Panel A of Table III contains summary statistics on the number of total exhibits with material agreements filed as part of the registration statement as well as the number and ratio of the redacted agreements for redacting firms. On average, redacting firms file 25 total material agreements and redact approximately five of them. The mean ratio of redacted exhibits is 19.6% (median of 15.4%). Thus, approximately one-fifth of material agreements that redacting firms file at the IPO have key details shielded from the view of rivals and from investors. Two firms redacted 100% of their material agreements. Panel B of Table III contains frequency distributions of the types of redacted contracts. Because each firm can redact more than one agreement, the percentages add up to more than 100%. *Customer/supplier* agreements are the most common type of contract redacted, followed by *License/royalty* and *Peer* agreements, respectively. *Stockholder* agreements are the least commonly type redacted.

II. Offering, Firm, and Industry Characteristics of Redacting vs. Non-Redacting Firms

In this section, we compare firm, industry, and offering characteristics across redacting and non-redacting firms to shed light on the factors potentially influencing the redaction decision. The broad hypotheses considered are whether redacting firms exhibit characteristics consistent with a need to protect proprietary information from potential rivals versus characteristics consistent with a need to hide negative information from investors.

¹² *Customer/Supplier* include the following agreements: inventory and supply, manufacturing, distribution, marketing agreements, reseller, vendor, production, etc. *License/royalty* involve license and royalty agreements. *Peer* agreements include joint ventures, strategic alliances or partnerships, co-branding agreements, transition agreements, and joint advertising/marketing agreements, among others. *Research/consulting* including the following: research, consulting, patent, or development agreements. *Credit/leasing* involves credit or lease agreements. *Employment* agreements involve contracts with a firm's employees. *Stockholder* agreements involve those with shareholders.

A.1. Univariate Comparisons of Redacting versus non-Redacting Firms

In Table IV, we examine whether offering characteristics differ between redacting and non-redacting firms. We examine the following variables: *Total Proceeds* is the gross amount of funding raised in the IPO. *Offer Price* is the IPO offer price as reported in the final SEC registration document. *Gross Spread* is the fee charged by the underwriter syndicate as percentage of total proceeds. *Price Revision* is the return from the filing date midpoint to the IPO offer price. *Time to Offering* is the calendar day difference between the initial IPO registration statement filing date and the IPO issue date. *Industry IPO Wave* follows Chemmanur and He (2011) and is a dummy variable equal to one where the total number of offerings in a Fama French industry equals five or more.

Mean and median *Gross Spread* are significantly lower for redacting firms, but the differences are not large economically. Redacting firms have a longer time between the date of first registration statement and the offering date, which is consistent with the notion that the screening and response time for receiving confidential treatment increases how long it takes to go public (Loughran and McDonald, 2014). None of the other offering characteristics are significantly different based jointly on the mean and median tests, including *Total Proceeds*, *Offer Price*, *Price Revision*, and proportions of IPOs that are part of industry waves.

Table IV also presents statistics on underwriter reputation. Based on discussions with individuals working with public offerings, the general consensus is that firms drive the choice to redact information. Thus, a firm's selection of an underwriter could be influenced by its redaction decision. We are agnostic regarding a predicted relation between underwriter reputation and whether IPO firms redact. On the one hand, redacting firms could be viewed as riskier by underwriters, making it more difficult to convince higher reputation banks to help place their shares. On the other hand, redacting firms could want to select the highest reputation underwriter possible to provide external certification to investors regarding their value

given the lower disclosure from redacting. The underwriter name and role in the syndicate comes from SDC while the reputation values come from Jay Ritter's dataset available on his website.¹³ As shown in Table IV, redacting firms use more lead managers for their offerings and their leads have significantly higher reputations, which suggests that redacting firms may desire higher reputation underwriters to help mitigate their greater information asymmetry regarding firm prospects.

Table V contains firm and industry characteristics of the sample firms by whether the company redacted information from at least one material agreement. Variables include measures of size (total assets), performance (industry-adjusted EBITDA scaled by assets and sales scaled by assets), research and development expenses and capital expenditures both scaled by assets, cash burn rate a measured by cash flow from operations divided by cash and cash equivalents, capital structure (total leverage scaled by assets), firm age measured as the time since founding using the Field-Ritter dataset, and venture-capital backing. We scale variables by assets instead of sales because some firms report zero sales, which prevents its use in the denominator. We winsorize each variable at the 1% and 99% levels to attenuate the influence of outliers. For each variable, we compute the mean and median (where appropriate) and present the difference in means test-statistic and Wilcoxon Rank-Sum test statistic and their corresponding *p*-values.

Panel A of Table V shows that redacting firms are smaller and younger, have higher R&D ratios, and are significantly more likely to be backed by a venture capitalist at 63% versus 29% for non-redacting firms. These variables are likely correlated with having greater proprietary information, so these univariate results provide initial support for the hypothesis that firms redact to protect such information.

Among other characteristics, Panel A of Table V shows that redacting firms have significantly lower sales ratios, which we show later in the paper continues into the post-IPO period, but they do not differ in

¹³ In later time periods consolidation in the investment banking industry reduced the variation in underwriter ranking. Untabulated results show that both redacting and non-redacting firms frequently use Goldman Sachs, Morgan Stanley, and Credit Suisse.

pre-IPO industry-adjusted EBITDA-to-assets. Average cash burn rates and capital expenditures ratios also do not differ across redacting and non-redacting firms. Finally, redacting firms have significantly lower leverage than non-redacting firms.

Prior work has documented that the nature of product market competition affects how much information firms choose to disclose. The evidence to date is mixed on whether greater competition increases or decreases firms' propensity to voluntarily disclose information. Ali, Klasa, and Yeung (2009) speculate that the mixed evidence could stem from problems with traditional measures of competition. For example, they note that industry Herfindahl measures are typically constructed using solely public firms, which can skew the measure when many of the firms in the industry are in fact private. To circumvent this problem, they use U.S. Census data that enables them to capture the sales of both private and public firms. These data, however, are available only for manufacturing industries, which would greatly restrict our sample and would exclude some of the high technology industries that frequently appear in the IPO sample.

We use an innovative measure of *potential* competitive threats for individual firms developed by Hoberg, Phillips and Prabhala (2014) called *Product Market Fluidity*. The measure captures instability in a given firm's product market environment by assessing changes in rivals' product descriptions relative to the firm's product descriptions. The process involves measuring the overlap between words in a firm's business description from its 10-K filing and the vector of aggregate absolute change in usage of each word in the product market universe from year $t-1$ to year t .

We also employ a variety of other variables used in the literature to further explore the nature of product market conditions faced the issuing firms. Following work by Karuna (2007) and Li (2010), we use the following measures. *Market Size*, computed as the sum of sales within an industry, captures the size of the product market. A larger market would reduce the direct effect of a new competitor entering the market. It could also proxy for higher barriers to entry since larger sales often require greater investment to achieve.

In this case, product market size would be negatively related to potential competition. Greater existing industry sales, however, is likely to exist when there are more firms in the same industry, in which case it could be positively associated with the current level of competition. *Entry costs* is the weighted average of gross value of cost of property, plant and equipment for firms in an industry weighted by each firm's market share in the industry, capture the investment needed to enter the market and should be inversely related to potential competition. *Product Substitutability* is computed as sales divided by operating costs (with operating costs defined as costs of goods sold, selling, general and administrative expenses and depreciation, depletion and amortization) for each industry. This measure captures industry profitability, with higher profits generally signaling greater product differentiation. If so, changes by rivals could have less of an effect on a firm's profitability. On the other hand, higher profitability could attract new competition to the market. *Market Share* is the percentage of sales obtained by each firm in our sample relative to the total sales for all firms within its code. As noted by Nickell (1996), firms within a particular industry could face differing levels of competition. In particular, those firms with higher market share could have greater market power, thus mitigating their exposure to competition. In all of these measures, we use industry definitions based on three digit SIC codes.

The univariate comparisons of the competitive measures are presented in Panel B of Table V. The mean and median *Product Market Fluidity* measure is significantly greater for redacting firms; to the extent that the measure captures *potential* competition, the result suggests that firms facing higher competitive threats from potential rivals are more likely to restrict the amount of information they disclose in their SEC filings. Median *Market Size*, which corresponds to the value of the product space, is significantly greater for redacting IPO firms, but the means do not differ significantly. Mean *Entry Costs* are significantly lower for redacting firms, suggesting that redaction occurs more frequently when there is greater threats from new entrants (the difference in medians *p*-value is 0.115). Redacting firms have significantly lower mean and median *Product Substitutability*, which suggests they operated in industries with lower product

differentiation, and thus a more competitive environment. Mean and median *Market Share* are significantly lower for redacting firms, which is consistent with firms in more competitive situations reducing their disclosure. Collectively, these findings are consistent with the hypothesis that firms redact to protect proprietary information when they face stronger competitive threats.

To assess how the disclosure concern might have affected a firm's decision to issue public equity, we examine whether firms conduct *private* placements under the SEC's Regulation (Reg) D within three years of the IPO date. For firms that do not have other public securities, an equity issuance under Reg D enables the firms to avoid disclosure of their material contracts.¹⁴ As shown in Panel C of Table V, approximately 51% of redacting firms conducted a Reg D private placement prior to going public, which is significantly greater than the 31% of non-redacting firms. Thus, proportionately more redacting firms needed capital and raised it via private equity offerings in the pre-IPO period. While redacting firms have on average slightly more Reg D offerings, the difference is not statistically different. In the post-IPO period, the proportion of redacting firms that do private equity issues falls to 43%, but the proportion is still significantly greater than the comparable figure of 33% for non-redacting firms. While only suggestive, this evidence is consistent with the notion that redacting firms need capital and employ private placements to protect proprietary information.

A.2. Probit Models Predicting Redaction at the IPO

We next examine the determinants of redacting information at the IPO using a probit regression model. We include variables intended to capture the existence of and potential need to protect proprietary information; these include firm size, age, research and development intensity, the competitive environment

¹⁴ These forms offer minimal information about the capital raising event with public investors (i.e., issuer size, federal exemption claimed, duration of offering, security type offered, gross proceeds amount and number of non-accredited investors). The economic significance of these equity private offerings exempted from registration is pointed out by Ivanov and Bauguess (2013) who find that in 2010, Reg D offerings surpassed debt offerings as the dominant offering method in terms of aggregate amount of capital raised in the U.S. For further information on Regulation D including the requirements for meeting the registration exception, see the SEC's website at: <http://www.sec.gov/answers/regd.htm>

faced by the firm at the time of the IPO, backing by venture capitalists, and the number of prior private equity (Reg D) offerings. We also include variables to capture the performance of the firm and whether the IPO is part of an industry wave. Table VI reports results for three regressions, one without fixed effects, one with year fixed effects, and one with year and industry fixed effects. The model with both year and industry fixed effects uses a smaller number of observations because some industries have only ones or only zeroes as the dependent variable, and thus are excluded from the probit estimation because they perfectly predict outcomes. The p -values are based on industry-clustered robust standard errors.

As show in Table IV, some of the characteristics that differed across redacting and non-redacting firms on a univariate basis are not significant in the probit regression because their effects are subsumed by other variables or the fixed effects. The coefficients for the *R&D Ratio* are significantly positive in all three regressions, which is consistent with the prediction that firms that engage in more R&D are more likely to have proprietary information that they attempt to protect via redactions. Firms conducting private placements under Reg D and with venture capital backing are significantly more likely to redact. A potential explanation is that these firms have valuable proprietary information that they need to protect, but that can be privately communicated to sophisticated investors who purchase Reg D offerings.

Among the competitiveness measures, only *Product Market Fluidity*, the variable intended to capture forward-looking competition, is statistically significant in all three regressions. The positive coefficient suggests that firms that face a more dynamic, and hence competitive, environment are more likely to redact information to keep it from potential rivals.

The probability of redacting is significantly negatively related to whether the IPO is part of an industry IPO wave. We interpret this result to be consistent with the view that redacting IPO firms are less likely to rely on or benefit from information spillovers from other IPOs. Not surprisingly, the IPO wave effect is subsumed by year and industry fixed effects when they are included in the regressions. Although

the coefficients are not reported, many of the year and industry effects also have statistically significant coefficients.

III. Underpricing and Redaction

A long line of academic literature focuses on explaining IPO underpricing levels (see Ritter (2003) for a review). Moreover, several studies examine disclosure in the context of IPOs and the association between the information content of IPO prospectuses and the levels of underpricing (Beatty and Ritter, 1986; Leone, Rock and Willenborg, 2007; Hanley and Hoberg, 2010; and Loughran and McDonald, 2013). We next explore how redacting information affects the pricing of the securities at the IPO. Increased disclosure can reduce information asymmetries, which can help better price securities and reduce underpricing. The tradeoff is that disclosure can provide rivals with key information that could result in competitive harm. Thus, if firms believe that the information is sufficiently valuable, they could choose to reduce disclosure even at the cost of greater underpricing at the IPO.

Table VII contains results of difference in mean and median underpricing across redacting and non-redacting firms. The mean underpricing is significantly greater for redacting firms at nearly 24% versus 19% for non-redacting firms (p -value <0.01). If the redaction of information creates greater uncertainty and information production costs for investors, then this evidence suggests that underwriters reduce the offer price to a greater extent to attract investors to the new issue. Table VII also contains results for difference in underpricing tests for the sample split into IPOs on an industry wave and IPOs off an industry wave. He (2007) notes that hot IPO markets are characterized by differences in underpricing and information production and the types of firms going public. Therefore, we examine whether the differences in underpricing between redacting and non-redacting firms is explained by waves. The evidence shows that redacting firms exhibit higher underpricing regardless of whether the IPO was on-wave or off-wave. For on-wave IPOs, redacting firms have mean underpricing of 35.1%, which is greater than the mean for 27.8%

for non-redacting firms at a significance level of 0.08 (the medians do not differ significantly). For off-wave IPOs, redacting firms have mean underpricing of 18.8%, which is greater than the mean for 14.6% for non-redacting firms at a significance level of 0.03 (the medians do not differ significantly).

We next estimate underpricing regressions that include two variables that capture redaction. The first is a dummy variable called *Redacting Firm* if the firm was granted confidential treatment for at least one material agreement. The second is a continuous variable called *Ratio Redacted* that measures the proportion of material agreements that a firm redacted. Although we include the continuous variable, it is not obvious that it can or should capture the *amount* of information redacted or the level of uncertainty created by the redaction(s). It is easy to imagine a scenario in which a firm redacts information in *one* exhibit that has very significant competitive value and/or creates significant uncertainty about the firm's future cash flows or risk, and yet another firm redacts information in *many* exhibits that have cumulatively much less significant value and uncertainty implications for the firm.¹⁵

We also include in the regressions explanatory variables that have been found to explain underpricing in prior work, including: firm size and age, venture capital financing prior to the IPO, hiring at high reputation underwriter; price revisions during the filing process; the number of lead managers, NASDAQ listing; the preceding 30-day stock returns of firms in the same 3-digit SIC code; whether the firm went public as part of an IPO industry wave. The submission process to redact information and respond to SEC comments could delay the IPO. We expect that this effect is likely to be negatively correlated with underpricing due to two potential effects. First, if firms cannot time the market they might experience lower returns at the offering. Second, this delay could allow investors more time to assess the value of the firm and reduce the need for underpricing. Hence, we also include the number of calendar days between the IPO

¹⁵ In untabulated results, we experimented with including various combinations of the seven redaction classifications on the right-hand side along with the dummy variable of the decision to redact information and the ratio of exhibits with redacted information. None of the dummy variables for the redaction classifications is statistically significant.

filing and the offer date. We include year fixed effects, and hence do not include a bubble period dummy as some prior studies have done.

The first regression in Table VIII includes only the *Redacting Firm* dummy and the *Redacted Ratio*, plus year and industry fixed effects. The second regression in Table VIII adds potential determinants of underpricing as control variables and also includes the additional variables that were significant determinants of the probability of redacting regression in Table VI, including the *R&D Ratio*, *Product Market Fluidity* measure, and *Num Prior Reg D Offerings*. The *p*-values in all regressions are based on industry-clustered robust standard errors. We focus discussion on the third regression, in which we specify the decision to redact information as an endogenous treatment, or choice, variable and estimate the treatment effect of redacting on underpricing using full maximum likelihood estimation. To estimate the redaction choice equation, we use the variables that were significant in the probit regressions in Table VI, including the year and industry fixed effects. The underpricing equation includes the potential determinants of underpricing, and the *R&D Ratio*, which is significantly related to underpricing in the second regression in Table VIII. The number of Reg D offerings and the product market fluidity measure are excluded from the underpricing regression, which helps identify the system. As evident in regression (2), the excluded variables have insignificant coefficients in the underpricing regression if they are included; it seems intuitive that neither variable should have direct effects on underpricing given that they are both established well in advance of the going public decision and given that neither have clear economic linkages to underpricing outside of their effect on redaction.

As shown in column (3) of Table VIII, the treatment effect of redaction on underpricing is 0.07, or seven percentage points. The results are consistent with the hypothesis that redacting information increases investor uncertainty and information production costs, which then leads to increased underpricing. Given that the overall sample mean underpricing is 21 percentage points, the seven percentage point effect of redacting is large economically, and suggests that it is a first order determinant of underpricing.

As also shown in column (3) of Table VIII, the coefficient on the λ (inverse Mills ratio) is significantly negative, which indicates a selection bias. The coefficient is significantly negative, which indicates that the unobservable component of a firm's choice to redact actually reduces underpricing, all else equal. Moreover, comparing the coefficients on the redacting firm dummy from regressions (1) and (2) with that in (3) shows that the effect of redaction increases in magnitude after controlling for the selection bias.

The ratio of exhibits with redacted information is not statistically significant in any of the regressions. Hence, the amount of exhibits does not provide explanatory power beyond whether or not a firm is redacted. Consistent with prior work such as Lee and Wahal (2004), VC-backed firms exhibit higher underpricing.¹⁶ The coefficient on *Firm Age* is significantly negative, consistent with the proposition that older firms present less uncertainty to investors, and thus are underpriced less. The coefficient on the dummy variable for IPOs underwritten by high reputation underwriters is significantly positive.¹⁷ The percent increase in price revision has a significantly positive coefficient, consistent with (Hanley, 1993). The *Industry IPO Wave* dummy has a significantly positive coefficient. Consistent with the findings in Loughran and McDonald (2014), the number of calendar days between the initial filing date and the issuance date has a significantly negative coefficient, which suggests that firms that take longer to go public have lowering underpricing. Finally, the coefficient on the *R&D Ratio* is significantly negative. Thus, even though firms with higher R&D are more likely to redact information (shown in Table VI), the direct effect

¹⁶ Lee and Wahal (2004) suggest that the grandstanding hypothesis by Gompers (1996) as a reason for their results, pointing out that commitments of capital are positively correlated with underpricing. The grandstanding hypothesis posits that VC firms that are unable to take portfolio companies public, are willing to bear the cost of higher underpricing. Loughran and Ritter (2002) outline the spinning hypothesis postulating that issuers accept underpricing to receive future allocations of "hot" IPOs. Liu and Ritter (2010) examine a sample of hot IPO deals with shares allocated to top executives and control for VC financing. Their estimates corroborate ours and find a positive and significant association between VC backing and underpricing levels.

¹⁷ In untabulated results, we permit the high reputation underwriter choice to be endogenous and find a significantly negative effect on underpricing as in Habib and Ljungqvist (2001). In that specification, which treats the redacting dummy as if it were exogenous, the coefficient on the redacting dummy remains significantly positive. In an ideal world, one would specify the choices of redaction, a high reputation underwriter, and perhaps others to be endogenous. Given the state of the literature, however, obtaining an identified system of equations for such an estimation is likely impossible at this point.

of R&D on underpricing is negative (the negative relation holds even in the basic OLS regression and when the redaction dummy variable is omitted from the specification).

IV. Post-IPO Performance, Insider Trading, and Abnormal Returns

Our findings in Section II indicate that redacting IPO firms have characteristics consistent with a need to protect proprietary information from rivals. If IPO firms' redacted information represents competitive advantages they have over rival firms, they should exhibit strong performance relative to their rival firms.

In Table IX, we examine industry-adjusted performance measures including: EBITDA-to-sales, return on assets (ROA), sales-to-assets, and market share change following the IPO. We report results for two main types of tests. First, we test whether redacting firms' performance differs significantly from their industry peers. Because the measures are industry adjusted, we test whether the mean and median industry-adjusted performance measures are significantly different from zero. Second, we test whether the industry-adjusted performance measures differ significantly across redacting and non-redacting firms. We report the test results for each of the first three years post-IPO. We note that the redacting versus non-redacting difference tests implicitly control for selection bias because we compare survivors for each group to each other.

As shown in Table IX, in each of the first three years post-IPO, redacting firms significantly outperform their industry peers based on mean and median EBITDA-to-sales and ROA, but they generate significantly lower mean and median sales-per-asset. We find no reliable differences in changes in market share between redacting and non-redacting firms. The results are consistent with the hypothesis that the proprietary information redacted from firms' IPO filings confers a competitive advantage that manifests itself in greater financial performance over a firm's rivals. Given the very nature of redacted information, it is difficult to identify the exact channel of the competitive advantages, but given the worse sales-to-asset

ratio and better profitability ratios, the competitive advantage appears to efficiency (expense) related rather than sales related.

Table IX also shows that, like redacting IPO firms, non-redacting IPO firms also outperform their industry peers on profitability measures, but they underperform on sales-to-asset ratios. Although not part of our research questions, the outperformance of both redacting and non-redacting IPO firms versus their industry peers suggests an IPO firm vs. already-public firm effect. More interestingly for our research questions, we find that the industry-adjusted profitability measures for redacting firms are generally significantly greater than the comparable ratios for non-redacting firms (except for the ROA ratio in year 3). Yet, redacting firms have significantly worse industry-adjusted sales to asset ratios than non-redacting firms in years 1 and 3.

The post-IPO performance results imply that IPO firms that redact information have efficiency advantages over their peers that are economically larger than the corresponding advantages that non-redacting IPO firms have over their peers. This superior performance is consistent with the view that redacting IPO firms have valuable proprietary information, and that by keeping it confidential, they are able to generate a larger financial performance advantage over their peers.

The greater underpricing for redacting firms that we document in Section III means that they have a greater first-day stock return than non-redacting firms. The first-day return represents a price adjustment from the offering price to the closing price. An interesting question is whether the closing price fully reflects the value of the redacted, and thus unknown, proprietary information. It seems plausible that investors might not fully value redacted information until they can observe the future performance outcomes when the firms report accounting figures. In this case, a stock could remain undervalued for a significant time in the post-IPO period. In contrast, investors may not initially discount the value of the redacted information, in which case the stock would be properly valued beginning with the first-day closing price.

How long it takes for a stock price to fully reflect the value of redacted information, is likely an important element in the initial decision to redact information at the IPO stage. Pre-IPO owners and insiders of the stock would like to preserve the value of proprietary information when the shares they retain become publicly traded, but if redaction leads to undervaluation of the stock in the post-IPO period, it creates a period over which it is costly for owners to liquidate their shares. We explore the valuation question by examining the sell decisions of insiders of the sample firms. If redacting and non-redacting firms are correctly valued shortly after the IPO, and if insiders are more likely to sell shares when they believe they are getting the full value of their shares, then there should be no difference in relative sales between insiders at redacting and non-redacting firms. Conversely, if the redacted information leaves redacting firms undervalued for a significant period after the IPO, we should find that insiders at redacting firms sell proportionately fewer shares than their counterparts at non-redacting firms in the near-term period following the IPO date.

We compute the cumulative fraction of shares that insiders at each firm sell during the first 12, 24, and 36-month periods post-IPO. An insider could sell more than 100% of their initial shareholdings by purchasing shares post-IPO and then selling them within the time periods we study. Because we are interested in how quickly they sell shares that they held initially (i.e., the shares subject to the initial underpricing), we cap the ratio of shares sold at 1.0. We determine initial holdings of shares as those reported in a filing nearest to, but strictly preceding, the IPO date. We discard observations for which we cannot identify shares held within 180 days of the IPO date.

As shown in Table X, insiders of redacting firms sell on average 12.9% of their shares within the first 12 months post-IPO, which is significantly less than the mean of 16.0% for non-redacting firms (p -value = 0.03). Cumulating through the first 24 months, we find that insiders at redacting firms sell on average 23.1% of their shares, which is significantly less than the mean of 28.6% for insiders at non-redacting firms (p -value < 0.01). By the 36th month, the mean fraction of shares that insiders sold does not

differ significantly across redacting and non-redacting firms: 31.8% vs. 34.5%, respectively, with a p -value of 0.30. Results based on the median fractions of shares sold are similar to the ones based on mean fractions sold.

To the extent that insider sell decisions contain information about whether shares in their firms are accurately valued, the results imply that the market takes significant time before fully incorporating the value of redacted proprietary information into the firms' share prices. The results based on insider sell decisions imply that insiders and other original owners of a firm face a liquidity cost tradeoff in the redaction decision. Redacting may protect the value of proprietary information, but if it results in the stock remaining undervalued for some time post-IPO, the insider must wait to sell shares over that period if she wants to sell them at full value. Choosing not to redact avoids the delay in selling at full value, but the full value may be lower because the firm's competitors can learn the non-redacted information that was otherwise proprietary.

Table XI contains estimates of equal-weighted calendar-time abnormal returns for redacting firms, non-redacting firms, and a hedge portfolio that has a long position in redacting firms and a short position in non-redacting firms. Abnormal returns are the alpha (intercept) estimates based on Fama-French-Carhart four factor return regressions using monthly returns. In the first 12 months post-IPO, neither redacting nor non-redacting firms earn statistically significant abnormal returns, nor is the difference between them statistically significant. During months 13 to 24, redacting firms exhibit a positive abnormal return of 0.70% per month ($t = 1.93$), but it is not significantly different from the return for non-redacting firms. During months 25 to 36, redacting firms exhibit a significant positive abnormal return (1.81% per month, $t = 3.82$) as well as non-redacting firms (1.14% per month, $t = 3.19$). The hedge portfolio abnormal return of 0.67% per month ($t = 1.85$) implies that redacting firms outperform non-redacting firms in the 25 to 36 month period by 67 basis points per month.

Combining the abnormal return results with the insider trading results discussed above paints a consistent picture. The insider trading results indicate that insiders of redacting firms sell their shares at a slower pace than insiders at non-redacting firms in the first 24 months post-IPO, which is when the abnormal return results indicate that redacting firms do not outperform non-redacting firms. During months 25 to 36, redacting firms outperform non-redacting firms in abnormal returns, and this is the period in which insiders at redacting firms catch up with non-redacting firms in sales of their shares. The results are consistent with the hypothesis that insiders at redacting firms wait until sufficient time passes for the market to recognize the value of the proprietary information that was redacted at the IPO stage.

The insider sell decisions and abnormal return results also potentially shed additional light on the question of whether *on average* IPO firms improperly use redaction to hide negative information from investors. If an insider used redaction to hide negative information and generate an overvalued stock price initially, and assumed that investors would eventually discover the truth over time and revalue the stock downward, we would expect that insider to sell shares relatively soon after the IPO date when lockups expire. In this case, we should also observe negative abnormal returns for the redacting firms when the market eventually realizes the redacted information was negative. Although the evidence cannot be considered definitive, the stock return results and the results that redacting insiders take longer to sell shares than non-redacting insiders are inconsistent with the proposition that redacting insiders would sell quickly to exploit overvaluation created by the improper redaction of negative information.

V. Conclusion

We document that almost 40% of IPO firms redact information from their material agreements to keep key information confidential despite the general view that IPO firms benefit from reductions in asymmetric information. Although redaction has the potential for misuse by managers wanting to shield negative information from investors, we find support for the hypothesis that redacting IPO firms have

characteristics consistent with the need to protect proprietary information from competitors. Redaction guards sensitive information from competitors, but also keeps it from investors who need to estimate stock values in an IPO.

Consistent with the hypothesis that redacting affects investors' estimates of stock values, we find that redacting firms experience significantly greater underpricing of their IPOs. Consistent with the hypothesis that the redacted information provides competitive advantages over rivals, we find that redacting firms are significantly more profitable than their industry peers in the first three post-IPO years. Redacting firm insiders sell smaller fractions of their shares in the first two years post-IPO, consistent with the hypothesis that the proprietary information has significant value and yet is undervalued in the market in that period. Redacting firm insiders catch up with non-redacting firm insiders in selling their shares during months 25-36, which is when we also find that redacting firms earn significantly greater abnormal returns than non-redacting firms do.

The results illustrate the tradeoffs firms make in balancing their need for capital, investors' needs for information to price securities, and firms' needs to protect proprietary information from competitors. The results also suggest that initial owners of a firm face a tradeoff in developing proprietary competitive advantages that rely on their confidentiality and their desire to sell shares at full valuation once their firms go public.

Appendix A. Confidential Treatment Request Process to Redact Information at IPO

Prior to issuing public securities, the SEC requires that a firm file a registration statement (S-1, SB-2, F-1) containing offering information, key shareholders, company descriptions and certain financial information. Item 601 of Regulation S-K also requires that certain exhibits be furnished to the public in conjunction with the registration statement or in a subsequent amendment.¹⁸ Moreover, a list of these agreements must be listed in an exhibit table. Items listed as 10.XX are material contracts or agreements that an investor might find important when making valuation and investment decisions.

If a firm wishes to redact particular components from one or more agreements, it can request confidential treatment for such material with the SEC under Rules 406 and 24b-2. The process starts when the firm privately submits the full non-redacted agreement in writing to the SEC along with a legal analysis on the potential competitive harm that could occur if the information were publicly disclosed. The firm must also specify the requested duration of the confidential treatment. The length generally corresponds to the length of the agreement, but is generally not allowed to exceed 10 years.

The SEC reviews the confidential treatment request and makes written or verbal comments to the firm if the reviewers require more detail or have concerns. In the meantime, the firm must make note in the exhibit index of the registration statement that it has requested confidential treatment for particular agreements. The firm files the redacted exhibit with either the initial registration statement or with one of the subsequent amendments. It also must place a notation in the publicly filed version of the agreement each time material is omitted from public view.

In order to have the request granted, the redacted material must not have been previously publicly disclosed, the redaction cannot be overly broad, and most information required to be reported under

¹⁸ For a complete description of the required exhibits see the Cornell University Law School website: <http://www.law.cornell.edu/cfr/text/17/229.601>

Regulation S-K cannot be redacted. Examples of these restrictions include: key customer identity, interest expense, MD&A discussion, related party transactions.

If the request is granted, then the omitted material is exempted from disclosure associated with requests under the Freedom of Information Act (FOIA) for the duration of the confidential treatment period. If the SEC does not grant the confidential treatment request, then the firm must file the full non-redacted contract. The company could also voluntarily withdraw the request if it no longer feels the information is proprietary or the contract is no longer material. The confidential treatment review may be lengthy, so the SEC suggests that firms file the request simultaneously with the initial registration statement. Moreover, the firm must resolve any issues raised by the SEC in regards to the request before the registration statement can be declared effective. This requirement could potentially delay the public offering.

Once the confidential treatment order expires, the information is subject to future FOIA requests. If the contract is still material with sensitive information, the firm can request an extension of the previous order. Otherwise, if the contract is still considered relevant and material, but no request is made, then the firm should file the unredacted agreement with public EDGAR.

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Table I: Sample Year Distribution

This table contains the distribution for the sample of firms completing IPOs from 1996 through 2011 by whether the issuer obtained a confidential treatment order from the SEC to redact information from its material agreements. The criteria to be included in the sample are reported in detail in detail in our sample generation and discussion of data section.

Year of IPO Issue	Total	Non-Redacting Firms	Redacting Firms	% of Redacting Firms by Year
1996	503	370	133	26.4%
1997	318	223	95	29.9%
1998	156	115	41	26.3%
1999	230	120	110	47.8%
2000	146	74	72	49.3%
2001	38	20	18	47.4%
2002	43	27	16	37.2%
2003	58	35	23	39.7%
2004	167	87	80	47.9%
2005	146	91	55	37.7%
2006	143	70	73	51.1%
2007	121	42	79	65.3%
2008	16	8	8	50.0%
2009	23	15	8	34.8%
2010	65	25	40	61.5%
2011	58	29	29	50.0%
Total	2,231	1,351	880	39.4%

Table II. Sample by Industry Distribution

This table presents the industry distribution of the sample of firms going public from 1996 through 2011 by whether the issuer obtained a confidential treatment order from the SEC to redact information from its material agreements. It lists the top 10 industries represented in each subsample across all years. Industry definitions are based on two-digit SIC codes.

Non-Redacting Firms			Redacting Firms		
Industry	Frequency	% of Subsample	Industry	Frequency	% of Subsample
Business Services	338	25.0	Business Services	225	25.6
Electronic and Other Electric Equipment	87	6.4	Chemical & Allied Products	169	19.2
Instruments & Related Products	77	5.7	Instruments & Related Products	94	10.7
Industrial Machinery & Equipment	70	5.2	Electronic and Other Electric Equipment	68	7.7
Oil & Gas Extraction	46	3.4	Communications	42	4.8
Miscellaneous Retail	43	3.2	Miscellaneous Retail Engineering & Management Services	38	4.3
Communications	42	3.1	Security & Commodity Brokers	23	2.6
Depository Institutions	42	3.1	Health Services	22	2.5
Insurance Carriers	42	3.1	Wholesale Trade - Nondurable Goods	14	1.6
Engineering & Management Services	41	3.0		11	1.3
Other	523	38.7	Other	174	19.8
Total	1,351	100.00	Total	880	100.00

Table III. Information on Material Agreements Filed by Firms at the IPO

This table presents information on material agreements at the IPO. Panel A presents the number of material agreements filed as an Exhibit 10 for the full sample and the redacting firm subsample. Panel B presents the frequency distribution for seven types of redacted agreements. We were able to classify 872 agreements stemming from 875 IPOs. *Customer/Supplier* agreements include inventory purchase/sale agreements, manufacturing agreements, distribution agreements, supply agreements, marketing agreements, reseller agreements, vendor Agreements, transportation agreements, subscriber agreements, management services, broker agreements, production agreements, promotion agreements, reinsurance agreements, customer service agreements, basic order agreements, reinsurance agreements, transaction agreements, service agreements, product order agreements, outsource agreements, development agreements, procurement agreements. *Peer* agreements include joint ventures, alliances, co-branding agreements, transition agreements, joint advertising (marketing) agreements, non-competition agreements, strategic partnering agreements, collaboration agreements, limited partnership agreements, stock and warrant purchase agreements, authorized assembler program agreements and IRU agreements. *License/royalty* agreements involve license royalties. *Credit/leasing* agreements involve credit agreements or lease agreements. *Research/consulting* agreements include research, consulting, or patent agreements and development agreements. *Employment* agreements involve contracts with a firm's employees. *Stockholder* agreements involve those with stockholders

Panel A. Summary statistics for material agreements filed as an Exhibit 10 at the IPO

Sample	Mean	Median	Min	Max	St. Dev.
Material Agreements: Full Sample	25.2	22.0	3.0	89.0	13.0
Redacted Agreements: Redacting Subsample	4.9	3.0	1.0	46.0	5.0
Ratio of Redacted Exhibits: Redacting Subsample	19.6	15.4	1.4	100.0	15.3

Panel B. Distribution of types of redacted material agreements

Type of Agreement	Number	Percentage found in redacted IPO sample
Customer/supplier	672	77.1
License/royalty	370	42.8
Peer	195	22.4
Research/consulting	94	10.8
Credit/leasing	72	8.3
Employment	24	2,8
Stockholder	13	1.5

Table IV. Public Offering Characteristics

This table compares information on the offering characteristics for firms that conducted an IPO from 1996 through 2011 by whether the issuer obtained a confidential treatment order from the SEC to redact information from its material agreements. The second and third columns report mean and median values with the median values appearing in parenthesis. *Total Proceeds* is the gross amount of funding raised in the IPO, *Offer Price* is the IPO offer price as reported in the final SEC registration document, *Gross Spread* is the fee charged by the underwriter syndicate as percentage of total proceeds, *Time to Offering* is the calendar day difference between the initial IPO registration statement filing date and the IPO issue date. *Price Revision* is the return from the filing date midpoint to the IPO offer price. *Industry IPO Wave* is measured following Chemmanur and He (2011) and is a dummy variable equal to one where the total number of offerings in a Fama French industry is equal to five or more, *Underwriter Reputation Rank* measures the reputation of the lead underwriters as determined from Jay Ritter's website, *Num Leading Underwriter* is the number of leading managers for the IPO. The last column presents the Satterthwaite t-statistics and Wilcoxon z-statistics (with *p*-values in parentheses) for difference in mean and median tests.

Offering Characteristic	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Total Proceeds	104.28 (45.50)	122.42 (55.00)	0.89 (0.371) 4.47 (<.001)
Offer Price	12.61 (12.00)	13.05 (12.00)	1.75 (0.080) 0.40 (0.689)
Gross Spread	7.13 (7.00)	6.93 (7.00)	5.62 (<.001) 2.65 (0.008)
Price Revision	-0.05 (0.00)	-0.04 (0.00)	1.11 (0.267) 2.18 (0.030)
Time to Offering	105 (78)	118 (90)	2.96 (0.003) 5.24 (<.001)
IPO Industry Wave	33.3%	31.1%	1.07 (0.283)
Underwriter Reputation Rank	6.93 (8.00)	7.66 (8.00)	8.88 (<.001) 7.07 (<.001)
Num Leading Underwriters	1.34 (1.00)	1.46 (1.00)	3.37 (<.001) 5.16 (<.001)

Table V. Firm and Industry Characteristics

This table compares information on the firm and industry characteristics for firms that conducted an IPO from 1996 through 2011 by whether the issuer obtained a confidential treatment order from the SEC to redact information from its material agreements. Panel A compares mean and median values of financial information for the 2,214 firms with available information in the year of the IPO. The second and third columns report mean and median values with the median values appearing in parenthesis (with the exception of VC backing that refers to the total percentage value). *Assets* is total assets, *Adj EBITDA Ratio* is the ratio of EBITDA over sales net of the mean EBITDA ratio of all companies in the same 3-digit SIC code industry during the same fiscal year, *Sales Ratio* is sales divided by total assets, *R&D Ratio* is the research and development expenditures divided by assets, *Capital Expenditure Ratio* is the capital expenditures scaled by total assets, *Cash Burn Rate* is the ratio of cash flow from operations over cash and cash equivalents (for the issuers with positive cash flow, cash burn rate is set equal to zero), *Leverage Ratio* is the firm's total debt divided by total assets, *Firm Age* is the number of years the issuer has been an operating company prior to the IPO issue year (drawn from the Field-Ritter dataset), and *VC Backing Dummy* equals one if the firm has received venture capital financing prior to the IPO. All firm and industry characteristics are winsorized at the 1% and 99% level. Panel C provides the industry competition measures. *Product Market Fluidity* is the Hoberg, Phillips and Prabhala (2014) measure computed as the vector of aggregate absolute change in usage of each word in the product market universe from year $t-1$ to year t . *Market Size* is the natural log of industry sales, *Entry Costs* is the weighted average of gross value of cost of property, plant and equipment for firms in the 3-digit SIC code industry weighted by each firm's market share in the 3-digit SIC code industry, *Product Substitutability* is equal to sales over operating costs (costs of goods sold, selling, general and administrative expenses and depreciation, depletion and amortization) for each 3-digit SIC code industry, and Market Share is the percentage of sales of all 3-digit SIC code issuers acquired by each issuer. Panel C lists information on the percentage of issuers completing at least one private equity placements (Regulation D offerings) within three calendar years preceding/following their IPO issue date. It also contains information on the frequency of those offerings. The second and third columns report mean and median values (apart from the percentage of Regulation D offerings for which only mean values are reported) with the median values appearing in parenthesis. The last column presents the Satterthwaite t-statistics and Wilcoxon z-statistics (with p -values in parentheses) for difference in mean and median tests.

Panel A. Firm Characteristics for Year of IPO Issue

Variable	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Assets (in \$M)	290.14 (41.73)	189.72 (31.77)	-3.47 (<.001) -2.95 (0.003)
Adj EBITDA ratio	2.22 (1.18)	4.09 (1.37)	1.49 (0.135) 1.39 (0.165)
Sales ratio	1.18 (0.94)	0.97 (0.68)	-4.58 (<.001) -5.45 (<.001)
R&D Ratio	0.09 (<.001)	0.26 (0.14)	12.18 (<.001) 17.23 (<.001)
Capital Expenditure Ratio	0.08 (0.04)	0.08 (0.05)	0.70 (0.482) 2.36 (0.018)
Cash Burn Rate	2.12 (<.001)	1.94 (0.12)	-0.50 (0.614) 8.40 (<.001)
Leverage ratio	0.36 (0.25)	0.27 (0.12)	-4.76 (<.001) -6.89 (<.001)
Firm Age	16.15 (9.00)	12.20 (7.0)	-3.47 (<.001) -4.88 (<.001)
VC Backing	0.29	0.63	16.73 (<.001)

Panel B. Industry Competition Measures

Variable	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Product Market Fluidity	7.83 (7.51)	9.94 (9.31)	8.30 (<.001) 8.36 (<.001)
Market Size	11.17 (11.12)	11.76 (12.51)	-1.57 (0.116) -4.75 (<.001)
Entry Costs	3.40 (0.008)	2.37 (0.002)	2.09 (0.037) 1.58 (0.115)
Product Substitutability	7.39 (1.18)	4.85 (1.22)	-8.87 (<.001) -9.75 (<.001)
Market Share	0.55 (0.52)	0.48 (0.44)	14.57 (<.001) 13.89 (<.001)

Panel C. Private Equity Placements around IPO

	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
<i>Percentage of Firms Conducting Regulation D Offerings</i>			
Before	30.9%	50.9%	9.46 (<.001)
After	33.0%	42.8%	4.68 (<.001)
<i>Days between Private Placement and IPO Issuance Date</i>			
Before	537.62 (267)	473 (275)	-5.87 (<.001) 6.59 (<.001)
After	1,053.57 (703)	906.20 (660)	-0.43 (0.677) -0.89 (0.371)
<i>Number of Issuances per Firm</i>			
Before	2.96 (3.00)	3.27 (3.00)	1.14 (0.266) 0.03 (0.982)
After	1.69 (1.00)	2.15 (1.00)	2.29 (0.023) 1.57 (0.128)

Table VI. Probit Regressions Predicting the Use of Confidential Treatment Orders

This table provides probit models predicting the whether firms conducting an IPO from 1996 through 2011 redact information from material contracts. *Firm Size* is the natural logarithm of the firm's total assets. *Adjusted EBITDA Ratio* is the ratio of EBITDA over sales whereby this ratio is adjusted by the average EBITDA ratio of the same 3-digit SIC code companies during the same fiscal year. *R&D Ratio* is the ratio of research and development expenditures scaled by assets. *Firm Age* is the natural logarithm of the number of years the issuer has been an operating company prior to the IPO issue year as determined from the Field-Ritter dataset. *Num Prior Reg D Offerings* refers to the number of Regulation D private equity offerings in the three years preceding the IPO issue year. *VC Backing* is the binomial dummy variable taking the value of one when the IPO issuer receives venture capital financing prior to the IPO and 0 otherwise. *Product Market Fluidity* is the Hoberg, Phillips and Prabhala (2014) measure that is computed as the vector of aggregate absolute change in usage of each word in the product market universe from year t-1 to year t. *Market Size* is the natural log of industry sales, *Entry Costs* is the weighted average of gross value of cost of property, plant and equipment for firms in the 3-digit SIC code industry weighted by each firm's market share in the 3-digit SIC code industry. *Product Substitutability* is equal to sales over operating costs (costs of goods sold, selling, general and administrative expenses and depreciation, depletion and amortization) for each 3-digit SIC code industry. *Market Share* is the percentage of sales of all 3-digit SIC code issuers acquired by each issuer. *Industry IPO Wave* is measured following Chemmanur and He (2011) and is a dummy variable equal to one where the total number of offerings in a Fama French industry is equal to five or more. Estimation models (2) and (3) include year control dummies whereby estimation model (3) also includes industry control dummies. The estimates are reported in log-odds form with the *p*-values being reported below in parenthesis. *p*-values are based on industry-clustered robust standard errors.

Variable	(1)	(2)	(3)
Firm Size	0.04 (0.13)	0.006 (0.82)	-0.04 (0.26)
Adj EBITDA Ratio	-0.001 (0.40)	-0.001 (0.60)	-0.001 (0.60)
R&D Ratio	0.72 (0.00)	0.68 (0.00)	0.37 (0.01)
Firm Age	-0.003 (0.94)	0.003 (0.87)	-0.03 (0.41)
Num Prior Reg D Offering	0.07 (0.00)	0.05 (0.00)	0.05 (0.00)
VC Backing	0.51 (0.00)	0.48 (0.00)	0.49 (0.00)
Product Market Fluidity	0.09 (0.00)	0.10 (0.00)	0.12 (0.00)
Market Size	-0.02 (0.68)	-0.06 (0.09)	-0.07 (0.13)
Entry Costs	-0.00 (0.94)	-0.00 (0.70)	0.02 (0.27)
Product Substitutability	-0.04 (0.28)	-0.02 (0.46)	-0.00 (0.92)
Market Share	-0.38 (0.16)	-0.50 (0.06)	-0.41 (0.15)
Industry IPO Wave	-0.17 (0.04)	-0.02 (0.88)	-0.03 (0.82)
Year Dummies	No	Yes	Yes
Industry Dummies	No	No	Yes
Num Obs Used	1,965	1,965	1,905
Pseudo R ²	0.15	0.17	0.21

Table VII. Underpricing Metrics

This table compares first-day underpricing for firms that conducted an IPO from 1996 through 2011 by whether the issuer obtained a confidential treatment order from the SEC to redact information from its material agreements. Underpricing is calculated as the percentage price difference between the first trading day closing price and the IPO offer price. Underpricing for on-wave (off-wave) IPOs, is the underpricing for redactors and non-redactors, respectively, that are identified to be (not be) part of an IPO wave. The last column presents the Satterthwaite t-statistics and Wilcoxon z-statistics (with *p*-values in parentheses) for difference in mean and median tests.

Offering Characteristic	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Underpricing*	18.8% (9.5%)	23.9% (9.7%)	2.79 (0.005) 5.24 (<.001)
Underpricing for on-wave IPOs	27.8% (13.2%)	35.1% (13.9%)	1.77 (0.077) 0.20 (0.839)
Underpricing for off-wave IPOs	14.6% (8.3%)	18.8% (9.1%)	2.25 (0.025) 0.64 (0.522)

* the overall sample mean underpricing is 21%

Table VIII. Regressions Explaining IPO Underpricing

This table presents regressions of the underpricing for the sample of firms conducting IPOs from 1996 through 2011. *Redacting Firm* is a dummy variable that equals one when the issuer redacts information from a material contract and 0 otherwise. *Ratio Redacted* is the proportion of total material agreements that are redacted. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the number of years the issuer has been an operating company prior to the IPO issue year (drawn from the Field-Ritter dataset). *VC Backing* is a dummy variable that equals one when the IPO issuer receives venture capital financing prior to the IPO and 0 otherwise. *Price Revision* is the return from the filing date midpoint to the IPO offer price. *High Underwriter Reputation* is a dummy variable that equals one when the underwriter reputation ranking value exceeds 8.0 and 0 otherwise. *Num of Leading Manager* is the natural logarithm of the number of leading underwriters for the issue. *Nasdaq Listing* is a dummy variable set equal to one when the securities trade on the Nasdaq and 0 otherwise. *Prior Mkt Return* is the average one-month preceding the IPO issue date cumulative abnormal returns for all issuers within the same 3-digit SIC code. *Time to Offering* is the calendar day difference between IPO filing date and the offering date. *Industry IPO Wave* is a dummy variable that follows Chemmanur and He (2011) and equals one when the total number of offerings in a 49 Fama French industry is equal to five or more. *R&D Ratio* is the research and development expenditures divided by assets. *Product Market Fluidity* is the Hoberg, Phillips and Prabhala (2014) measure that is computed as the vector of aggregate absolute change in usage of each word in the product market universe from year t-1 to year t. *Num Prior Reg D Offerings* refers to the number of Regulation D private equity offerings in the three years preceding the IPO issue year. Regressions (1) and (2) are OLS regressions. Regression (3) is a treatment regression estimated by full maximum likelihood that specifies the choice to redact as endogenous and a function of the significant right hand side variables in Table 6. *p*-values in parentheses are based on industry-clustered robust standard errors.

Variable	(1)	(2)	(3)
Redacting Firm	0.04 (0.09)	0.04 (0.07)	0.07 (0.01)
Ratio Redacted	0.02 (0.77)	-0.001 (0.87)	-0.01 (0.89)
Firm Size		-0.003 (0.63)	-0.003 (0.64)
Firm Age		-0.02 (0.02)	-0.02 (0.01)
VC Backing Dummy		0.05 (0.00)	0.04 (0.00)
Price Revision		0.49 (0.00)	0.49 (0.00)
High Underwriter Reputation		0.06 (0.01)	0.06 (0.01)
Num of Lead Managers		-0.006 (0.65)	-0.006 (0.65)
Nasdaq Listing		0.02 (0.23)	0.02 (0.19)
Prior Mkt Return		0.08 (0.91)	0.08 (0.90)
Time to Offering		-0.03 (0.02)	-0.03 (0.02)
Industry IPO Wave		0.05 (0.03)	0.05 (0.03)
R&D Ratio		-0.06 (0.01)	-0.06 (0.00)
Product Market Fluidity		0.003 (0.30)	
Num Prior Reg D Offering		-0.001 (0.87)	
λ (Inverse Mills Ratio)			-0.02 (0.01)
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Num Obs Used	2,187	2,103	2,103
Adjusted R-Square	0.15	0.22	--

Table IX. Post-IPO Operating Performance Metrics

This table lists information on the one-year, two-year and three-year post-IPO operating performance ordered by whether the issuer was predicted to request a confidential treatment order from the SEC to redact information from its material agreements. Panel A (B, C) reports the annual mean and median financial variables for the firms one year (two years, three years) after the IPO issue year. *Adj EBITDA Ratio* is the ratio of EBITDA over sales that is adjusted by the average EBITDA ratio of all companies in the same 3-digit SIC code industry during the same fiscal year, *Adj Sales Ratio* is the ratio to sales over total assets that is adjusted by the average sales ratio of all companies in the same 3-digit SIC code industry. *Adj ROA* is the ratio of net income over total assets that is adjusted by the average ROA of all companies in the same 3-digit SIC code industry during the same fiscal year. *Market Share Change* is percentage change in firm's market share, which is measured as the ratio of company's sales over the sum of sales for all companies in the same 3-digit SIC code industry and the same year. The panels report the mean and median values with the p-values for a test of whether the means and medians are statistically different than zero put in parentheses. The last column presents the Satterthwaite t-statistics and Wilcoxon z-statistics (with p-values in parentheses) for difference in mean and median tests.

Panel A. One Year Post-IPO

Financial Metric	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Adj EBITDA ratio			
Mean	0.48 (<.001)	0.71 (<.001)	2.43 (0.020)
Median	0.13 (<.001)	0.28 (<.001)	7.92 (0.001)
Adj ROA			
Mean	0.61 (<.001)	1.07 (<.001)	2.83 (0.005)
Median	0.13 (<.001)	0.33 (<.001)	8.66 (0.001)
Adj Sales ratio			
Mean	-0.20 (<.001)	-0.38 (<.001)	-4.35 (0.001)
Median	-0.25 (<.001)	-0.40 (<.001)	-5.15 (0.001)
Market Share Change			
Mean	78.32 (<.001)	134.08 (<.001)	0.36 (0.191)
Median	18.47 (<.001)	27.99 (<.001)	2.81 (0.002)

Panel B. Two Years Post-IPO

Financial Metric	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Adj EBITDA ratio			
Mean	0.39 (<.001)	0.95 (<.001)	5.51 (0.001)
Median	0.14 (<.001)	0.36 (<.001)	8.23 (0.001)
Adj ROA			
Mean	0.56 (<.001)	2.10 (<.001)	2.12 (0.031)
Median	0.14 (<.001)	0.42 (<.001)	8.84 (0.001)
Adj Sales ratio			
Mean	-0.22 (<.001)	-0.26 (<.001)	-0.36 (0.722)
Median	-0.21 (<.001)	-0.35 (<.001)	-3.83 (0.001)
Market Share Change			
Mean	167.04 (<.001)	249.67 (0.008)	0.76 (0.434)
Median	30.57 (<.001)	38.12 (<.001)	1.22 (0.451)

Panel C. Three Years Post-IPO

Financial Metric	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
Adj EBITDA ratio			
Mean	0.51 (<.001)	1.09 (<.001)	4.77 (0.001)
Median	0.16 (<.001)	0.40 (<.001)	6.37 (0.001)
Adj ROA			
Mean	1.32 (<.001)	1.42 (<.001)	0.17 (0.867)
Median	0.19 (<.001)	0.48 (<.001)	6.43 (0.001)
Adj Sales ratio			
Mean	-0.12 (<.001)	-0.21 (<.001)	-2.06 (0.045)
Median	-0.16 (<.001)	-0.32 (<.001)	-4.12 (0.001)
Market Share Change			
Mean	162.14 (<.001)	255.04 (<.001)	0.82 (0.408)
Median	27.68 (<.001)	37.29 (<.001)	1.35 (0.313)

Table X. Post-IPO Insider Sales

This table presents mean and median cumulative percentages of sales of stock by insiders following the IPO. We split the sample by whether the issuer was predicted to request a confidential treatment order from the SEC to redact information from its material agreements. We track cumulative sales of shares expressed as a percentage of stock holding reported most recently before the IPO date. We omit insiders with no holdings reported or reported holdings data more than 180 days before the IPO date. Data are from Thomson Reuters Insider Trading database. The difference test p-values for means are based on typical difference in mean t-tests. The last column presents the Satterthwaite t-statistics and Wilcoxon z-statistics (with *p*-values in parentheses) for difference in mean and median tests.

Proportion of Shares Sold	Non-Redacting Firms	Redacting Firms	Difference test statistic (p-value)
By 12 th month post-IPO			
Mean	16.0%	12.9%	2.15 (0.032)
Median	1.3%	0.5%	1.77 (0.077)
By 24 th month post-IPO			
Mean	28.9%	23.1%	2.76 (0.006)
Median	10.5%	6.9%	2.09 (0.037)
By 36 th month post-IPO			
Mean	34.5%	31.8%	1.03 (0.302)
Median	17.0%	15.4%	0.53 (0.600)

Table XI. Post-IPO Monthly Calendar-time Abnormal Returns

This table presents monthly equal-weighted calendar-time portfolio abnormal returns estimated as alphas based on a Fama-French-Carhart four factor model. The returns for months 0 to 12 include the listing day return. Untabulated results are qualitatively similar when we exclude the listing day return. T-statistics are in parentheses.

Time Window Relative to IPO date	Non-Redacting Firms	Redacting Firms	Hedge: Redactors minus Non- Redactors
0-12 months	0.31% (t=0.79)	-0.17% (t=0.53)	-0.48% (t=1.27)
13-24 months	0.54% (t=1.49)	0.70% (t=1.93)	0.15% (t=0.45)
25-36 months	1.14% (t=3.19)	1.81% (t=3.82)	0.67% (t=1.85)