UNIVERSITY OF QUEBEC IN MONTREAL

ISSUES SURROUNDING PUBLIC EQUITY OFFERINGS

DOCTORAL DISSERTATION

PRESENTED

AS A PARTIAL REQUIREMENT

PH.D. IN ADMINISTRATION

BY

CARÈNE BOUCHER

JANUARY 2022

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

TROIS ÉTUDES SUR LES OFFRES PUBLIQUES D'ACTIONS

THÈSE

PRÉSENTÉE

COMME EXIGENCE PARTIELLE

DOCTORAT EN ADMINISTRATION

PAR

CARÈNE BOUCHER

JANVIER 2022

UNIVERSITÉ DU QUÉBEC À MONTRÉAL
Service des bibliothèques

Avertissement

La diffusion de cette thèse se fait dans le respect des droits de son auteur, qui a signé le formulaire *Autorisation de reproduire et de diffuser un travail de recherche de cycles supérieurs* (SDU-522 – Rév.01-2006). Cette autorisation stipule que «conformément à l'article 11 du Règlement no 8 des études de cycles supérieurs, [l'auteur] concède à l'Université du Québec à Montréal une licence non exclusive d'utilisation et de publication de la totalité ou d'une partie importante de [son] travail de recherche pour des fins pédagogiques et non commerciales. Plus précisément, [l'auteur] autorise l'Université du Québec à Montréal à reproduire, diffuser, prêter, distribuer ou vendre des copies de [son] travail de recherche à des fins non commerciales sur quelque support que ce soit, y compris l'Internet. Cette licence et cette autorisation n'entraînent pas une renonciation de [la] part [de l'auteur] à [ses] droits moraux ni à [ses] droits de propriété intellectuelle. Sauf entente contraire, [l'auteur] conserve la liberté de diffuser et de commercialiser ou non ce travail dont [il] possède un exemplaire.»

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my director, Professor Maher Kooli, for his continuous support and guidance through the years. Thank you for supervising my doctoral journey with such benevolence.

Many thanks to Professor Thomas Walker for the valuable feedback given all along and for getting on board with me as a co-author for my third research paper. Many thanks to my other committee members as well, Professor Komlan Sedzro and Professor Moez Bennouri, for their precious input at several stages of my journey.

Finally, I thank the ESG School of Management for providing all the necessary conditions for me to successfully complete this doctoral program.

TABLE OF CONTENTS

RÉSUMÉ DE LA THÈSE

Ma thèse de doctorat est constituée de trois articles examinant plusieurs questions empiriques autour des offres publiques d'actions. Elle considère des données du marché américain.

Article 1. SEOs : match amical ou menaçant pour les entreprises rivales ?

Nous étudions les effets sur l'industrie des émissions d'actions par des sociétés américaines qui ont mûri au-delà du processus d'introduction en bourse (SEOs), sur la période 1980-2017. Nous trouvons que la valeur des actions des entreprises rivales augmente autour des SEOs complétées, et diminue autour des SEOs avortées. Ces effets à court terme sont plus marqués dans le cas des offres d'actions primaires que dans le cas des offres d'actions secondaires. Nous trouvons également que les concurrents connaissent une amélioration de leurs performances financière (valeur des actions) et opérationnelle sur le long terme. Nous constatons aussi que leur probabilité de survie est plus grande à la suite d'offres d'actions primaires. Dans l'ensemble, nos résultats sont en accord avec l'hypothèse des effets d'information positifs. Ainsi, les SEOs transmettent des informations favorables sur les perspectives d'une industrie.

Article 2. Anatomie des introductions en bourse par des sociétés non-rentables

Ces dernières années, de nombreuses sociétés non-rentables ont levé d'importantes sommes d'argent via des premiers appels publics à l'épargne (PAPEs) sur le marché américain. À l'aide d'un échantillon de 1,505 PAPEs de 1998 à 2018, nous examinons ces émetteurs non-rentables en les comparant à des émetteurs rentables en termes de motivations pour l'introduction en bourse, évaluation obtenue à l'émission et résultats à court et long termes. Nous trouvons que les sociétés non-rentables sont motivées par la nécessité de financer d'importants investissements en recherche et développement, et par l'ambition de plus facilement devenir des cibles de fusions et acquisitions. Nous constatons également qu'elles obtiennent des évaluations plus faibles, et que les

opportunités de croissance et l'innovation sont des facteurs distinctivement importants dans leur évaluation. Nous documentons aussi une sous-évaluation plus élevée, une liquidité et un volume de transactions plus faibles, ainsi qu'une volatilité plus importante sur le marché secondaire. Enfin, nous trouvons que ces entreprises sous-performent à long terme, et sont plus susceptibles d'être décotées pour des raisons négatives dans les trois années subséquentes.

Article 3. Risque de litige, sous-évaluation et PAPEs par des entreprises non-rentables

Nous examinons l'impact de la rentabilité des entreprises au moment de leur introduction en bourse sur la relation entre le risque de litige et le degré de sous-évaluation observé à l'émission. Nous émettons l'hypothèse que les émetteurs non-rentables ont plus de raisons d'éviter les coûts associés aux litiges que les émetteurs rentables. Nous trouvons effectivement que l'effet d'assurance lié à la sous-évaluation s'applique principalement à notre échantillon d'émetteurs non-rentables. Dans le même temps, bien que nous ne trouvions que peu de preuves d'un effet de dissuasion de la sous-évaluation, nous notons que ces preuves concernent uniquement les émetteurs non-rentables. Nos résultats restent valides lorsque nous considérons (1) différents horizons temporels pour l'arrivée des poursuites après les PAPEs, (2) des mesures de sous-évaluation sur de plus longues périodes, et (3) d'additionnelles variables de contrôle ajoutées à nos modèles de régression initiaux. Nous étudions également la relation entre le risque de litige, la rentabilité au moment de l'introduction en bourse et les frais de souscription. Nous trouvons que les souscripteurs facturent des frais plus élevés aux émetteurs non-rentables parmi les sociétés qui présentent un risque de litige plus grand.

DISSERTATION SUMMARY

My doctoral dissertation consists of three articles examining several empirical questions around public equity offerings. The data analyzed pertains to the US market.

Article 1. SEOs: friendly or threatening game for rivals?

We examine the effects of large seasoned equity offerings (SEOs) on industry rivals. We provide evidence that rivals react positively to SEO issues and negatively to SEO withdrawals. These short-term valuation effects are stronger in the case of primary offerings than in the case of secondary offerings. We also find that the long-term stock price and operating performances of rivals improve after an industry SEO. Further, we report that rivals are more likely to survive following primary issues. Overall, our results are consistent with the positive information effects hypothesis. Thus, large SEOs convey favorable information regarding the prospects of an industry.

Article 2. Anatomy of money-losing IPOs

Money-losing initial public offerings (IPOs) have recently raised an important amount of capital in the United States. Investors have assigned high valuation premia to these IPOs. Using a sample of 1,505 IPOs from 1998 to 2018, we investigate negative-earnings and zero-revenue issuers' motivations for going public, IPO valuation, and post-IPO outcomes, considering profitable and revenue-generating issuers as respective benchmarks. We find that money-losing IPO firms are motivated by the need to finance significant R&D investments and to be more easily targeted on the M&A market. We also find that they obtain lower valuations at the time of the IPO, and that innovation and growth opportunities are distinctively significant factors in their valuation. Further, we document that money-losing issuers exhibit higher underpricing, lower liquidity and trading volume, and higher volatility in the aftermarket. Finally, we show that they underperform profitable issuers in the long run, and are more likely to delist for negative reasons in the three years following the IPO.

Article 3. Litigation risk, underpricing and money-losing IPOs

We examine the impact of firms' pre-IPO earnings on the relation between litigation risk and IPO underpricing. We hypothesize that negative-earnings issuers have stronger incentives than positive-earnings issuers to avoid the costs associated with litigation. We find that the insurance effect of the lawsuit avoidance hypothesis predominantly applies within a subsample of negative-earnings issuers. At the same time, we find limited evidence for the deterrence effect, only for negative-earnings issuers. Our results are robust to the time horizons over which sample firms were sued, to alternative underpricing measures, and to the addition of several control variables to our baseline regression models. We also explore the relation between litigation risk, pre-IPO earnings, and underwriter gross spreads. We find that underwriters charge significantly higher spreads to negative-earnings issuers among firms with higher litigation risk.

PAPER 1. SEOS: FRIENDLY OR THREATENING GAME FOR RIVALS?

ABSTRACT

We examine the effects of large seasoned equity offerings (SEOs) on industry rivals. We provide evidence that rivals react positively to completed SEOs in their industry and negatively to SEO withdrawals. These short-term SEO effects are stronger in the case of primary offerings than in the case of secondary offerings. Rivals also appear to experience improvements in their long-run financial and operating performances. Further, we find that the likelihood of rivals' survival is greater subsequent to primary issues than secondary ones. Overall, our results are consistent with the information effects hypothesis. Thus, large SEOs convey favorable information regarding the prospects of an industry.

JEL classification: G14
Keywords: Seasoned equity offerings; Rivals; Competitive effects; Information effects; Withdrawal

1. Introduction

Corporate events can have spillover effects on rival firms, and numerous studies have examined these effects in the context of initial public offerings (IPOs). These studies focus on the consequences of the entry of newly public players on the competitive landscape. For instance, Akhigbe et al. (2003) examine the impact of IPOs on rival firms and find no implication for rivals on average. However, they identify significant positive information effects associated with IPOs in regulated industries and the first IPO in an industry after a period of dormancy. They also find significant negative competitive effects for larger IPOs in competitive, risky, and high-performing industries. Hsu et al. (2010) also analyze the effect of IPOs on industry competitors and find that rivals experience negative stock price reactions to completed IPOs and positive stock price reactions to withdrawn issues. They document that IPOs have effects on other firms that operate in the same industry. However, little is known about the competitive dynamics that surround seasoned equity offerings (SEOs).

SEOs differ from IPOs in various aspects. As highlighted by Chemmanur et al. (2009), IPO firms are typically younger and riskier firms characterized by a high level of information asymmetry. They are private firms that become public through an IPO. In contrast, SEO firms are public firms that have matured beyond the IPO process. They have been complying with public firms' disclosure requirements for some time, so there is more publicly available information about them. Besides, SEO firms' stocks already trade on the market before the SEO. Thus, there is a pre-offer market that is non-existent in IPOs, which implies a history of competition among rivals in the industry. This could influence the intensity of rivals' response to SEO events. Given these important differences, IPO results cannot be extrapolated to SEO.

The purpose of our study is to provide an in-depth analysis of the intra-industry effects of SEOs. First, we measure the short-term effects of SEO filings, completions, and withdrawals on rivals' stock prices. Second, we examine the long-term effects of SEOs on the stock price and operating performances of rivals and attempt to explain these performances by considering different multivariate analyses.

Our sample of U.S. SEOs includes 259 offerings in 51 industries (based on two-digit Standard Industrial Classification (SIC) codes). We focus on large and important SEOs issued during the 1980-2017 period. Our sample period starts in 1980 as it is the first year of data available on our different databases. It ends in 2017 because we want to track each SEO firm for several years after the offering date. Our results are summarized as follows. Rivals experience positive and significant short-term valuation changes around SEO completions and negative and significant valuation changes around SEO withdrawals. For instance, rivals' value-weighted cumulative abnormal returns (CARs) for the [-10; +10] window surrounding the event are 1.18% around SEO issues and -3.75% around SEO withdrawals, both significant at the 1% level. Thus, we find that SEOs convey favorable information about the entire industry. Further, we document that the positive short-term effects of SEOs are stronger for primary offerings (entirely new shares) than for secondary offerings (existing shares sold by insiders). This result is consistent with the view that primary offers are a capital-raising strategy to finance growth opportunities, while secondary offers are wealth transfers from insiders to outside investors.

Focusing on the long-term effects of SEOs, we find that rivals' stock price performance significantly improves in the one-year, two-year, and three-year periods after an offering. Over the 36-month post-SEO period, we report CARs of 11.42%, buy-and-hold abnormal returns

(BHARs) of 8.62%, and an alpha of 0.30% using calendar time portfolios (based on a four-factor model), all significant at the 1% level. Thus, rivals capture positive long-run externalities from SEOs, with a significant boost in their stock price performance. We also find that primary offers are associated with better performance for rivals compared to secondary offers.

We further report that rivals' assets growth, sales growth, capital expenditures growth and, to a lower extent, interest coverage ratio, significantly increase after an SEO. Thus, rivals' operating performance tends to improve after an issue. This result suggests that rivals do not particularly suffer from a heightened level of competition tied to SEO firms after an issue. We also find that rivals' likelihood of survival is greater after a primary SEO by an older and less levered firm with a higher interest coverage ratio. We further report that rivals' likelihood of survival is greater for firms that operate in industries with a lower market-to-book ratio and industries that are less concentrated (with a lower Herfindahl-Hirschman index (HH)). Overall, we conclude that SEOs have positive information effects on rival firms. They send a positive signal of future market growth to investors, who consequently adjust their expectations upwards regarding competing firms' value.

We contribute to the existing literature in several important ways. First, we complement research on spillover effects of equity offerings. Numerous studies focus on the effects of IPOs on competing firms (Hsu et al., 2010; Akhigbe et al., 2006, among others) and find that large IPOs have negative intra-industry effects due to competitive reasons. We extend the literature by investigating the case of SEOs and find that large SEOs have positive information effects on rival firms instead.

Second, we contribute to the existing literature on the intra-industry effects of SEOs. Slovin et al. (1992) analyze information spillovers around SEOs, but consider only banks and industrial firms. In contrast, we perform our analysis across a large set of industries (51 different two-digit SIC codes) and report results at a more aggregate level. Szewczyk (1992) investigates the impact of initial SEO announcements on non-announcing industry competitors but does not examine the effects of actual SEO issues and only focuses on a short-term reaction.

The study most similar to ours is Bradley & Yuan (2013), who examine the intra-industry consequences of SEO announcements and the long-term stock price performance of rivals after an SEO announcement. However, they do not consider the case of SEO completions and withdrawals. We fill these gaps by investigating the short-term valuation response of rivals around three events: SEO filings, SEO completions, and SEO withdrawals. We also are the first to investigate the long-term operating performance and survival determinants of rival firms after a large SEO.

The remainder of this article proceeds as follows- Section 2 presents the previous literature and hypotheses that motivate our empirical tests. Section 3 describes our data sources and sample construction. Section 4 reports and comments on our empirical findings. Section 5 provides our conclusion.

2. Previous literature and hypothesis development

An SEO could be the opportunity for investors to reassess the issuing firm's competitive position relative to its rivals (competitive effects). It could also generate information pertinent to

the entire industry, affecting competing firms' stock prices (information effects). In this section, we discuss each of these effects and present our hypotheses.

2.1. Competitive effects

Equity offerings could represent a competitive threat for industry rivals. Kim & Weisbach (2008) study IPOs and SEOs in 38 countries and show that the capital raised is used mainly for value-increasing investments. Walker & Yost (2008) report that firms significantly increase their capital expenditures and research and development expenses after an SEO. If these investments could strengthen the competitive position of issuing firms, they could also reduce profit margins and lower industry market shares for rivals. Akhigbe et al. (2003) examine the intra-industry effects of 3,906 IPOs from 1989 to 2000. They find that valuation effects are insignificant on average but that larger IPOs in competitive, relatively risky, and high-performing industries (notably, the technology sector) have negative and significant competitive effects on rival firms.

Akhigbe et al. (2006) investigate the long-run stock price performance of industry rivals following an IPO and report an unfavorable performance over the 36-months post-issue period. Their results are partially explained by competitive effects. Hsu et al. (2010) study 4,188 large IPOs from 1980 to 2001 and report negative short-term price reactions for rivals around completed issues and IPO filings and positive price reactions around withdrawn issues. They further document that rivals experience deteriorating operating performance in the three years following the IPOs. Braun & Larrain (2009) examine 254 IPOs in 22 emerging markets and find that stocks that are highly correlated with the offering experience a price decline during the month of the issue. McGilvery et al. (2012) study Australian IPOs and find that firms experience negative stock price reactions to the completion of an IPO in their industry. Bessler & Thies (2006)

argue that subsequent equity financing is an important determinant of the long-run performance of IPO firms. Focusing on IPOs in Germany, they find that IPO firms that have no subsequent equity financing underperform in the long-run, while IPO firms that raise additional capital through an SEO outperform in the long-run. These findings suggest that an SEO could provide a real edge to publicly traded firms. With the capital raised, they could re-engineer their processes, finance positive net present value investments, and reach higher levels of performance. Thus, from a competitive standpoint, SEOs could also be a threatening event for rivals.

In this context, we conjecture that rivals experience negative short-term valuation changes around SEO filings and SEO issues, and positive valuation changes around SEO withdrawals. We also hypothesize that the long-term stock price and operating performances for rivals decline in the three years following an issue.

To test for competitive effects, we consider, as Akhigbe et al. (2003) do, the following factors:

Degree of industry concentration: We expect SEOs to be more threatening to rivals that operate in more competitive (less concentrated) industries. We consider the industry Herfindahl-Hirschman index (Industry HH Index) as our measure of industry concentration.

Interaction of SEO size and degree of industry concentration: The larger the SEO proceeds, the more funds available for the issuing firm to enhance its competitive position, especially in more competitive industries. Thus, we expect large SEOs in industries with a low degree of concentration to have stronger competitive effects.

Use of proceeds: SEO firms may use their proceeds for several purposes, including investment or debt repayment. We expect rivals to react more negatively to SEOs made for investment purposes. Autore et al. (2009) report that SEO firms that state investment purposes show little or no subsequent underperformance, contrary to firms that state other uses of proceeds. Hence, SEOs made for investment purposes could represent a greater threat to industry rivals.

Technology industry: An intense competition characterizes the high technology industry. Thus, we expect that rivals react more adversely to SEOs in the technology industry.

2.2. Information effects

Equity offerings could convey information that is pertinent to the industry as a whole. On the one hand, the underlying message could be negative. Previous studies show that SEO announcements, on average, have negative valuation effects on issuing firms, as outside investors infer that stock overvaluation is at the root of insiders' decision to issue equity (Asquith & Mullins, 1986; Baker & Wurgler, 2002; Baker & Wurgler, 2000; Loughran & Ritter, 1995, 1997; Masulis & Korwar, 1986; Spiess & Affleck-Graves, 1995). Investors could assume that the negative signal pertains to the entire industry. Szewczyk (1992) reports that announcing SEO issuers and non-announcing industry competitors both experience negative and significant abnormal average returns around the announcement date. The author sustains that investors' inferences are more about the industry's general prospects as a whole rather than shifts in competitive advantage between the announcing firm and its industry competitors. Slovin et al. (1992) examine the banking sector and find that SEOs by commercial banks have negative stock price effects on rival commercial and investment banks. They argue that information asymmetry—namely, the market's lack of bank-specific information—could explain these informational

externalities. Bradley & Yuan (2013) examine 1,777 SEOs from 1997 to 2006 and find that rivals' stock prices fall around SEOs of secondary shares (existing shares sold by insiders). They argue that secondary offerings potentially send a negative signal of industry overvaluation.

On the other hand, the industry-wide message conveyed by equity offerings could be positive. Ritter (1991) argues that the going-public decision can be driven by irrational over-optimism among investors regarding the future of some industries. Akhigbe et al. (2003) find that IPOs in regulated industries (financial services, utility, communications, and transportation), and the first IPO after a period of dormancy, have positive information effects on industry rivals. They report that these IPOs cause rivals' stock prices to be revised upwards.

Lee et al. (2011) focus on the computer-related service industry and report that IPOs send a positive growing industry demand signal. Cotei & Farhat (2013) find that the stock prices of rival firms have no significant reaction to non-venture backed IPOs, while they have a positive reaction to venture-backed IPOs. They conclude that venture-backed IPOs convey positive information about the industry, which is transferred to rival firms. Bradley & Yuan (2013) find that SEOs of primary shares (entirely new shares) have positive valuation effects on rivals, as primary offerings signal favorable industry prospects.

To sum up, if the SEO conveys unfavorable (favorable) information about the entire industry, rivals should be negatively (positively) affected by the listing. Thus, we expect that rivals experience negative (positive) short-term valuation changes around SEO filings and SEO issues and positive (negative) valuation changes around SEO withdrawals. We also conjecture that their stock price and operating performances deteriorate (improve) over the long run.

To test for information effects, we consider the following factors:

Size: As there is generally less information available about smaller firms relative to larger ones, the new information conveyed by an SEO could trigger more significant valuation changes for smaller firms. Thus, we expect stronger information effects on smaller rivals.

Regulation in the industry: Considering the presence of regulation as a measure of industry homogeneity, we expect SEOs in more regulated industries (communications and transportation) to generate stronger information spillovers.

Type of shares offered: Previous studies point out that, contrary to the sale of existing insider shares (secondary offers), the sale of new shares (primary offers) is indicative of growth opportunities (Asquith & Mullins, 1986; Bradley & Yuan, 2013; Brau, James C; Li & Shi, 2007; Kim & Weisbach, 2008; Walker & Yost, 2008). Thus, we expect stronger information effects associated with primary issues relative to secondary issues.

3. Data

We collect a sample of SEOs in the U.S. issued between January 1980 and December 2017 from the Securities Data Corporation (SDC) New Issues database. We start our sample in 1980 that coincides with the first year of data available on our different databases. We also stop collecting data in 2017 because we want to track each SEO firm for several years after the SEO date. Following the SEO literature, we focus exclusively on issues of common shares with an offer price higher than $3. We further restrict our sample to only NYSE, NASDAQ, and AMEX offerings and remove those from both the financial and utility sectors (SDC and SIC codes 6000 to 6999 and 4900 to 4949, respectively). Following Hsu et al. (2010), we retain only the largest issues for our empirical tests. Indeed, when both small and large SEO events occur within a short period of

time in the same industry, the effect of the small events is difficult to capture as it is dominated by the effect of the large events. Thus, we choose to select only large offerings to reduce potential contamination of our results by other industry SEOs. Hsu et al. also argue that considering small and large events altogether is a noisy measurement approach that could lead to mixed results. We use SEO proceeds as a measure of the offering size and identify 492 SEOs that are not preceded or followed by a larger industry SEO in the surrounding four years.[1] We obtain filing and issue dates for the remaining issues from the SDC.

We collect financial statements data from Compustat and rely on the Center for Research in Security Prices (CRSP) for stock returns and information pertaining to delisting. We retain only those firms with Compustat and CRSP data availability and, for consistency reasons, remove all firms identified as belonging to the financial and/or utilities sector by any of the two data sources. Our final sample of SEOs includes 259 events by 204 different firms that belong to 51 Compustat two-digit SIC code industries. We apply the same filters (except for the one related to the offering size) to derive our sample of withdrawn SEOs. Our final sample of withdrawn SEOs includes 180 events by 174 different firms that operate in 32 two-digit SIC code industries. All withdrawal dates are provided by the SDC.

We further use Compustat to build our sample of industry rivals. We collect data on all US-based firms with any of the 51 two-digit SIC codes represented in our sample of completed SEOs. We remove sample SEO firms from the results and keep only rivals with available CRSP

[1] SEOs generally occur more frequently than IPOs. Thus, we limit our selection criterion to a surrounding period of four years to avoid discarding too many issues. The advantage of this selection approach is that large SEOs are identified based on offerings in the surrounding years, and not based on arbitrarily stated periods of time.

data. Our final sample of rivals includes 9,368 firms. All the variables considered in our study are defined in Table 1.

Table 2 reports the distribution of SEOs by year, and Table 3 reports descriptive statistics for our samples of SEO firms and industry rivals. In Panel A of Table 3, we present the mean and median assets, sales, market capitalization, and age for both samples, as well as the Wilcoxon test significance of the value differences observed between the two samples. At the time of an offering, the average (median) SEO firm has $9,089.75 ($4,663.36) million in assets, $7,842.25 ($4,645.97) million in sales, and $11,173.13 ($2,259.22) million in market capitalization, compared to $1,272.98 ($87.40) million in assets, $1,090.28 ($80.28) million in sales and $1,962.03 ($126.37) million in market capitalization for the average (median) industry rival. All mean and median differences are significant at the 1% level. These values are substantially higher for our SEO firms relative to their rivals because of our selection criterion. Indeed, we focus on the largest SEOs by industry within a four-year period. We hereby select issues likely to be made by larger and more established firms. In contrast, our sample of industry rivals covers small and large firms altogether and comprises a higher number of firms, which explains the lower values observed. Panel A also shows that SEO firms are older than their rivals. They have been publicly traded for 29 (23) years, compared to 16 (12) years for their competitors. The mean and median differences are significant at the 1% level.

Panel B of Table 3 reports the number and percentage of SEOs based on their category. Throughout our analysis, we account for both the type of shares offered and the intended use of proceeds stated by SEO firms. A total of 127 SEOs (49%) are issues of mainly primary shares (entirely new shares), while 132 (51%) are issues of mainly secondary shares (already existing

shares). Also, 96 SEOs (37%) are issued for investment purposes (general corporate intents, future acquisitions, and capital expenditures), 74 (29%) for debt repayment purposes, and 89 (34%) for other purposes (secondary uses and stock repurchases).

[Insert Tables 1, 2, and 3 here]

4. Empirical results

4.1. Short-term price reaction

4.1.1. Returns around SEO filings, issues, and withdrawals

In this section, we focus on rivals' short-term valuation changes around SEO filings, SEO issues and SEO withdrawals. Table 4 reports our results. We present both equally-weighted and value-weighted average CARs over five event windows, measured in days before and after the SEO: [-1; +1], [-1; +10], [-5; +5], [-10; +1], and [-10; +10].

In columns 2 to 5 of Table 4, we report rivals' abnormal returns around SEO filings. We find that equally-weighted average CARs are positive and significant at the 5% level for windows [-1; +1] and [-1; +10], and at the 1% level for windows [-5; +5], [-10; +1] and [-10; +10]. Value-weighted average CARs are also consistently positive and significant for all event windows examined. For the [-10; +10] window, the equally-weighted (value-weighted) average CAR is 0.48% (1.08%), significant at the 1% level. Figure 1 plots rivals' equally-weighted mean CAR from 30 days before to 30 days after the filing of an SEO. We notice that the CAR follows a positive trend over the event window, like the one observed around completed SEOs. The CAR reaches 1.25% a month after the SEO filing date. Overall, we find that stock prices of rival firms react positively to SEO filings.

In columns 6 to 9 of Table 4, we report rivals' abnormal returns around completed SEOs. Equally-weighted average CARs are positive and significant at the 1% level for windows [-5; +5] and [-10; +10], and at the 5% level for windows [-10; +1] and [-1; +10]. Value-weighted average CARs are positive and significant at the 1% level for all windows but [-1; +1], significant at the 10% level. For the [-10; +10] window, the equally-weighted (value-weighted) average CAR is 0.63% (1.18%), significant at the 1% level. Figure 1 plots rivals' equally-weighted mean CAR from 30 days before to 30 days after a completed SEO. We observe that the CAR follows a positive trend over the entire period, starting from 0% a month before the issue to 1.50% a month after the issue. Thus, our results suggest ex-ante optimistic anticipation of the SEO in the industry and an ex-post positive effect for rivals when the issue is completed.

The stock prices of rival firms react positively to SEOs. SEOs seem to signal promising growth opportunities at an industry-wide level, resulting in a price increase for rivals. In other words, SEOs have positive information effects. These results are opposite to those reported by Hsu et al. (2010) for IPOs. For the event window [-10; +10], they calculate an equally-weighted average CAR of -0.82%, significant at the 1% level (versus +0.63% around SEOs). Thus, they find that the arrival of new public players represents a competitive threat for industry rivals. The inherent differences between SEO firms and IPO firms could explain, in part, these contrasting results. SEO firms have been publicly traded for some time. They have a history of competition with their peers as public firms. Hence, the uncertainty regarding the level of competition that rivals can anticipate facing after an issue, is lower in the case of SEOs than IPOs. Our results show that there is no relevant threat around SEOs. Instead, a large SEO generates optimism among investors regarding the future of the industry.

In columns 10 to 13 of Table 4, we report rivals' abnormal returns around SEO withdrawals. We find that both equally-weighted and value-weighted average CARs are negative and significant at the 1% level for all event windows that we examine. For example, the equally-weighted (value-weighted) average CAR is -0.40% (-0.71%) and -1.28% (-3.75%) for windows [-1; +1] and [-10; +10], respectively. These results are consistent with those observed around completed SEOs. The stock prices of rivals exhibit a positive reaction around completed issues and a rationally negative reaction around withdrawn issues. Figure 1 plots rivals' equally-weighted mean CAR from 30 days before to 30 days after an SEO withdrawal. We notice that the CAR increases up to a week before the withdrawal date, before starting to decrease consistently to reach -1.50% a month after the withdrawal date. The positive trend observed in the early days could indicate optimistic anticipation of the SEO in the industry. However, as more information becomes available about the likelihood of the issue's withdrawal (approximately a week before it becomes effective), rivals' abnormal returns decrease. The CAR continues to decrease after the withdrawal date. We also note that, for the event window [-30; +30], the CAR associated with withdrawn SEOs (-1.50%) is equivalent in magnitude to the CAR associated with completed SEOs (+1.50%).

Our findings show that the stock prices of rival firms react negatively to SEO withdrawals. Withdrawn issues seem to convey negative information about the industry's prospects, which results in adverse valuation effects for rivals. We find additional evidence that information effects prevail over competitive effects around SEOs. Again, these results are opposite to those reported

by Hsu et al. (2010) for IPOs. For the event window [-10; +10], they report an equally-weighted average CAR of +2.06% around IPO withdrawals (versus – 1.28% around SEO withdrawals).[2]

[Insert Table 4 and Figure 1 here]

4.1.2. Returns around primary versus secondary offerings

In this section, we examine how the type of shares offered affects our results.[3] Table 5 reports rivals' short-term valuation changes around primary offerings (50% or more primary shares) and around secondary offerings (50% or more secondary shares). We present both equally-weighted and value-weighted average CARs over five event windows, measured in days before and after the SEO: [-1; +1], [-1; +10], [-5; +5], [-10; +1], and [-10; +10].

In columns 2 to 5 of Table 5, we report rivals' abnormal returns around primary SEOs. Equally-weighted average CARs are positive and significant for event windows [-1; +10], [-5; +5], [-10; +1], and [-10; +10]. Value-weighted average CARs are also positive and significant for event windows [-5; +5], [-10; +1], and [-10; +10]. In columns 6 to 9 of Table 5, we report rivals' abnormal returns around secondary SEOs. Equally-weighted average CARs are insignificant for most event windows. However, value-weighted average CARs are positive and significant for all windows. Overall, rivals' CARs are higher in magnitude around primary offerings than around secondary offerings. For instance, for the event window [-10; +10], the equally-weighted average CAR for

[2] As a robustness check, we split our data into six time periods based on different market events and our findings remain qualitatively unchanged. Results are not reported in a table but available upon request.
[3] We should note that while (Bradley & Yuan, 2013) consider all SEOs, we focus on examining large offerings.

primary SEOs is 0.96% and statistically significant at the 1% level, while it is 0.19% and not statistically significant for secondary SEOs.

Figure 2 plots rivals' equally-weighted average CARs from 30 days before to 30 days after a primary SEO and a secondary SEO, respectively, and supports our observations. The nature of both types of shares could explain our findings. While primary shares are entirely new shares, secondary shares are existing shares sold by insiders (Asquith & Mullins, 1986; Bradley & Yuan, 2013; Brau, Li & Shi, 2007; Kim & Weisbach, 2008; Walker & Yost, 2008). Bradley & Yuan (2013) highlight that primary issues indicate a need for funds to finance upcoming projects and growth opportunities. In contrast, motivations for selling secondary shares include taking advantage of high market valuations (Kim & Weisbach, 2008; Walker & Yost, 2008) and cashing out given anticipation of future firm performance deterioration (Brau, Li & Shi, 2007).

[Insert Table 5 and Figure 2 here]

In Table 6, we present the results of the cross-sectional analysis of rivals' short-term CARs around an SEO. Our regression specification is the following:

$$[-5,+5]\ day\ CARs_i = \alpha + \beta_1\ Size_i + \beta_2\ Regulation_i + \beta_3\ Primary\ SEO_i + \\ +\beta_4\ Industry\ HH\ Index_i + \beta_5\ SEO\ size\ x\ Industry\ HH\ Index_i + \beta_6\ Investment\ SEO_i + \\ \beta_7\ Debt\ SEO_i + \beta_8\ Technology_i + \beta_9\ Age_i + \beta_{10}\ Leverage\ Ratio_i + \\ \beta_{11}\ Interest\ Coverage\ Ratio_i + \beta_{12}\ Industry\ Market\text{-}to\text{-}Book\ Ratio_i + \\ \beta_{13}\ Industry\ Fixed\ Effects_i + \beta_{14}\ Year\ Fixed\ Effects_i + \varepsilon_i \quad (1)$$

All the variables are defined in Table 1. We also include industry dummies to control for heterogeneity among the 51 SIC code industries represented in our sample and year dummies to account for market conditions over time. Model 1 of Table 6 includes only factors related to competitive effects. We find that the coefficient of *Investment SEO* is positive and statistically

significant at the 1% level. Thus, rivals react positively to SEOs made for investment purposes. We also find that coefficients of *Industry HH Index*, *SEO size × Industry HH Index,* and *Technology* are not significant. Thus, there is no evidence of existence of significant competitive effects on rival firms. Model 2 of Table 6 includes only factors related to information effects. We find that the coefficient of *Size* is negative and significant at the 1% level, while the coefficient of *Primary SEO* is positive and significant at the 1% level. These results are in line with our information effects hypothesis. Spillover effects are the strongest on smaller rivals and following SEOs of primary shares. Model 3 of Table 6 presents results for factors related to both competitive and information effects and confirms our previous observations.

[Insert Table 6]

4.2. Long-term effects

4.2.1. Stock price performance

In this section, we focus on the stock price performance of rivals in the 12-month, 24-month and 36-month periods after a large SEO in their industry. We restrict our sample to only rivals that never announce an SEO over the measurement period and distinguish between primary and secondary SEOs. Table 7 reports our results. In Panel A (event-time results), we present rivals' value-weighted average CARs and BHARs. In Panel B (calendar-time results), we present rivals' excess returns (alphas) based on the Fama & French (1993) and Carhart (1997) four-factor model. We use the following regression specification:

$$R_{p,t} = \alpha_{p,t} + \beta_p\, MKT_t + \delta_p\, SMB_t + \omega_p\, HML_t + \varphi_p\, UMD_t + \varepsilon_{p,t} \quad (2)$$

where $R_{p,t}$ is the value-weighted return of portfolio p in excess of the one-month T-bill rate in month t, $\alpha_{p,t}$ is the intercept named "alpha" and p is the abnormal return of the portfolio in month t. MKT_t is the value-weighted return of the market in excess of the one-month T-bill rate in month t, SMB_t is the average return of small firms minus the average return of big firms in month t and HML_t is the average return of high book-to-market firms minus the average return of low book-to-market firms in month t. UMD_t is the average return of the highest-performing firms (up) minus the average return of the lowest-performing firms (down) in month t; β_p, δ_p, ω_p and φ_p are the coefficients obtained for MKT_t, SMB_t, HML_t, and UMD_t, respectively; and $\varepsilon_{p,t}$ is the error term.

In Panel A of Table 7, columns 2 to 4 report event-time results for the full SEO sample. Rivals' average CARs are 6.28%, 9.71%, and 11.42% over 12, 24, and 36 months, respectively. Rivals' average BHARs are 4.50%, 7.94%, and 8.61% over 12, 24, and 36 months, respectively. All values are significant at the 1% level. In Panel B of Table 7, columns 2 to 4 report calendar-time results for the full sample of SEOs. Rivals' alphas are 0.43%, 0.35%, and 0.30% over 12, 24, and 36 months, respectively. All excess returns are significant at the 1% level. Thus, our results show that SEOs have positive information effects over the long run. Rivals appear to benefit from the renewed interest and augmented focus of investors on their industry.[4]

Next, we investigate how our results are affected by the type of shares offered. Columns 5 to 7 of Panel A of Table 7 reports event-time results for primary SEOs, while columns 8 to 10 report results for secondary SEOs. We find that rivals' average CARs (BHARs) are 6.23% (4.26%), 12.07% (10.03%), and 15.69% (14.69%) for primary SEOs, while they are 6.35% (4.84%), 6.45%

[4] We also examine the long-term performance of rivals by time period based on market events and confirm the long-term positive reaction for rivals across different sub-periods. Results are not reported in a table but available upon request.

(5.05%), and 5.51% (3.18%) for secondary SEOs over 12, 24, and 36 months, respectively. All values are significant at the 1% level. Overall, rivals perform relatively better following primary offerings than secondary offerings.

Panel B of Table 7 reports calendar-time results for primary SEOs (columns 5 to 7), and for secondary SEOs (columns 8 to 10). We find that in the case of primary SEOs, rivals' alphas are 0.18%, 0.33% and 0.27%, which are statistically significant over 12, 24 and 36 months. In the case of secondary SEOs, rival's alphas are 0.49%, 0.40% and 0.28% and statistically significant over 12, 24 and 36 months. Figure 3 plots rivals' value-weighted mean CARs over a 36-month post-SEO period for all SEOs, primary SEOs, and secondary SEOs and corroborates our univariate findings. We also observe that stock price performances of rivals are higher following primary SEOs than following secondary offerings.

[Insert Table 7 and Figure 3 here]

In Table 8, we present the results of the cross-sectional analysis of rivals' 36-months CARs after an SEO. Our regression specification is the following:

$$\begin{aligned} 36\text{-}months\ CARs_i = {} & \alpha + \beta_1\, Size_i + \beta_2\, Regulation_i + \beta_3\, Primary\ SEO_i + \\ & + \beta_4\, Industry\ HH\ Index_i + \beta_5\, SEO\ size\ x\ Industry\ HH\ Index_i + \beta_6\, Investment\ SEO_i + \\ & \beta_7\, Debt\ SEO_i + \beta_8\, Technology_i + \beta_9\, Age_i + \beta_{10}\, Leverage\ Ratio_i + \\ & \beta_{11}\, Interest\ Coverage\ Ratio_i + \beta_{12}\, Industry\ Market\text{-}to\text{-}Book\ Ratio_i + \\ & \beta_{13}\, Industry\ Fixed\ Effects_i + \beta_{14}\, Year\ Fixed\ Effects_i + \varepsilon_i \quad (3) \end{aligned}$$

All the variables are defined in Table 1. We also include industry dummies to control for heterogeneity among the 51 SIC code industries represented in our sample and year dummies to account for market conditions over time.

In model 1 of Table 8, we focus on factors related to competitive effects. We find that coefficients of *Investment SEO* and *Debt SEO* are positive and statistically significant. Thus, SEOs made for investment purposes and debt repayment are associated with positive long-term CARs for rivals. The results are against the presence of competitive effects.

In model 2 of Table 8, we focus on factors related to information effects. The coefficient of *Primary SEO* is positive (0.099) and significant at the 1% level. Thus, we find evidence that the stock price performance of rivals is higher following primary SEOs relative to secondary SEOs. Secondary offerings are typically wealth transfers from pre-SEO shareholders to outside investors, while primary offerings could signal upcoming wealth creation at an industry-wide level. We also find that the coefficient of *Size* is negative (-0.050) and significant at the 1% level. Thus, in line with the positive information effects hypothesis. Primary SEOs are the most rewarding for rivals in the long run and effects are stronger on smaller rivals.

Model 3 presents results for factors related to both competitive and information effects and confirm our previous observations. As for the set of control variables, we find that rivals that are older and have a higher leverage ratio perform better over the long run following a large industry SEO. The coefficient of *Industry MB ratio* is also negative and significant at the 1% level. Thus, firms that operate in overvalued industries (higher market-to-book ratios) have lower long-term CARs than others.

[Insert Table 8 here]

4.2.2. Operating performance

In this section, we examine the long-run operating performance of rivals following an SEO. Table 9 reports our univariate results. We evaluate changes in performance measures from the pre-SEO to the post-SEO period. We focus on six operating performance measures: assets growth, sales growth, capital expenditures (capex) growth, return on assets (ROA), leverage ratio, and interest coverage ratio. All the variables are defined in Table 1. Columns 2 to 4 report results for the full SEO sample, columns 5 to 7, for primary SEOs, and columns 8 to 10, for secondary SEOs.

Our first performance measure is assets growth. We find that regardless of the type of shares offered, rivals' assets growth increases significantly after an SEO. For example, assets growth increases from 11.38% one year before an SEO to 11.96%, 12.09%, and 11.58% one, two, and three years after, respectively. Our second performance measure is sales growth. For the whole SEO sample, rivals' sales growth also increases significantly from 12.05% to 14.36%, 13.94%, and 13.01% one, two, and three years after an SEO, respectively.

Using capex growth as a third performance measure, we find that rivals significantly increase their capital expenditures from 27.17% one year before an SEO to 30.87%, 30.80%, and 27.83% one, two, and three years after, respectively. We also find that in the first two post-SEO years, primary SEOs exhibit the highest increase. Our next performance measure is ROA. For the whole SEO sample, rivals' ROA decreases significantly from -1.61% to -1.16%, -2.02%, and -1.85% one, two, and three years after the SEO, respectively. We also note that the deterioration of rivals' ROA is less pronounced in the case of primary SEOs than in the case of secondary SEOs.

The fifth performance measure is the leverage ratio. On average, we find no significant change in rivals' leverage ratio after an SEO. However, we notice that while there is a reduction in leverage after a primary SEO, there is an increase in leverage after a secondary SEO. Our sixth performance measure is the interest coverage ratio. For the whole SEO sample, we notice that rivals' interest coverage ratio significantly increases from 3.55 (one year before) to 3.97 (one year after an SEO). Overall, the operating performance measures of rival firms improve after an SEO.

[Insert Table 9 here]

Next, we perform multivariate panel regressions using different operating performance measures as dependent variables (assets growth, sales growth, capital expenditures (capex) growth and ROA). Our regression specification is as follows:

$$
\begin{aligned}
&Operating\ performance\ measure_{i,t} \\
&= \alpha + \beta_1\, SEO_{i,t} + \beta_2\, Size_{i,t} + \beta_3\, Regulation_{i,t} + \beta_4\, Primary\ SEO_{i,t} \\
&+ \beta_5\, Industry\ HH\ Index_{i,t} \\
&+ \beta_6\, SEO\ size_{i,t}\ x\ Industry\ HH\ Index_{i,t} + \beta_7\, Investment\ SEO_{i,t} + \beta_8\, Debt\ SEO_{i,t} \\
&+ \beta_9\, Technology\ SEO_{i,t} + \beta_{10}\, Age_{i,t} + \beta_{11}\, Leverage\ Ratio_{i,t} \\
&+ \beta_{12}\, Interest\ Coverage\ Ratio_{i,t} + \beta_{13}\, Industry\ Market\text{-}to\text{-}Book\ Ratio_{i,t} \\
&+ \beta_{14}\, Industry\ Fixed\ Effects_{i,t} + \beta_{15}\, Year\ Fixed\ Effects_{i,t} \\
&+ \varepsilon_{i,t} \quad (4)
\end{aligned}
$$

Operating performance is measured in each year *t* for every rival firm *i*. All variables are defined in Table 1. We include industry dummies to control for heterogeneity among the 51 SIC code industries represented in our sample and year dummies to account for market conditions over time.

Table 10 reports our results. Our first performance measure is assets growth. We find that *SEO* has a positive (0.005) and significant coefficient at the 1% level. Thus, the three-year period that follows an SEO is characterized by higher assets growth for industry rivals. We also find that

this significant boosting effect is attributable to primary SEOs. The coefficient of *Primary SEO* is positive (0.009) and significant at the 10% level. Rivals' assets growth is negatively and significantly related to firm age and leverage ratio, and positively and significantly related to firm size, interest coverage ratio and industry market-to-book ratio. Our observations are qualitatively unchanged when we use rivals' sales growth and capex growth as alternative performance measures. Overall, the long-run operating performance of rivals improves after an SEO. They do not appear to suffer from increased competition in relation to SEO firms.

[Insert Table 10 here]

4.2.3. Survival

In this section, we test the robustness of our long-term results by examining the likelihood of survival of rivals in the three years following an SEO. We restrict our firm-year data to only SEO years. For each rival firm, we include an indicator variable that takes the value 1 if the firm in a given industry survives after an SEO, and 0 if it delists for negative reasons within three years of the offering. A total of 17,082 firm-year observations are considered in the model, including 2,227 delisting cases. Our survival analysis relies on the Cox proportional hazards model. Our specification is as follows:

$$h_i(t) = h_0(t) \times \exp(\beta_1 Size_i + \beta_2 Regulation_i + \beta_3 Primary\ SEO_i + \\ +\beta_4 Industry\ HH\ Index_i + \beta_5 SEO\ size\ x\ Industry\ HH\ Index_i + \beta_6 Investment\ SEO_i + \\ \beta_7 Debt\ SEO_i + \beta_8 Technology_i + \beta_9 Age_i + \beta_{10} Leverage\ Ratio_i + \\ \beta_{11} Interest\ Coverage\ Ratio_i + \beta_{12} Industry\ Market\text{-}to\text{-}Book\ Ratio_i) \quad (5)$$

$h_i(t)$ is the expected hazard for rival firm *i* at time *t*. $h_0(t)$ is the baseline hazard and represents the hazard when all of the predictors (control variables) are equal to zero. All the variables are defined in Table 1.

Table 11 reports our results. We present the hazard ratio, coefficient, and *p*-value associated with each variable. A hazard ratio higher than 1 is equivalent to a positive coefficient and means that a given variable increases the likelihood of delisting. A hazard ratio lower than 1 is equivalent to a negative coefficient and means that a given variable decreases the likelihood of delisting.

In model 1, we focus on factors related to competitive effects. *Investment SEO* has a hazard ratio of 1.212, equivalent to a positive coefficient of 0.192 and significant at the 1% level. *Debt SEO* has a hazard ratio of 0.371, equivalent to a negative coefficient of -0.991 and significant at the 1% level. Thus, delisting is more likely to occur following SEOs made for investment purposes than following SEOs made for debt repayment. We also find that the likelihood of delisting is higher in industries with a higher Herfindahl-Hirschman index (higher market concentration).

In model 2 of Table 11, we consider factors related to information effects. *Size* has a hazard ratio of 0.491, equivalent to a negative coefficient of -0.712 and significant at the 1% level. Thus, large rivals are significantly more likely to survive following a large SEO. We also find that rivals in regulated industries exhibit a higher likelihood of survival. Further, *Primary SEO* has a hazard ratio of 0.797, equivalent to a negative coefficient of -0.227 and significant at the 1% level. Our results therefore provide evidence that SEOs that signal upcoming value creation – primary offerings – are associated with better survival outcomes for rivals.

In model 3, we combine factors related to both competitive and information effects and confirm previous results. As for the set of control variables, we find that older rivals with lower

leverage and a higher interest coverage ratio and operate in industries with a lower market-to-book ratio are significantly more likely to survive following a large SEO.

[Insert Table 11 here]

5. Conclusion

We examine the intra-industry effects of large SEOs on the stock price performance, operating performance, and survivability of rival firms. We find that rivals' stock prices respond positively to SEO issues and filings, and negatively to SEO withdrawals. We also find that the positive short-term effects of SEOs are stronger for primary offerings than for secondary offerings, and that the long-term stock price and operating performances of rival firms improve after an SEO. For example, over the 36-month post-SEO period, we report CARs of 11.42%, BHARs of 8.62%, and calendar time portfolio alphas (based on a four-factor model) of 0.30%, all significant at the 1% level. We also test the robustness of our long-term results by examining the likelihood of survival of rivals in the three years following an SEO. We find that survival is more likely to occur after a primary SEO and for older and less levered firms with a higher interest coverage ratio. It is also more likely for firms that operate in industries with a lower market-to-book ratio and a lower Herfindahl-Hirschman index (lower concentration).

Overall, our results are consistent with the information effects hypothesis. SEOs do not seem to be a threatening event for competitors. Rather, they send a positive industry-wide signal of growth opportunities and dynamism, which has positive short-term and long-term consequences for rival firms.

References

Aggarwal, R., Bhagat, S., & Rangan, S. (2009). The impact of fundamentals on IPO valuation. *Financial Management*, *38*(2), 253–284.

Akhigbe, A., Borde, S. F., & Whyte, A. M. (2003). Does an industry effect exist for initial public offerings? *Financial Review*, *38*(4), 531–551. https://doi.org/10.1111/1540-6288.00059

Akhigbe, A., Johnston, J., & Madura, J. (2006). Long-term industry performance following IPOs. *Quarterly Review of Economics and Finance*, *46*(4), 638–651. https://doi.org/10.1016/j.qref.2005.01.004

Aktas, N., Andries, K., Croci, E., & Ozdakak, A. (2019). Stock market development and the financing role of IPOs in acquisitions. *Journal of Banking and Finance*, *98*, 25–38. https://doi.org/10.1016/j.jbankfin.2018.10.015

Alexander, J. C. (1993). The lawsuit avoidance theory of why initial public offerings are underpriced. *UCLA Law Review*, *41*(1), 17–73.

Allen, F., & Faulhaber, G. R. (1989). Signalling by underpricing in the IPO market. *Journal of Financial Economics*, *23*(2), 303–323. https://doi.org/10.1016/0304-405X(89)90060-3

Altinkiliç, O., & Hansen, R. S. (2000). Are there economies of scale in underwriting fees? Evidence of rising external financing costs. *Review of Financial Studies*, *13*(1), 191–218. https://doi.org/10.1093/rfs/13.1.191

Arena, M., & Ferris, S. (2017). A survey of litigation in corporate finance. *Managerial Finance*, *43*(1), 4–18. https://doi.org/10.1108/MF-07-2016-0199

Arena, M., & Julio, B. (2015). The effects of securities class action litigation on corporate liquidity and investment policy. *Journal of Financial and Quantitative Analysis*, *50*(1–2), 251–275. https://doi.org/10.1017/S0022109015000010

Aslan, H., & Kumar, P. (2010). Lemons or cherries? Growth opportunities and market temptations in going public and private. *Journal of Financial and Quantitative Analysis*, *46*(2), 489–526. https://doi.org/10.1017/S0022109010000761

Asquith, P., & Mullins, D. W. (1986). Equity issues and offering dilution. *Journal of Financial Economics*, *15*(1–2), 61–89. https://doi.org/10.1016/0304-405X(86)90050-4

Autore, D. M., Bray, D. E., & Peterson, D. R. (2009). Intended use of proceeds and the long-run performance of seasoned equity issuers. *Journal of Corporate Finance*, *15*(3), 358–367. https://doi.org/10.1016/J.JCORPFIN.2008.12.003

Baker, M. P., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, *57*(1), 1–32. https://doi.org/10.1111/1540-6261.00414

Baker, M., & Wurgler, J. (2000). The equity share in new issues and aggregate stock returns. *The Journal of Finance*, *55*(5), 2219–2257. https://doi.org/10.1111/0022-1082.00285

Ball, E., Chiu, H. H., & Smith, R. (2011). Can VCs time the market? An analysis of exit choice for venture-backed firms. *Review of Financial Studies*, *24*(9), 3105–3138. https://doi.org/10.1093/rfs/hhr042

Banerjee, S., Dai, L., & Shrestha, K. (2011). Cross-country IPOs: what explains differences in underpricing? *Journal of Corporate Finance*, *17*(5), 1289–1305. https://doi.org/10.1016/j.jcorpfin.2011.06.004

Beatty, P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, *15*, 213–232.

Bessler, W., & Thies, S. (2006). Initial public offerings, subsequent seasoned equity offerings, and long-run performance: evidence from IPOs in Germany. *Journal of Entrepreneurial Finance*, *11*(3), 1–37.

Bradley, D., & Yuan, X. (2013). Information spillovers around seasoned equity offerings. *Journal of Corporate Finance*, *21*(1), 106–118. https://doi.org/10.1016/j.jcorpfin.2013.01.006

Brau, James C; Li, M., & Shi, J. (2007). Do secondary shares in the IPO process have a negative effect on aftermarket performance? *Journal of Banking and Finance*, *31*(9), 2612–2631. https://doi.org/10.1016/j.jbankfin.2006.09.016

Brau, J. C., & Fawcett, S. E. (2006). Initial public offerings: an analysis of theory and practice. *The Journal of Finance*, *61*(1), 399–436.

Braun, M., & Larrain, B. (2009). Do IPOs affect the prices of other stocks? Evidence from emerging markets. *The Review of Financial Studies*, *22*(4), 1505–1544.

Brav, A., & Gompers, P. A. (1997). Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and nonventure capital-backed companies. *The Journal of Finance*, *52*(5), 1791–1821.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, *LII*(1), 57–82.

Carter, R. B., Dark, F. H., & Singh, A. K. (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. *The Journal of Finance*, *53*(1), 285–311.

Celikyurt, U., Sevilir, M., & Shivdasani, A. (2010). Going public to acquire? The acquisition motive in IPOs. *Journal of Financial Economics*, *96*(3), 345–363. https://doi.org/10.1016/j.jfineco.2010.03.003

Chemmanur, T. J., He, S., & Hu, G. (2009). The role of institutional investors in seasoned equity offerings. *Journal of Financial Economics*, *94*(3), 384–411. https://doi.org/10.1016/j.jfineco.2008.12.011

Chemmanur, T. J., He, S., & Nandy, D. K. (2010). The going-public decision and the product market. *Review of Financial Studies*, *23*(5), 1855–1908.

Chemmanur, T. J., Hu, G., & Huang, J. (2010). The role of institutional investors in initial public

offerings. *The Review of Financial Studies*, *23*(12), 4496–4540. https://doi.org/10.1093/rfs/hhq109

Chemmanur, T., & Yan, A. (2017). Product market advertising, heterogeneous beliefs, and the long-run performance of initial public offerings. *Journal of Corporate Finance*, *46*, 1–24. https://doi.org/10.1016/j.jcorpfin.2017.06.010

Cliff, M. T., & Denis, D. J. (2004). Do initial public offering firms purchase analyst coverage with underpricing? *Journal of Finance*, *59*(6), 2871–2901. https://doi.org/10.1111/j.1540-6261.2004.00719.x

Corwin, S. A., Harris, J. H., & Lipson, M. L. (2004). The development of secondary market liquidity for NYSE-listed IPOs. *The Journal of Finance*, *59*(5), 2339–2373.

Cotei, C., & Farhat, J. (2013). Informational externalities of initial public offerings: does venture capital backing matter? *Journal of Economics and Finance*, *37*(1), 80–99. https://doi.org/10.1007/s12197-010-9167-2

Dong, M., Michel, J. S., & Pandes, J. A. (2011). Underwriter quality and long-run IPO performance. *Financial Management*, *40*(1), 219–251. https://doi.org/10.1111/j.1755-053X.2010.01140.x

Drake, P. D., & Vetsuypens, M. R. (1993). IPO Underpricing and insurance against legal liability. *Financial Management*, *22*(1), 64. https://doi.org/10.2307/3665966

Ellul, A., & Pagano, M. (2006). IPO underpricing and after-market liquidity. *Review of Financial Studies*, *19*(2), 381–421. https://doi.org/10.1093/rfs/hhj018

Engelen, P. J., Heugens, P., van Essen, M., Turturea, R., & Bailey, N. (2020). The impact of stakeholders' temporal orientaton on short- and long-term IPO outcomes: A meta-analysis. *Long Range Planning*, *53*(2), 101853. https://doi.org/10.1016/j.lrp.2018.10.003

Fama, F., & French, R. (1993). Common risk factors in the returns stocks and bonds. *Journal of Financial Economics*, *33*, 3–56.

Field, L. C., & Lowry, M. (2009). Institutional versus individual investment in IPOs: the importance of firm fundamentals. *Journal of Financial and Quantitative Analysis*, *44*(3), 489–516.

Gounopoulos, D., & Pham, H. (2018). Specialist CEOs and IPO survival. *Journal of Corporate Finance*, *48*, 217–243. https://doi.org/10.1016/j.jcorpfin.2017.10.012

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics*, *60*(2–3), 137–243.

Grinblatt, M., & Hwang, C. Y. (1989). Signalling and the pricing of new issues. *The Journal of Finance*, *44*(2), 393–420. https://www.jstor.org/stable/2328596

Hanley, K. W., & Hoberg, G. (2012). Litigation risk, strategic disclosure and the underpricing of initial public offerings. *Journal of Financial Economics*, *103*(2), 235–254.

https://doi.org/10.1016/j.jfineco.2011.09.006

Hao, G. Q. (2011). Securities litigation, withdrawal risk and initial public offerings. *Journal of Corporate Finance*, *17*(3), 438–456. https://doi.org/10.1016/j.jcorpfin.2010.12.005

Hao, Q. (2007). Laddering in initial public offerings. *Journal of Financial Economics*, *85*(1), 102–122. https://doi.org/10.1016/j.jfineco.2006.05.008

Hensler, D. A. (1995). Litigation costs and the underpricing of initial public offerings. *Managerial and Decision Economics*, *16*(2), 111–128. https://doi.org/10.1002/mde.4090160203

Hensler, D. A., Rutherford, R. C., & Springer, T. M. (1997). The survival of initial public offerings in the aftermarket. *The Journal of Financial Research*, *20*(1), 93–110.

Houston, J., James, C., & Karceski, J. (2006). What a difference a month makes: stock analyst valuations following initial public offerings. *Journal of Financial and Quantitative Analysis*, *41*(1), 111–137. https://doi.org/10.1017/S0022109000002441

Hovakimian, A., & Hutton, I. (2010). Merger-motivated IPOs. *Financial Management*, *39*(4), 1547–1573.

Hsieh, J., Lyandres, E., & Zhdanov, A. (2011). A theory of merger-driven IPOs. *The Journal of Financial and Quantitative Analysis*, *46*(5), 1367–1405.

Hsu, H.-C., Reed, A. V, & Rocholl, J. (2010). The new game in town: competitive effects of IPOs. *The Journal of Finance*, *65*(2), 495–528.

Hughes, P. J., & Thakor, A. V. (1992). Litigation risk, intermediation, and the underpricing of initial public offerings. *The Review of Financial Studies*, *5*(4), 709–742.

Ibbotson, R. G. (1975). Price performance of common stock new issues. *Journal of Financial Economics*, *2*(3), 235–272. https://doi.org/10.1016/0304-405X(75)90015-X

Jain, B. A., Jayaraman, N., & Kini, O. (2008). The path-to-profitability of internet IPO firms. *Journal of Business Venturing*, *23*(2), 165–194. https://doi.org/10.1016/j.jbusvent.2007.02.004

Jain, B. A., & Kini, O. (1999). The life cycle of initial public offering firms. *Journal of Business Finance and Accounting*, *26*(9–10), 1281–1307.

Jain, B. A., & Kini, O. (2000). Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance and Accounting*, *27*(9), 1133–1183.

Jain, B. A., & Kini, O. (2008). The impact of strategic investment choices on post-issue operating performance and survival of US IPO firms. *Journal of Business Finance and Accounting*, *35*(3–4), 459–490. https://doi.org/10.1111/j.1468-5957.2007.02072.x

Karpoff, J. M., Lee, D. S., & Martin, G. S. (2008). The cost to firms of cooking the books. *Journal of Financial and Quantitative Analysis*, *43*(3), 581–611. https://doi.org/10.1017/S0022109000004221

Kim, M., & Ritter, J. R. (1999). Valuing IPOs. *Journal of Financial Economics*, *53*(3), 409–437. https://doi.org/10.1016/S0304-405X(99)00027-6

Kim, W., & Weisbach, M. S. (2008). Motivations for public equity offers: an international perspective. *Journal of Financial Economics*, *87*(2), 281–307. https://doi.org/10.1016/j.jfineco.2006.09.010

Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, *46*(5), 1295–1333. https://doi.org/10.1017/S0022109011000251

Lee, S.-H., Bach, S. B., & Baik, Y. (2011). The impact of IPOs on the values of directly competing incumbents. *Strategic Entrepreneurship Journal*, *5*(2), 158–177. https://doi.org/10.1002/sej

Leland, H. E., & Pyle, D. H. (1977). Informational Asymmetries , Financial Structure , and Financial Intermediation. *The Journal of Finance*, *32*(2), 371–387.

Lerner, J. (1994). Venture capitalists and the decision to go public. *Journal of Financial Economics*, *35*(3), 293–316.

Lin, H. L., Pukthuanthong, K., & Walker, T. J. (2013). An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance*, *19*(1), 56–77. https://doi.org/10.1016/j.jcorpfin.2012.10.003

Loughran, T. (1993). NYSE vs NASDAQ returns: market microstructure or the poor performance of initial public offerings? *Journal of Financial Economics*, *33*(2), 241–260.

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance*, *50*, 23–51. https://doi.org/10.1016/j.jcorp

Loughran, T., & Ritter, J. R. (1997). The operating performance of firms conducting seasoned equity offerings. *The Journal of Finance*, *52*(5), 1823–1850. https://doi.org/10.1111/j.1540-6261.1997.tb02743.x

Loughran, T., & Ritter, J. R. (2004). Why has IPO underpricing changed over time? *Financial Management*, *33*(3), 5–37.

Lowry, M. (2003). Why does IPO volume fluctuate so much? *Journal of Financial Economics*, *67*(November 2001), 3–40.

Lowry, M., Officer, M. S., & Schwert, W. G. (2010). The variability of IPO initial returns. *The Journal of Finance*, *65*(2), 425–465.

Lowry, M., & Shu, S. (2002). Litigation risk and IPO underpricing. *Journal of Financial Economics*, *65*(3), 309–335. https://doi.org/10.1016/S0304-405X(02)00144-7

Maddala, G. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*.

Masulis, R. W., & Korwar, A. N. (1986). Seasoned equity offerings: an empirical investigation. *Journal of Financial Economics*, *15*(1–2), 91–118.

https://doi.org/http://dx.doi.org/10.1016/0304-405X(86)90051-6

Matanova, N., Steigner, T., Yi, B., & Zheng, Q. (2019). Going concern opinions and IPO pricing accuracy. *Review of Quantitative Finance and Accounting*, *53*(1), 195–238. https://doi.org/10.1007/s11156-018-0747-0

McGilvery, A., Faff, R., & Pathan, S. (2012). Competitive valuation effects of Australian IPOs. *International Review of Financial Analysis*, *24*, 74–83. https://doi.org/10.1016/j.irfa.2012.08.002

Michaely, R., & Shaw, W. H. (1994). The pricing of initial public offerings: tests of adverse-selection and signaling theories. *Review of Financial Studies*, *7*(2), 279–319.

Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, *90*(2), 127–151. https://doi.org/10.1016/j.jfineco.2007.11.008

Ofek, E., & Richardson, M. (2003). Dotcom mania : the rise and fall of internet stock prices. *The Journal of Finance*, *58*(3), 1113–1137.

Pommet, S. (2017). The impact of the quality of VC financing and monitoring on the survival of IPO firms. *Managerial Finance*, *43*(4), 440–451. https://doi.org/10.1108/MF-06-2016-0178

Poulsen, A. B., & Stegemoller, M. (2008). Moving from private to public ownership: selling out to public firms versus initial public offerings. *Financial Management*, *37*(1), 81–101. https://doi.org/10.1111/j.1755-053X.2008.00005.x

Purnanandam, A. K., & Swaminathan, B. (2004). Are IPOs really underpriced? *Review of Financial Studies*, *17*(3), 811–848. https://doi.org/10.1093/rfs/hhg055

Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance*, *46*(1), 3–27.

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing and allocations. *The Journal of Finance*, *57*(4), 1795–1828.

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics*, *15*(1–2), 187–212. https://doi.org/10.1016/0304-405X(86)90054-1

Santos, F. (2017). IPO market timing with uncertain aftermarket retail demand. *Journal of Corporate Finance*, *42*, 247–266. https://doi.org/10.1016/j.jcorpfin.2016.11.013

Saunders, A., & Steffen, S. (2011). The costs of being private: evidence from the loan market. *The Review of Financial Studies*, *24*(12), 4091–4122.

Schenone, C. (2010). Lending relationships and information rents: do banks exploit their information advantages? *The Review of Financial Studies*, *23*(3), 1149–1199.

Schultz, P., & Zaman, M. (2001). Do the individuals closest to internet firms believe they are overvalued? *Journal of Financial Economics*, *59*(3), 347–381.

Signori, A. (2018). Zero-revenue IPOs. *International Review of Financial Analysis*, *57*, 106–121.

https://doi.org/10.1016/j.irfa.2018.03.003

Slovin, M. B., Sushka, M. E., & Polonchek, J. A. (1992). Informational externalities of seasoned equity issues: differences between banks and industrial firms. *Journal of Financial Economics*, *32*(1), 87–101. https://doi.org/10.1016/0304-405X(92)90026-T

Spiegel, M., & Tookes, H. (2007). Dynamic competition , innovation and strategic financing. *Working Paper, Yale University*.

Spiess, D. K., & Affleck-Graves, J. (1995). Underperformance in long-run stock returns following seasoned equity offerings. *Journal of Financial Economics*, *38*(3), 243–267. https://doi.org/10.1016/0304-405X(94)00817-K

Szewczyk, S. H. (1992). The intra-industry transfer of information inferred from announcements of corporate security offerings. *The Journal of Finance*, *47*(5), 1935–1945.

Tiniç, S. M. (1988). Anatomy of initial public offerings of common Stock. *The Journal of Finance*, *43*(4), 789–822.

Walker, M. D., & Yost, K. (2008). Seasoned equity offerings: what firms say, do, and how the market reacts. *Journal of Corporate Finance*, *14*, 376–386. https://doi.org/10.1016/j.jcorp

Walker, T., Turtle, H. J., Pukthuanthong, K., & Thiengtham, D. (2015). Legal opportunism, litigation risk, and IPO underpricing. *Journal of Business Research*, *68*(2), 326–340. https://doi.org/10.1016/j.jbusres.2014.06.025

Welch, I. (1989). Seasoned offerings, imitation costs, and the underpricing of initial public offerings. *The Journal of Finance*, *44*(2), 421–449.

Yi, J. (2001). Pre-offering earnings and the long-run performance of IPOs. *International Review of Financial Analysis*, *10*, 53–67.

Zhu, Y. (2009). The relation between IPO underpricing and litigation risk revisited: changes between 1990 and 2002. *Financial Management*, *38*(2), 323–355. https://doi.org/10.1111/j.1755-053X.2009.01038.x

Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies*, *62*(3), 425–448.

Figure 1. ***Abnormal returns of industry rivals around filed, completed and withdrawn SEOs***

We consider 259 completed SEOs for which we have filing dates and 180 withdrawn SEOs, collected from the SDC New Issues Database for the period going from 1980 to 2017. Sample completed SEOs are those for which there is no larger issue in the same industry in the surrounding four years. Industry rivals share the same two-digit SIC industry codes as the completed or withdrawn SEO firms. The timeline (in days) around an SEO event is shown on the x-axis, where date zero depicts the date of the filing/completion/withdrawal of the SEO. We derive the cumulative abnormal returns (CARs) on the y-axis using the equally-weighted market model abnormal returns.

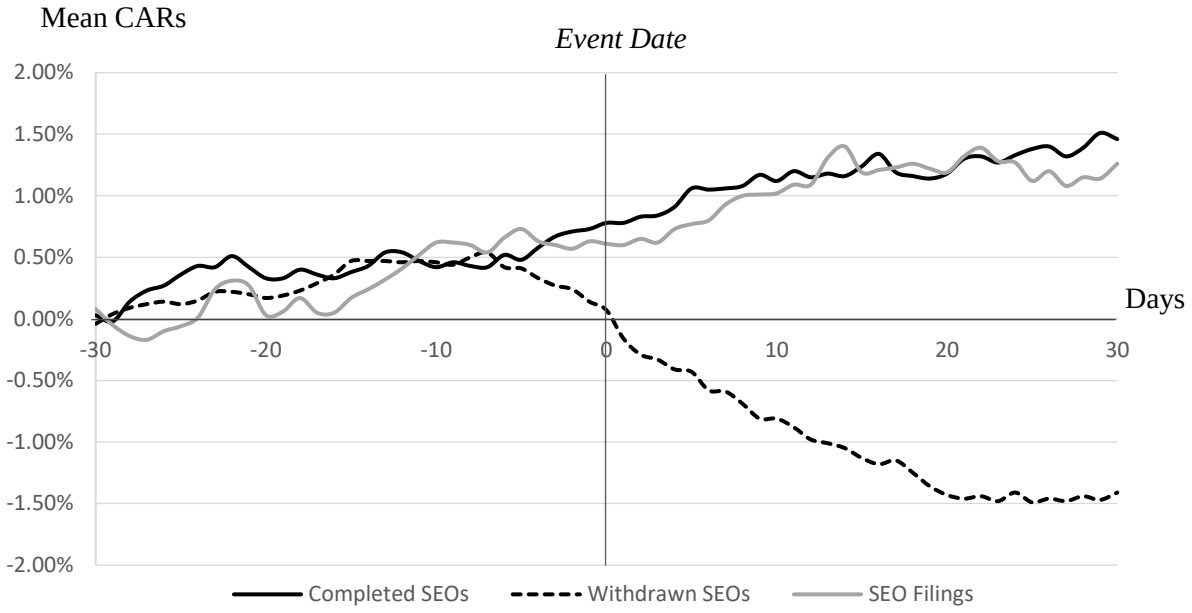

Figure 2. *Abnormal returns of industry rivals around primary versus secondary SEOs*

We consider 259 completed SEOs collected from the SDC New Issues Database for the period going from 1980 to 2017. Primary SEOs are those that comprise a majority of primary shares (>50%) while secondary SEOs are those that comprise a majority of secondary shares (>50%). Sample completed SEOs are those for which there is no larger issue in the same industry in the surrounding four years. Industry rivals share the same two-digit SIC industry codes as the completed or withdrawn SEO firms. The timeline (in days) around an SEO event is shown on the x-axis, where date zero depicts the date of the filing/completion/withdrawal of the SEO. We derive the cumulative abnormal returns (CARs) on the y-axis using the equally-weighted market model abnormal returns.

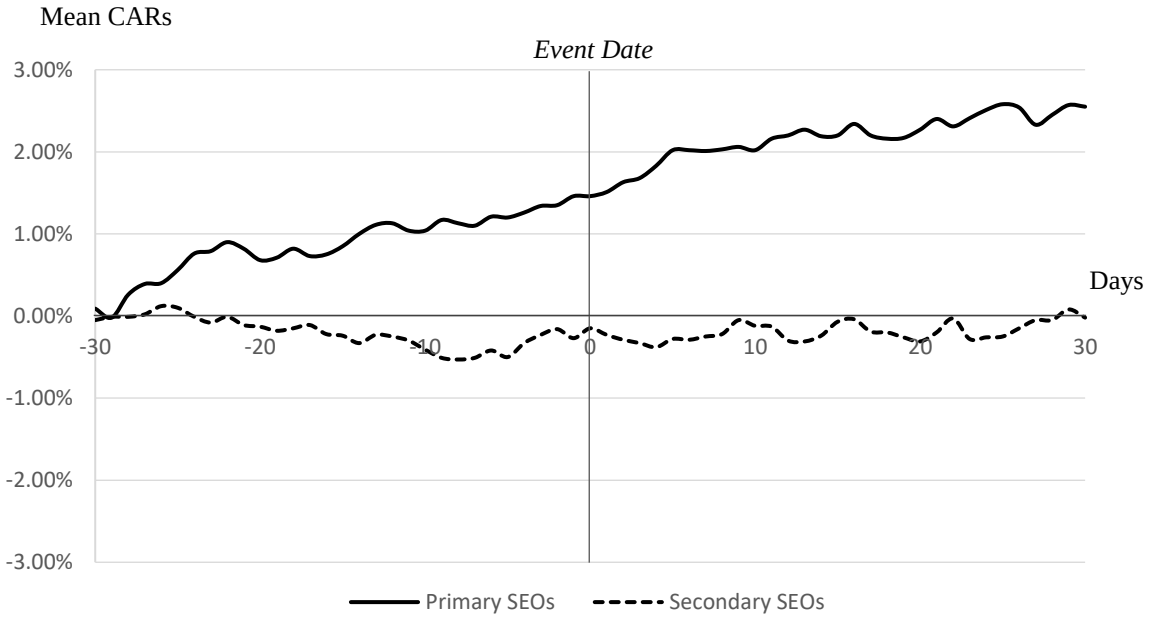

Figure 3. *Long-run abnormal returns of industry rivals after an SEO*

We consider 259 completed SEOs collected from the SDC New Issues Database for the period going from 1980 to 2017. Primary SEOs are those that comprise a majority of primary shares (>50%) while secondary SEOs are those that comprise a majority of secondary shares (>50%). Sample completed SEOs are those for which there is no larger issue in the same industry in the surrounding four years. Industry rivals share the same two-digit SIC industry codes as the completed or withdrawn SEO firms. The timeline (in months) after an SEO event is shown on the x-axis, where date zero depicts the date of the SEO. We derive the cumulative abnormal returns (CARs) on the y-axis using the value-weighted market-adjusted returns.

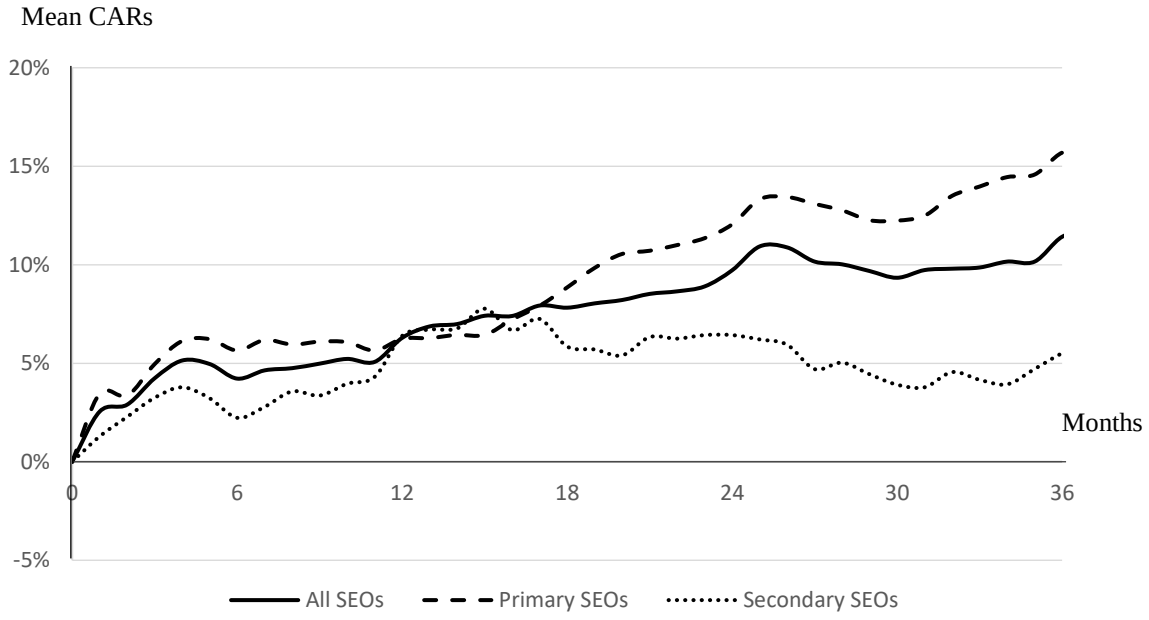

Table 1. *Variable definitions*

Variable	Definition
SEO firm characteristics	
SEO	Indicator variable that takes the value 1 if an SEO occurred in the rival firm's industry in the last 3 years, and 0 otherwise.
Primary SEO	SEO of mainly primary shares (>50% of entirely new shares). Indicator variable that takes the value 1 if a primary SEO occurred in the rival firm's industry in the last 3 years, and 0 otherwise.
Secondary SEO	SEO of mainly secondary shares (>50% of already existing shares). Indicator variable that takes the value 1 if a secondary SEO occurred in the rival firm's industry in the last 3 years, and 0 otherwise.
Investment SEO	SEO made for investment purposes (general corporate purposes, future acquisitions and capital expenditures). Indicator variable that takes the value 1 if an investment SEO occurred in the rival firm's industry in the last 3 years, and 0 otherwise.
Debt SEO	SEO made for debt repayment purposes. Indicator variable that takes the value 1 if a debt SEO occurred in the rival firm's industry in the last 3 years, and 0 otherwise.
Other Uses SEO	SEO made for other purposes (secondary uses and stock repurchases). Indicator variable that takes the value 1 if an SEO made for reasons other than investment and debt occurred in the rival firm's industry, and 0 otherwise.
Rival firm characteristics	
Age	Logarithm of the difference between a given data year and the first year of price data recorded by Compustat for the firm.
Assets Growth	Annual percentage change in the book value of total assets for a given data year.
Capex Growth	Annual percentage change in the capital expenditures for a given data year.
Industry HH Index	Herfindahl-Hirschman Index, measure of industry concentration, calculated by squaring the market share of each firm competing in a given industry before summing the resulting numbers.
Industry MB Ratio	Market-to-book ratio of a given industry in a given data year.
Interest Coverage Ratio	Ratio of the earnings before interest and taxes (EBIT) to the total interest expense for a given data year.
Leverage Ratio	Ratio of the total liabilities to the book value of assets for a given data year.
Regulation	Indicator variable that takes the value 1 if the firm operates in a regulated industry, including communications and transportation, and 0 otherwise.
ROA	Ratio of the net income to the book value of total assets for a given data year.
Sales Growth	Annual percentage change in the book value of revenues for a given data year.
SEO size × Industry HH Index	Variable interacting the SEO proceeds with the industry Herfindahl-Hirschman Index.
Size	Logarithm of the book value of total assets for a given data year.
Technology	Indicator variable that takes the value 1 if the firm operates in the technology industry, and 0 otherwise.

Table 2. *Distribution of SEOs*

In this table, we report the number of SEOs, primary SEOs and secondary SEOs included in our sample by data year. Sample SEOs are those whose issue was the largest in their industry in the surrounding period of four years. 51 two-digit industry codes (SIC) are represented.

Year	All SEOs	Primary SEOs	Secondary SEOs
1980	3	2	1
1981	3	3	0
1982	1	0	1
1983	12	8	4
1984	0	0	0
1985	4	3	1
1986	5	3	2
1987	6	3	3
1988	2	1	1
1989	2	2	0
1990	2	1	1
1991	10	6	4
1992	5	3	2
1993	8	5	3
1994	3	2	1
1995	5	2	3
1996	6	3	3
1997	7	3	4
1998	3	1	2
1999	7	6	1
2000	8	3	5
2001	6	4	2
2002	4	2	2
2003	9	4	5
2004	11	4	7
2005	9	3	6
2006	11	4	7
2007	7	4	3
2008	6	5	1
2009	10	9	1
2010	8	4	4
2011	8	2	6
2012	3	0	3
2013	23	6	17
2014	9	5	4
2015	8	1	7
2016	8	5	3
2017	17	5	12
Total	259	127	132

Table 3. *Descriptive statistics*

In this table, we report descriptive statistics for our sample SEO firms and their corresponding industry rivals. Sample SEO firms are those whose issue was the largest in their industry in the surrounding period of four years. Industry rivals share the same 51 two-digit SIC industry codes as sample SEO firms. We collect *Assets*, *Sales* and *Market Capitalization* from Compustat. We consider values at the end of SEO years and average them. *Primary*, *Secondary, Investment, Debt* and *Other Uses* are categories of SEOs based on data from SDC. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Panel A: Samples comparison	SEO Firms (n = 259)		Industry Rivals (n = 9,368)		Wilcoxon Test Significance	
	Mean	*Median*	*Mean*	*Median*	*Mean*	*Median*
Assets (USD millions)	9,089.75	4,663.36	1,272.98	87.40	***	***
Sales (USD millions)	7,842.25	4,645.97	1,090.28	80.28	***	***
Market Capitalization (USD millions)	11,173.13	2,259.22	1,962.03	126.37	***	***
Age (trading years)	29	23	16	12	***	***
Panel B: Categories of SEOs	*Number*	*Percentage*				
Type of shares offered:						
Primary	127	49%				
Secondary	132	51%				
Use of proceeds:						
Investment	96	37%				
Debt	74	29%				
Other Uses	89	34%				

Table 4. *Short-term stock price reaction of industry rivals*

In this table, we report the market model cumulative abnormal returns (CARs) of sample industry rivals around SEO filing dates, issue dates and withdrawal dates. We consider 259 completed SEO events for which there is no larger issue in the same industry in the surrounding four years, and 180 withdrawn SEO events. Industry rivals share the same two-digit SIC industry codes as the completed SEO firms. We rely on a 255 days estimation period for daily returns, ending 42 days prior to the SEO event. We report the *p*-value of each CAR based on the Patell Z test. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	SEO Filing Dates				SEO Issue Dates				SEO Withdrawal Dates			
Event Windows (Days)	Mean CARs (Equally-Weighted)	*p*-value	Mean CARs (Value-Weighted)	*p*-value	Mean CARs (Equally-Weighted)	*p*-value	Mean CARs (Value-Weighted)	*p*-value	Mean CARs (Equally-Weighted)	*p*-value	Mean CARs (Value-Weighted)	*p*-value
(-1, +1)	0.03%**	0.0454	0.20%*	0.0664	0.06%	0.1326	0.18%*	0.0848	-0.40%***	<.0001	-0.71%***	<.0001
(-1, +10)	0.44%**	0.0112	0.32%***	<.0001	0.40%**	0.0126	0.38%***	0.0036	-1.06%***	<.0001	-3.20%***	<.0001
(-5, +5)	0.11%***	<.0001	0.69%**	0.0444	0.52%***	0.0010	0.79%***	<.0001	-0.85%***	<.0001	-2.25%***	<.0001
(-10, +1)	0.07%***	0.0016	0.78%***	<.0001	0.30%**	0.0160	0.98%***	<.0001	-0.62%***	<.0001	-1.26%***	<.0001
(-10, +10)	0.48%***	0.0002	1.08%***	<.0001	0.63%***	<.0001	1.18%***	<.0001	-1.28%***	<.0001	-3.75%***	<.0001

Table 5. *Short-term stock price reaction of industry rivals: Primary versus secondary offerings*

In this table, we report the market model cumulative abnormal returns (CARs) of our sample industry rivals around SEO issue dates. Our 259 completed SEO events are those for which there is no larger issue in the same industry in the surrounding four years. Primary SEOs are those that comprise a majority of primary shares (>50%) while secondary SEOs are those that comprise a majority of secondary shares (>50%). Industry rivals share the same two-digit SIC industry codes as the completed SEO firms. We rely on a 255 days estimation period for daily returns, ending 42 days prior to the SEO event. We report the *p*-value of each CAR based on the Patell Z test statistic. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Primary SEOs (*n=127*)				Secondary SEOs (*n=132*)			
Event Windows (Days)	Mean CARs (Equally-Weighted)	*p*-value	Mean CARs (Value-Weighted)	*p*-value	Mean CARs (Equally-Weighted)	*p*-value	Mean CARs (Value-Weighted)	*p*-value
(-1, +1)	0.16%	0.2555	0.25%	0.3586	-0.07%	0.1718	0.08%**	0.0451
(-1, +10)	0.66%***	0.0003	0.32%	0.1039	0.04%	0.2896	0.46%***	0.0038
(-5, +5)	0.80%***	0.0002	0.95%***	<.0001	0.14%	0.2898	0.57%***	<.0001
(-10, +1)	0.46%*	0.0683	1.44%***	<.0001	0.08%*	0.0596	0.35%***	<.0001
(-10, +10)	0.96%***	<.0001	1.51%***	<.0001	0.19%	0.1302	0.73%***	<.0001

Table 6. *Cross-sectional analysis of industry rivals' short-term CARs after an SEO*

In this table, we report the cross-sectional analysis of rival firms' value-weighted market model cumulative abnormal return (CAR) for the (-5, +5) window around the SEO issue dates. Industry rivals share the same two-digit SIC industry codes as sample SEO firms. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Model 1 Competitive effects		Model 2 Information effects		Model 3 Competitive and information effects	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Size			-0.004***	0.000	-0.004***	0.000
Regulation			0.000	0.999	0.001	0.989
Primary SEO			0.007***	0.010	0.018***	0.000
Industry HH Index	0.063	0.280			0.054	0.351
SEO size × Industry HH Index	0.000	0.641			0.000	0.662
Investment SEO	0.010***	0.008			0.022***	0.000
Debt SEO	0.022***	0.000			0.037***	0.000
Technology	-0.047	0.165			-0.042	0.213
Age	-0.001	0.661	0.000	0.857	0.001	0.566
Leverage Ratio	-0.013**	0.036	-0.008	0.216	-0.005	0.435
Interest Coverage Ratio	0.000*	0.061	0.000	0.411	0.000	0.763
Industry MB Ratio	0.002	0.254	0.003*	0.081	0.003	0.104
Industry Fixed Effects	Yes		Yes		Yes	
Year Fixed Effects	Yes		Yes		Yes	
Intercept	0.119	0.240	0.105	0.980	0.125	0.216
N	14,745		15,484		14,745	
Adjusted R^2	0.0711		0.0645		0.0736	

Table 7. *Long-term stock price performance of industry rivals after an SEO*

In this table, we report the value-weighted market-adjusted cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs) of rival firms (panel A), as well as their calendar time portfolio alphas (panel B). We focus on the 12-months, 24-months and 36-months periods following an industry SEO. For the calendar time portfolio approach, we implement the Fama-French-Carhart 4-factor model. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively, based on the Patell Z test statistic.

	All SEOs			Primary SEOs			Secondary SEOs		
Post-SEO period	12 months	24 months	36 months	12 months	24 months	36 months	12 months	24 months	36 months
Panel A : Event Time Approach									
CARs	6.28%***	9.71%***	11.42%***	6.23%***	12.07%***	15.69%***	6.35%***	6.45%***	5.51%***
BHARs	4.50%***	7.94%***	8.61%***	4.26%***	10.03%***	14.69%***	4.84%***	5.05%***	3.18%***
Panel B : Calendar Time Portfolio Approach									
Alpha	0.0043***	0.0035***	0.0030***	0.0018**	0.0033***	0.0027***	0.0049***	0.0040***	0.0028**
MKT	1.0487***	0.9950***	0.9793***	1.0316***	0.9965***	0.9707***	1.1212***	1.0319***	0.9916***
SMB	0.8493***	0.9378***	0.9092***	0.8648***	0.9691***	0.9541***	0.7878***	0.7745***	0.7677***
HML	0.2194***	0.1468***	0.0809***	0.2123***	0.1267***	0.0298***	0.3826***	0.2784***	0.1963***
UMD	-0.2911***	-0.2394***	-0.2135***	-0.2134***	-0.2128***	-0.1859***	-0.3609***	-0.3287***	-0.2820***
Adjusted R^2	0.8284	0.8952	0.8965	0.7490	0.8366	0.8812	0.7208	0.7913	0.8256

Table 8. *Cross-sectional analysis of industry rivals' long-term CARs after an SEO*

In this table, we report the cross-sectional analysis of rival firms' value-weighted market-adjusted cumulative abnormal returns (CARs) over the 36-months period following an SEO. Industry rivals share the same two-digit SIC industry codes as sample SEO firms. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Model 1 Competitive effects		Model 2 Information effects		Model 3 Competitive and information effects	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Size			-0.050***	0.000	-0.046***	0.000
Regulation			0.611	0.500	0.618	0.495
Primary SEO			0.099***	0.005	0.012**	0.024
Industry HH Index	-0.960	0.169			-1.027	0.141
SEO size × Industry HH Index	0.000	0.866			0.000	0.874
Investment SEO	0.102**	0.025			0.091	0.118
Debt SEO	0.236***	0.000			0.222**	0.042
Technology	0.476	0.228			0.532	0.177
Age	0.069***	0.000	0.092***	0.000	0.088***	0.000
Leverage Ratio	0.149**	0.048	0.239***	0.002	0.252***	0.001
Interest Coverage Ratio	-0.014***	0.000	-0.009***	0.000	-0.010***	0.000
Industry MB Ratio	-0.062***	0.001	-0.045**	0.012	-0.062***	0.001
Industry Fixed Effects	Yes		Yes			
Year Fixed Effects	Yes		Yes			
Intercept	-1.092	0.246	-1.431	0.114	-1.041	0.268
N	14,307		14,887		14,307	
Adjusted R^2	0.0841		0.0870		0.0856	

Table 9. *Operating performance: Univariate statistics*

In this table, we report changes in the operating performance measures of rival firms from one year before an industry SEO to up to three years after that SEO. For each measure, we compute averages before and after an issue for each firm, then we report the mean value across all firms. We use the Wilcoxon signed rank test to assess the statistical significance of the value differences. We present results for rivals following all SEOs, primary SEOs alone, and secondary SEOs alone. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Performance Measures	All Rivals - All SEOs			All Rivals - Primary SEOs			All Rivals - Secondary SEOs		
	(-1, 0)	**(0, +1)**		**(-1, 0)**	**(0, +1)**		**(-1, 0)**	**(0, +1)**	
Assets Growth	11.38%	11.96%	0.58%*	11.14%	11.89%	0.75%*	11.56%	12.06%	0.50%***
Sales Growth	12.05%	14.36%	2.31%***	10.59%	14.09%	3.50%*	13.09%	14.71%	1.62%***
Capex Growth	27.17%	30.87%	3.70%*	24.39%	30.62%	6.23%*	29.13%	31.20%	2.07%**
Return on Assets	-1.61%	-1.16%	0.45%*	-1.67%	-0.83%	0.84%***	-1.57%	-1.60%	-0.03%**
Leverage Ratio	46.19%	46.03%	-0.16%	48.90%	46.61%	-2.29%**	44.29%	45.27%	0.98%
Interest Coverage Ratio	3.55	3.97	0.42**	3.37	4.10	0.73***	3.67	3.79	0.12
	(-1, 0)	**(0, +2)**		**(-1, 0)**	**(0, +2)**		**(-1, 0)**	**(0, +2)**	
Assets Growth	11.38%	12.09%	0.71%***	11.14%	12.50%	1.36%**	11.56%	11.74%	0.18%***
Sales Growth	12.05%	13.94%	1.89%***	10.59%	13.56%	2.97%***	13.09%	14.34%	1.25%***
Capex Growth	27.17%	30.80%	3.63%***	24.39%	29.24%	4.85%**	29.13%	32.24%	3.11%***
Return on Assets	-1.61%	-2.02%	-0.41%***	-1.67%	-1.72%	-0.05%	-1.57%	-2.36%	-0.79%***
Leverage Ratio	46.19%	45.62%	-0.58%	48.90%	44.86%	-4.04%***	44.29%	46.17%	1.88%**
Interest Coverage Ratio	3.55	3.57	0.02	3.37	3.78	0.41**	3.67	3.36	-0.31***
	(-1, 0)	**(0, +3)**		**(-1, 0)**	**(0, +3)**		**(-1, 0)**	**(0, +3)**	
Assets Growth	11.38%	11.58%	0.20%***	11.14%	11.67%	0.53%***	11.56%	11.75%	0.19%***
Sales Growth	12.05%	13.01%	0.96%***	10.59%	12.27%	1.68%***	13.09%	14.36%	1.27%***
Capex Growth	27.17%	27.83%	0.66%***	24.39%	24.99%	0.60%***	29.13%	32.82%	3.69%***
Return on Assets	-1.61%	-1.85%	-0.24%***	-1.67%	-1.82%	-0.15%**	-1.57%	-1.68%	-0.11%***
Leverage Ratio	46.19%	46.05%	-0.14%	48.90%	45.67%	-3.23%***	44.29%	46.15%	1.86%**
Interest Coverage Ratio	3.55	3.63	0.08	3.37	3.68	0.31**	3.67	3.69	0.02***

Table 10. *Operating performance: Multivariate analysis*

In this table, we report our multivariate panel regression results for four performance measures as our dependent variables: assets growth, sales growth, capital expenditures growth and ROA. We use balance sheet data on sample rival firms and consider both SEO years and non-SEO years. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Assets Growth	Sales Growth	Capex Growth	ROA
SEO	0.005***	0.009***	0.014***	0.001
Size	0.014***	0.005***	-0.004***	0.014***
Regulation	0.002	0.001	0.003	0.002
Primary SEO	0.009*	0.038***	0.048***	0.001
Industry HH Index	0.003	-0.019	0.053	-0.005
SEO size × Industry HH Index	0.000	0.000	0.000	0.000
Investment SEO	0.005	0.016***	0.020	-0.001
Debt SEO	0.001	0.029***	0.046**	0.001
Technology	0.012	0.024	0.010	-0.019
Age	-0.086***	-0.074***	-0.136***	0.007***
Leverage Ratio	-0.067***	0.005	-0.154***	-0.013***
Interest Coverage Ratio	0.008***	0.007***	0.011***	0.011***
Industry MB Ratio	0.006***	0.005***	0.009***	0.001***
Intercept	0.235	0.223	0.591	-0.141
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	106,758	106,758	106,758	108,905
Adjusted R^2	0.1784	0.1619	0.0624	0.6125

Table 11. *Survival: Multivariate analysis*

In this table, we report the results of our Cox proportional hazards analysis performed to assess the likelihood of survival of rival firms in the 36-months period after an industry SEO. A hazard ratio greater than 1 is equivalent to a positive coefficient and means a given variable increases rivals' likelihood of failure. A hazard ratio inferior to 1 is equivalent to a negative coefficient and means a given variable decreases rivals' likelihood of failure. A total of 17,082 firm-year observations is considered in the model, concerning 2,227 delisting cases. We report both hazard ratios and coefficients for each variable. All variables are defined in Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

	Model 1 Competitive effects			Model 2 Information effects			Model 3 Competitive and information effects		
	Hazard ratio	*Coefficient*	*p-value*	*Hazard ratio*	*Coefficient*	*p-value*	*Hazard ratio*	*Coefficient*	*p-value*
Size				0.491***	-0.712***	0.000	0.493***	-0.707***	0.000
Regulation				0.756***	-0.279***	0.001	0.680***	-0.386***	0.000
Primary SEO				0.797***	-0.227***	0.000	0.814***	-0.205***	0.002
Industry HH Index	1.525***	0.422***	0.001				1.483***	0.394***	0.000
SEO size × Industry HH Index	0.995***	-0.005***	0.000				0.998***	-0.002***	0.000
Investment SEO	1.212***	0.192***	0.000				1.409***	0.343***	0.000
Debt SEO	0.371***	-0.991***	0.000				0.457***	-0.784***	0.000
Technology	1.003***	0.003***	0.000				0.828***	-0.189***	0.002
Age	0.845***	-0.168***	0.000	0.801***	-0.221***	0.000	0.806***	-0.216***	0.000
Leverage Ratio	1.228***	0.206***	0.000	1.231***	0.207***	0.000	1.249***	0.222***	0.000
Interest Coverage Ratio	0.877***	-0.132***	0.000	0.969***	-0.032***	0.000	0.967***	-0.033***	0.000
Industry MB Ratio	1.530***	0.425***	0.000	1.313***	0.272***	0.000	1.451***	0.372***	0.000
N		17,076			17,076			17,076	

PAPER 2. ANATOMY OF MONEY-LOSING IPOS

ABSTRACT

Money-losing initial public offerings (IPOs) have recently raised an important amount of cash in the U.S. market since the dot-com bubble, and investors have assigned high valuation premia to these IPOs. In this paper, using a sample of 1,505 U.S. IPOs from 1998 to 2018, we investigate how much money-losing issuers could be compared to profitable issuers in terms of motivations for going public, IPO valuation, and post-IPO outcomes. We find that money-losing firms are motivated by the need to finance significant R&D investments and become M&A targets. We also find that they take advantage of favorable market conditions and obtain lower valuations at the time of their IPOs. Innovation and growth opportunities are important factors for their valuation. Further, we document that money-losing firms are characterized by higher underpricing, lower aftermarket liquidity and trading volume, and higher aftermarket volatility. Finally, we show that money-losing IPOs underperform in the long run compared to profitable IPOs and are more likely to delist for negative reasons in the three years following their going public decision.

JEL classification: G14
Keywords: Initial public offerings; IPOs; Negative earnings; Zero revenue; Money-losing

1. Introduction

Over the years 2014 through 2018, more than 75% of firms going public in the United States had negative earnings at their initial public offerings (IPOs). Among these firms, close to one-third did not even generate revenues yet. Prior studies show that firms should reach some level of efficiency through private funding before relying on public markets to finance further growth opportunities (Spiegel & Tookes, 2007; Chemmanur, He, et al., 2010; among others). However, this upward trend of unprofitable firms going public via IPOs seems to continue, suggesting that investors have no prominent reluctance to participate in these issues. For instance, Lyft, a ride-hailing company that disclosed losses of $911 million in 2018, successfully raised $2.34 billion through its IPO in March 2019, with a first-day return exceeding 20%. The situation is somewhat worrisome, as it could be similar to the dot-com bubble that surged in the early 2000s. More than 80% of IPO firms were unprofitable and later on left thousands of investors with gigantic losses (Ofek & Richardson, 2003).

Anecdotal evidence from the financial press indicates that the hype around money-losing IPOs is not trivial. For example, a recent *Bloomberg* article[5] entitled "Unprofitable companies are raising the most IPO cash since the dot-com era" discusses how unprofitable firms are raising money in IPOs and how investors are buying into the hype thinking money-losing IPOs will create great brands. Another article[6] from *CNBC* entitled "Charles Schwab says he would never buy the money-losing companies going public these days" recommends not to invest in money-losing IPO firms and to buy firms that are growing in revenue and making money instead. Despite

[5] By Esha Dey, Drew Singer, Ryan Vlastelica, Kristine Owram and Mathieu Benhamou. Published: September 25, 2019, 5:00 am | Updated: September 27, 2019, 7:00 am: https://www.bloomberg.com/graphics/2019-unprofitable-ipo-record-uber-wework-peloton/

[6] By Yun Li. Published, October 7, 2019, 12:36 pm| Updated Monday, October 7, 2019, 3:54 pm EDThttps://www.cnbc.com/2019/10/07/charles-schwab-says-he-would-never-buy-the-money-losing-companies-going-public-these-days.html

recognizing this excitement for money-losing IPO firms in the current financial press and among practitioners, the academic literature has yet to distinguish money-losing firms from profitable ones when examining the IPO market. The purpose of this study is to fill this gap by providing an in-depth analysis of money-losing IPO firms in the United States. Specifically, we attempt to examine the motivations of money-losing firms for conducting an IPO. We also analyze how the valuation of unprofitable IPOs compares to that of profitable issuing firms and whether the lack of pre-issue profitability affects IPO outcomes.

Using a sample of 1,505 IPOs from 1998 to 2018, we focus on negative-earnings offerings and a particular subsample of zero-revenue offerings. We consider two samples of firms as benchmarks: positive-earnings issuers for negative-earnings issuers and revenue-generating issuers for zero-revenue issuers. Our results are summarized as follows. We find that the decision of money-losing IPO firms to go public could be in part motivated by the need to finance growth opportunities. Compared to profitable firms, they make more substantial investments in R&D and, to a lesser extent, in capital expenditures. Zero-revenue issuers are those that devote the largest portion of their IPO proceeds to innovation efforts. We further report that money-losing firms become very active on the M&A market in the three years following their IPO. Zero-revenue issuers are, however, less likely to get involved. Compared to profitable firms, money-losing issuers have higher probabilities of becoming targets rather than acquirers, a result that the weakness of their cash inflows can explain. Going public, therefore, facilitates their access to acquirers, with the hope of signing M&A deals. We find that money-losing firms obtain significantly lower IPO valuations and that factors related to innovation and growth opportunities are distinctively important in valuation. Our empirical tests also show that IPOs by unprofitable firms are more underpriced than profitable firms. Their stocks are also less liquid and more

volatile in the aftermarket, and they underperform over the long, and are more likely to delist from their exchange in the three years following their IPO.

Our study contributes to several strands of literature. First, most existing U.S. IPO studies examine IPOs as a general group without considering their profitability level. In this paper, we fill this gap and complement the few studies that consider pre-IPO profitability. Yi (2001) investigates the long-run stock price performance of issuers with and without losses for the period 1987-1991. In contrast, we do not limit our research to the long-run performance but also explore IPO motivations, valuation, underpricing, liquidity, volatility, and survival. Jain et al. (2008) examine the timing and probability of achieving the post-IPO profitability milestone for internet issuers during the 1996-2000 period. However, they focus on factors related to corporate governance, third-party certification, and investor demand. In contrast, we perform a comparative analysis of IPO firms based on pre-IPO earnings and pre-IPO revenue. More recently, Signori (2018) focuses mainly on zero-revenue IPOs in a European context, covering the 2002-2014 period. However, he does not analyze the firms' valuation and long-term stock price performance and, coherently, he ignores unprofitable IPOs that generate revenues.[7] We complement this literature by investigating the ongoing rise of both negative-earnings and (zero-revenue IPOs in the U.S. market. To the best of our knowledge, we are the first to provide an in-depth analysis of money-losing IPOs and to include in the sample period the most recent trend that starts around 2014 and that features a large predominance of unprofitable IPO firms.

[7] Specifically, we find that out of all 1,505 sample IPOs, 942 (63%) are negative-earnings issues, among which 124 (8%) are zero-revenue issues over the period 1998-2018. Signori (2018) does not cover money-losing IPOs and finds that zero-revenue IPOs represent 15% of total European IPOs during the period 2002–2014. In this paper, we confirm that money losing firms in the U.S. are also more growth-oriented issuers. We, however, observe that American negative earnings IPOs in our sample are much larger, older, with higher leverage, and more VC-backed than European revenue-less IPOs.

Second, we complement previous studies that focus on motivations for going public. Schultz & Zaman (2001) report that a large number of acquisitions followed numerous Internet IPOs of the late 1990s. Brau & Fawcett (2006) survey 336 CFOs and document that IPO firms' primary motivation is to facilitate acquisitions. Celikyurt et al. (2010) find that newly public firms participate actively in M&A activity, with more than 80% of large issuers becoming acquirers in the five years following their IPO. They argue that acquisitions are as essential to the firms' growth as investments in the form of CAPEX and R&D. In our study, we conjecture that several motives could drive the going-public decision of money-losing firms, and we explore three non-mutually exclusive hypotheses (investment financing, market timing, and M&A facilitation).

Third, we also complement studies that examine the relation between pre-IPO profitability and IPO valuation. For instance, Aggarwal et al. (2009) find that firms with more positive earnings have higher valuations than firms with less positive earnings and that firms with more negative earnings have higher valuations than firms with less negative earnings. Our study documents that the lack of profitability and the inability to generate revenues both have a negative effect on IPO valuation. We also show that factors related to growth options, such as pre-IPO R&D spending, boost unprofitable issuers' valuation, while they are not significant determinants of the valuation of positive-earnings issuers.

Fourth, we complement previous studies investigating IPO underpricing and aftermarket performance. Using meta-analytical techniques on a sample of 123 empirical studies, Engelen et al. (2020) find that underpricing positively affects long-term IPO performance, but at the expense of heightening the volatility of firm value in the aftermarket.[8] We find that money-losing IPOs

[8] We thank one of our anonymous referees for suggestion this point.

are marginally more underpriced than IPOs by profitable firms. Through higher underpricing, money-losing issuers could compensate investors for bearing augmented risk. We also analyze the long-term stock price performance and survivability of money-losing firms and profitable firms. We find that both categories of firms have negative abnormal returns in the three-year period following their IPO, which is in line with the well-documented evidence of long-run underperformance for IPO firms. Further, we find that negative-earnings issuers significantly underperform positive-earnings issuers. We test the robustness of our findings by performing a survival analysis. We find that money-losing IPO firms are significantly more likely to delist for negative reasons from their exchange in the three years following their IPO. Thus, post-IPO failure risk is greater for unprofitable issuers.

Overall, our findings have direct implications for investors. Money-losing IPOs often generate excitement among them. Some investors could overlook the lack of profitability and invest by fear of missing out on the relatively few firms that go public nowadays. Other investors could overestimate the firms' ability to develop successfully and become big money-makers on the market. Our study highlights the importance of distinguishing between money-losing issuers and profitable issuers when examining IPOs. It sheds light on the performance of these investments and therefore contributes to more informed portfolio allocation decision-making.

The remainder of the paper is organized as follows. Section 2 presents previous relevant research and formulates our hypotheses. Section 3 provides data collection details and presents our descriptive statistics. Section 4 reports and comments on our empirical results. Section 5 concludes.

2. Previous research and hypothesis development

In this section, we develop our hypotheses. We investigate money-losing IPOs in contrast with IPOs completed by profitable firms. Specifically, our hypotheses focus on IPO motivations, IPO valuation, and IPO outcomes (underpricing, aftermarket liquidity, trading volume and volatility, long-term stock price performance, and survival). Firms referred to as money-losing firms are negative-earnings issuers, while firms referred to as profitable firms are positive-earnings issuers.

2.1. IPO Motivations

(Jain et al., 2008) point out that money-losing firms go public based on a promise of profitability, not on actual profitability. Taking the IPO route could be viewed as a premature decision for them. We investigate several theories to shed light on the motivations of negative-earnings issuers for conducting an IPO. Specifically, we test three non-mutually exclusive hypotheses: (1) investment financing, (2) market timing, and (3) M&A facilitation.

2.1.1. Investment financing

The need for capital is one of the primary drivers of the going-public decision. Lowry (2003) finds that changes in private firms' demand for capital explain fluctuations in IPO volume. Poulsen & Stegemoller (2008) show that firms that prefer going public over being acquired by a public company have greater growth opportunities and face more capital constraints. Aslan & Kumar (2010) focus on U.K firms and report that they go public to relax financing constraints and invest in growth options. Santos (2017) finds that issuers use their IPO proceeds for investment purposes when sentiment-driven investors' valuations are low. Kim & Weisbach (2008) conduct a global study and document that IPO firms invest a significant portion of their proceeds in the

form of capital expenditures (CAPEX) and research and development (R&D). Jain et al. (2008) point out that the path to profitability of emerging firms involves substantial investments in capital expenditures (CAPEX) and research and development (R&D). Spiegel & Tookes (2007) model predicts that firms will privately finance projects with high revenue-generating potential and then turn to the public markets to achieve further growth. Chemmanur, He, et al. (2010) empirically show that the firms that are more likely to go public are characterized by a steadier level of product market efficiency. As a result, taking the IPO route could be a premature decision for money-losing firms. Yet, an IPO could be the only available way for them to raise capital, given the difficulty to access private sources of financing.

We conjecture that money-loosing firms invest an extensive part of their IPO proceeds in capital investments and innovation efforts. Thus, we expect that negative-earnings issuers to invest significantly more in capital expenditures and research and development in the three years following the IPO than positive-earnings issuers.

2.1.2. Market timing

Market-timing motivations could drive the going-public decision. Ritter & Welch (2002) highlight the importance of market conditions for corporate insiders when planning an IPO. Indeed, asymmetric information models predict that firms will delay their equity issue until the market offers favorable pricing. Lerner (1994) finds that venture-backed biotechnology firms go public when equity valuations are high, while they prefer turning to private financing options when valuations are lower. Baker & Wurgler (2002) find that firms tend to issue equity when investors are too enthusiastic about their prospects. Graham & Harvey (2001) survey 392 chief financial officers (CFOs) and report that the latter consider the amount by which their stock is

undervalued or overvalued when deciding whether or not to raise public equity. Kim & Weisbach (2008) demonstrate that high market-to-book (high valuation) firms have higher post-IPO cash holdings than low market-to-book (low valuation) firms. This result suggests that high market-to-book firms' decision to issue equity is more driven by efforts to exploit investor over-optimism than by a need to finance investments.

Similarly, Santos (2017) finds that firms that go public when sentiment-driven investors' valuations are high tend to lack profitable projects. Ball et al. (2011) investigate whether IPO waves are driven by aggregate market timing, pseudo-market timing and/or firm-specific market timing. They find evidence of pseudo-market timing as they show firms react to market runups but do not predict downturns.

Pre-IPO profitability could affect firms' inclination to time the market when going public. Money-losing firms have weak cash inflows outweighed by their outflows, making it difficult for them to have access to affordable private financing sources. Saunders & Steffen (2011) document that private ownership and lower profitability are associated with significantly higher risk-adjusted loan spreads. Schenone (2010) finds that average interest rates charged by lending banks decrease after an IPO. Thus, due to more difficult access to private financing sources, money-losing firms could find it particularly important to take advantage of a window of opportunity on the market. We, therefore, expect that negative-earnings issuers are significantly more likely to engage in IPO market timing than positive-earnings issuers.

2.1.3. M&A facilitation

The going-public decision could also be motivated by corporate control considerations. Schultz & Zaman (2001) report that many acquisitions followed numerous Internet IPOs of the

late 1990s. Brau & Fawcett (2006) survey 336 CFOs and document that IPO firms' primary motivation is to facilitate acquisitions. Celikyurt et al. (2010) find that newly public firms participate actively in M&A activity, with more than 80% of large issuers becoming acquirers in the five years following their IPO. They argue that acquisitions are as essential to the firms' growth as investments in the form of CAPEX and R&D. Zingales (1995) shows that an IPO provides targets with an increased bargaining power allowing them to obtain a higher price in the deal. Hovakimian & Hutton (2010) investigate merger-motivated IPOs and report that IPOs facilitate acquisitions in several ways, notably by providing firms with a publicly observable stock currency. Hsieh et al. (2011) find that the IPO process reduces valuation uncertainty, which increases the efficiency of the acquisition strategy. Aktas et al. (2019) report that IPOs facilitate newly listed firms' acquisition activity, especially in economies with a more developed stock market.

Overall, going public leads firms towards less information asymmetry, more visibility, and greater credibility, which facilitate transactions in the M&A market. We anticipate an important involvement of money-losing firms in post-IPO M&A activity. We conjecture that their cash inflows' weakness makes them more likely to be targeted by other firms for strategic unions than to become acquirers themselves. Thus, we expect that negative-earnings issuers are significantly more likely to become M&A targets in the three years following the IPO than positive-earnings issuers.

2.2. IPO valuation

Our next goal is to investigate how the IPO valuation of money-losing firms compares to that of profitable firms. Several existing studies attempt to understand the valuation of IPO firms. Kim & Ritter (1999) investigate the use of comparable firm multiples (e.g., price-to-earnings,

market-to-book, price-to-sales) for valuing IPOs. Houston et al. (2006) report that, on average, IPO offer prices were set at a discount relative to comparable multiples during the bubble period of 1999 to 2000, while they were set at a premium in the pre-bubble period. Purnanandam & Swaminathan (2004) find that the median IPO is priced above the valuation based on price multiples. Besides, the study shows that hereby "overvalued" IPOs have lower profitability but higher analyst growth forecasts than "undervalued" IPOs and that they provide high first-day returns but low long-term returns. Aggarwal et al. (2009) examine the influence of pre-offer profitability in their IPO valuation analysis. They report that the income of positive-earnings IPOs is positively correlated with value, while the income of negative-earnings IPOs is negatively correlated with value. Indeed, they find that profitable firms with more positive earnings obtain higher valuations than profitable firms with less positive earnings, while unprofitable firms with more negative earnings obtain higher valuations than unprofitable firms with less negative earnings.

The act of issuing equity with negative earnings could be apprehended in two ways. On the one hand, it could indicate unclear future cash flows and poor future prospects. In this case, we would expect lower IPO valuations for money-losing firms relative to profitable firms. On the other hand, it could signal tremendous upcoming growth opportunities. In this case, we would expect higher IPO valuations for money-losing firms relative to profitable firms. Therefore, we remain agnostic about how pre-IPO profitability affects IPO valuation, and we leave it to the data to determine how IPO valuation is different for negative-earnings issuers relative to positive-earnings issuers.

2.3. IPO outcomes

Our third goal is to examine IPO outcomes for negative-earnings issuers relative to positive-earnings issuers. If the IPO does not provide outcomes that benefit the issuer, there is no need to go public for negative-earnings firms. We focus on underpricing, aftermarket liquidity, trading volume and volatility, long-term stock price performance, and survival.

2.3.1. Underpricing

It is widely accepted in the IPO literature that IPOs are, on average, underpriced. Prior research documents a systematic increase from the offer price to the first-day closing price (Ritter & Welch, 2002). Using a sample of 6,249 IPOs from 1980 to 2001, Ritter & Welch (2002) compute an average first-day return of 18.8%. Previous studies show that asymmetric information is an important determinant of IPO underpricing. Rock (1986) argues that the issuer must leave enough "money on the table" to compensate outside investors for the firm's value uncertainty. Beatty & Ritter (1986) and Michaely & Shaw (1994) show that higher information asymmetry typically leads to higher underpricing. Loughran & Ritter (2004) report that underpricing skyrocketed to 65% during the internet bubble years of 1999-2000, when numerous highly risky technology firms went public. Many of these firms were far from profitable at the time. With no record of lucrative operations, money-losing firms have a high-risk profile with much uncertainty surrounding their future cash flows. They could exhibit higher information asymmetry that would translate into higher underpricing. Thus, we expect that IPOs by money-losing firms are more likely to be more underpriced than positive-earning IPOs.

2.3.2. Aftermarket liquidity and trading volume

Newly public firms have no prior history as publicly-traded entities. Thus, there is only little publicly available information about them. Corwin et al. (2004) argue that the start of IPO trading is a period of high information asymmetry, which increases the costs associated with providing liquidity. Ellul & Pagano (2006) propose a model that predicts a negative relation between information asymmetry and aftermarket liquidity. Thus, money-losing firms' higher uncertainty profile could discourage investors from trading their stocks, both in terms of frequency and in terms of volume. We, therefore, expect that negative-earnings issuers have significantly lower aftermarket liquidity and trading volume than positive-earnings issuers.

2.3.3. Aftermarket volatility

Generally, higher information asymmetry makes it more challenging to estimate the value of a firm (Beatty & Ritter, 1986). Lowry et al. (2010) report that the volatility of initial IPO returns is higher for firms that are more difficult to value due to higher information asymmetry. Since money-losing firms are associated with higher uncertainty, their stock price is more likely to become a noisy reflection of true firm value. They could therefore have significantly higher aftermarket volatility than positive-earnings issuers.

2.3.4. Long-term stock price performance

The literature commonly acknowledges the long-run underperformance of IPO firms, on average. Using a sample of 1,526 IPOs from 1975 to 1984, Ritter (1991) finds that they significantly underperform both market indices and comparable firms in the three-year period following the issue. Loughran (1993) and Loughran & Ritter (1995) show that this underperformance continues for up to six years after an issue. Prior research that examines the

cross-sectional variation in IPO returns shows that IPO performance is improved by the presence of venture capitalists (Brav & Gompers, 1997; Nahata, 2008; Krishnan et al., 2011), by higher underwriter prestige (Carter et al., 1998; Dong et al., 2011), greater institutional ownership (Field & Lowry, 2009), and greater product market advertising before the issue (Chemmanur & Yuan, 2017). Focusing on the sign of earnings at the IPO, Yi (2001) finds that issuers with profits outperform issuers with losses. Thus, if money-losing firms have difficulty generating positive earnings and becoming profitable, we expect them to underperform in the long run. Alternatively, if money-losing firms turn to be the next Amazon, become profitable and live up to their hype, they should show superior performance as soon as investors recognize their true quality.

2.3.5. IPO survival

Several studies investigate the factors that positively influence IPO survival. Hensler et al. (1997) find that survival time increases with firm size, age, initial return, insider ownership percentage, and the market's IPO activity level. They further report that survival time decreases with the number of risk factors associated with the issuing firm and the general market level at the IPO. Jain & Kini (1999) document that lower risk, higher pre-IPO operating performance, and higher industry R&D intensity improve the likelihood of survival of IPO firms. Other survival-boosting factors documented by the literature include venture capitalists' involvement (Jain & Kini, 2000; Pommet, 2017), managerial commitment to developing diversified product lines (Jain & Kini, 2008), and specialist (rather than generalist) CEO ability (Gounopoulos & Pham, 2018).

Pre-IPO profitability could affect the survival of IPO firms. Jain et al. (2008) report that the risk of post-IPO failure is particularly high for unprofitable firms. In general, exchange listing

requirements involve a minimum stock price directly tied with performance, a minimum trading volume, and some listing fees. On the one hand, with lower pre-IPO performance and less liquid and more volatile trading in the aftermarket, money-losing firms could find it harder to meet their exchange listing requirements. In this case, we expect that negative-earnings issuers are less likely to survive in the years following the IPO than positive-earnings issuers. On the other hand, if money-losing firms become profitable and deliver performance, the likelihood of their survivability on the stock exchange will be improved.

3. Data

We collect a sample of IPOs issued between January 1998 and December 2018 from the Securities Data Corporation (SDC) New Issues database. Following the IPO literature, we focus exclusively on common shares issues with an offer price higher than $5USD. We exclude ADRs, unit offers, closed-end funds, REITs, natural resource-limited partnerships, best-efforts offers, and offers in the financial and utility sectors (SIC codes 6000 to 6999 and 4900 to 4949, respectively). We further restrict the sample to only NYSE, NASDAQ, and AMEX issues. For the remaining firms, we obtain financial statements data from Compustat, data on mergers and acquisitions from SDC, and institutional holdings data from the WRDS Thomson Reuters Institutional (13f) Holdings database. We rely on the Center for Research in Security Prices (CRSP) for stock returns, market returns, and information related to delisting. Underwriter prestige levels and firms' founding years, used to derive their age, are collected from Jay R. Ritter's website. Finally, we obtain the factors included in Fama & French (1993) and Carhart (1997)'s model for expected returns from Kenneth R. French's website.

Our final sample consists of 1,505 IPOs in 53 different Compustat two-digit SIC code industries. We define negative-earnings IPOs as IPOs of firms with a net income below zero in the year preceding their IPO year. Positive-earnings IPOs are IPOs of firms with a net income above zero in the preceding IPO year. We also define zero-revenue IPOs as IPOs of firms with revenue equal to zero in the year prior to their IPO year, and revenue-generating IPOs are IPOs of firms with a revenue greater than zero in the year preceding their IPO year. Zero-revenue IPOs are a subset of the negative-earnings IPOs subsample. These firms have also raised substantial amounts of capital in recent years (10% of total sample proceeds from 2014 to 2018). Revenue-generating IPO firms can be both positive-earnings and negative-earnings issuers.

In our empirical tests, we consider the full sample including the 1,505 firms. However, to address concerns regarding the comparability of positive-earnings and negative-earnings IPOs, we also consider a sample of matching firms. Each negative-earnings issuer is matched with a positive-earnings issuer that 1) operates in the same industry (Compustat 2-digit SIC codes), (2) goes public in the same year, and (3) has the closest value of pre-IPO total assets. No control firm is matched more than five times. We match each zero-revenue issuer with a revenue-generating issuer using the same procedure. Our final matching sample consists of 286 pairs based on earnings and 120 pairs based on revenue.[9] All variables considered in our paper are described in Table 1.

[Insert Table 1 here]

[9] As a robustness check, we also perform all multivariate analyses using a propensity score matching approach (considering the following set of covariates: SIC, IPO year, pre-IPO size, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum) and our findings remain qualitatively unchanged. Results are not reported in a table but available upon request.

Table 2 reports the distribution of negative-earnings and zero-revenue IPOs by year (Panel A) and by industry (Panel B). Out of all 1,505 sample IPOs, 942 (63%) are negative-earnings issues, among which 124 (8%) are zero-revenue issues. In Panel A of Table 2, column 2 presents the number of IPOs in a given year while columns 3 and 4 present, respectively, the number and percentage of negative-earnings IPOs for that same year. Over the years, the fraction of negative-earnings IPOs has evolved in line with the major economic events that affected the United States financial market. The percentage of money-losing IPOs went from 44% in 1998 to more than 75% during the technology bubble years 1999 and 2000. Many highly risky firms took the IPO route despite their lack of profitability.10 After the bubble burst in 2001, the percentage of negative-earnings IPOs amounted to about half of yearly IPOs until 2007. When the financial crisis hit in 2008, it led IPO activity to a very low point, and the fraction of negative-earnings IPOs fell to 38% in 2008 and 23% in 2009. Then, the economy gradually recovered, and negative-earnings firms represented the majority of IPO issuers until 2013. Since 2014, the phenomenon has extended considerably. The percentage of negative-earnings IPOs has become exceptionally high, above 70% of total IPOs every year, reaching 85% in 2018.

In Panel A of Table 2, columns 5 and 6 present, respectively, the number and percentage of zero-revenue IPOs for a given year. We note that zero-revenue IPOs have been very rare from 1998 to 2013, never exceeding a fraction of 9% of yearly IPOs, in 2011. However, since 2014, the percentage of zero-revenue issues has substantially increased. They represent 15% or more of the total IPOs every year, with a peak at 30% in 2018. Hence, since 2014, generating revenues has become much less critical to successfully raise capital through an IPO. Investors seem willing

10 See Ofek & Richardson (2003) for further details about the dot.com bubble.

to provide financing to not only firms that are unprofitable but also firms that have yet to bring a product to the market.

In Panel B of Table 2, the distribution of IPOs by industry shows that negative-earnings issues occur primarily in the manufacturing (48%) and services (39%) industries. As for zero-revenue IPOs, the great majority is concentrated in the manufacturing industry (93%).

[Insert Table 2 here]

Table 3 reports descriptive statistics for our sample IPOs. We present mean and median values across each category of firms, along with standard deviations. At the time of going public, the average (median) negative-earnings issuer has been operating for 11 (7) years, compared to 26 (15) years for its positive-earnings counterpart. Both the mean and median differences are significant at the 1% level. Negative-earnings issuers have $305.61 ($120.08) million in assets at the IPO year, compared to $608.34 ($256.82) million for positive-earnings issuers. Also, they raise $122.21 ($75.00) million in proceeds, compared to $242.05 ($104.00) million for positive-earnings issuers. All differences are significant at the 1% level. Thus, money-losing issuers are only half as big and raise only half as much capital as profitable issuers. Our statistics further show that negative-earnings issuers are significantly more likely to be backed by venture capitalists, with 662 VC-backed firms out of 942 (71%), compared to 171 out of 563 (30%) for positive-earnings issuers. We note no significant difference between unprofitable and profitable issuers in terms of underwriter prestige. They hire underwriters of a similar ranking. Further, we find that institutional investors own a smaller fraction of negative-earnings issuers' shares immediately post-issue, namely 30.77% (25.48%), compared to 35.87% (27.95%) for positive-earnings issuers. The mean difference is significant at the 1% level. On a different note, leverage

is significantly lower for negative-earnings issuers, with 34.90% (28.51%) ratio, compared to 47.24% (46.10%) for positive-earnings issuers. Also, negative-earnings issuers have a market-to-book of 6.33 (4.43), compared to 5.39 (3.25) for positive-earnings issuers. Differences are significant at the 1% level. Finally, the return recorded for the S&P500 in the 100 trading days preceding the firms' IPOs is 0.99% (1.05%) for negative-earnings issuers, compared to 1.13% (1.34%) for positive-earnings issuers. The mean difference is significant at the 10% level, while the median difference is significant at the 5% level. Thus, our market momentum measure shows that negative-earnings issuers go public in a less thriving market than positive-earnings issuers.

Overall, our descriptive statistics demonstrate that money-losing firms have a higher risk profile than their profitable counterparts. They are younger, smaller, and less established firms with lower leverage. They rely more heavily on venture-capital financing, attract fewer institutional investors, and have more growth opportunities, as suggested by their higher market-to-book.

Table 3 also reports descriptive statistics that compare zero-revenue IPOs to revenue-generating IPOs. At the time of going public, the average (median) zero-revenue issuer has been operating for 6 (5) years, compared to 18 (9) years for its revenue-generating counterpart. Besides, it has $128.19 ($99.21) million in assets and raises $74.88 ($65.90) million in proceeds compared to $444.95 ($161.22) million in assets and 175.32 ($83.70) million in proceeds for its revenue-generating counterpart. All differences are significant at the 1% level. Further, zero-revenue issuers are significantly more likely to be backed by venture capitalists, with 99 VC-backed firms out of 124 (80%) compared to 740 out of 1,381 (54%) revenue-generating issuers. Besides, they hire underwriters of a lower ranking, namely 7.41 (8.10) compared to 8 (9.10) for

revenue-generating issuers. The mean difference is significant at the 1% level. In terms of institutional ownership immediately post-issue, we find no notable difference between zero-revenue and revenue-generating issuers. As for leverage, zero-revenue issuers have a lower ratio of 20.14% (16.03%) compared to 41.24% (34.65%) for revenue-generating issuers. Mean and median differences are significant at the 1% level. We further note that the two categories of firms have comparable market-to-books (no significant difference). Finally, the return recorded for the S&P500 in the 100 trading days preceding the firms' IPOs is 0.77% (0.85%) for zero-revenue issuers, compared to 1.07% (1.14%) for revenue-generating issuers. Differences are significant at the 5% level. Thus, our market momentum measure shows that zero-revenue issuers go public in a relatively less booming market than revenue-generating issuers.

Overall, our descriptive statistics show that zero-revenue issuers have the highest risk profile in the money-losing firms' category. They are the youngest, smallest, and least established firms with the lowest leverage. They, less often, have access to higher-prestige underwriters, and they rely the most heavily on venture-capital financing.

[Insert Table 3 here]

4. Empirical results

4.1. IPO motivations

Our first objective is to shed light on the motivations of money-losing firms for conducting an IPO. We test the following hypotheses: (1) investment financing, (2) market timing, and (3) M&A facilitation.

4.1.1. Investment financing

Table 4 reports univariate statistics about sample firms' post-IPO investments in capital expenditures (CAPEX) and research and development (R&D) in the three years following the offering. We present mean and median values across each category of firms, along with standard deviations. We also report the statistical significance of mean and median differences.

Our results show that unprofitable issuers make lower post-IPO investments in capital expenditures. We also find that zero-revenue issuers invest less in capital expenditures than revenue-generating issuers. While capital expenditures could be considered as long-term horizon investments, R&D expenses are operating costs incurred in finding and creating new products or services. We find that R&D expenses represent 16.32% (12.33%) of total assets for the average (median) negative-earnings issuer, four times more than the 3.64% (0.00%) observed for its positive-earnings counterpart. Mean and median differences are significant at the 1% level.

Further, among negative-earnings issuers, zero-revenue issuers are those that dedicate the most significant fraction of their proceeds to R&D investments: 32.20% (30.90%) of total assets, compared to 9.09% (3.30%) for revenue-generating issuers. All differences are significant at the 1% level. Using the matching sample, we find that R&D expenses remain significantly higher for negative-earnings issuers than positive-earnings issuers and zero-revenue issuers than revenue-generating issuers.

[Insert Table 4 here]

We turn to multivariate evidence to explore our hypothesis further. Table 5 reports our results. Our dependent variables are the three-year post-IPO capital expenditures (CAPEX) in

models 1 and 2 and the three-year post-IPO research and development expenses (R&D) in models 3 and 4. Our general regression specification is the following:

$$CAPEX\ (R\&D) = \alpha + \beta_1\ Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\ SOX + \beta_3\ JOBS + \beta_4\ Tech + \beta_5\ Age + \beta_6\ Proceeds + \beta_7\ VC\text{-}backed + \beta_8\ Underwriter\ Prestige + \beta_9\ Institutional\ Ownership + \beta_{10}\ Leverage + \beta_{11}\ Market\text{-}to\text{-}Book\ Ratio + \beta_{12}\ Market\ Momentum + \beta_{13}\ Industry\ Fixed\ Effects + \beta_{14}\ Year\ Fixed\ Effects + \varepsilon \quad (1)$$

The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. Our control variables – SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum – are described in Table 1. Additionally, our regressions consider industry and year-fixed effects.

In model 1 of Table 5, we find that the marginal impact of the negative-earnings dummy on capital expenditures is positive and significant at the 10% level, suggesting that negative-earnings issuers invest more in capital expenditures than positive-earnings issuers. Unprofitable issuers could require greater capital investments as they have a long way to operational stability. In model 2, the zero-revenue dummy has a coefficient of -0.011, significant at the 10% level. Therefore, the subset of zero-revenue issuers spends marginally less in capital expenditures than revenue-generating issuers.

Models 3 and 4 of Table 5 focus on R&D expenses. Results show that unprofitable firms make substantially greater post-IPO investments in R&D compared to profitable firms. In model 3, the negative-earnings dummy has a coefficient of 0.055, significant at the 1% level, while in model 4, the zero-revenue dummy has a coefficient of 0.059, significant at the 1% level. Considering our matching sample (models 5 through 8), we find that the coefficient of negative-

earnings dummy is positive (0.044) and significant at the 1% level (model 7). Our multivariate findings provide additional support to our first hypothesis. Investment financing, mainly in the form of R&D, affects the going-public decision of money-losing firms.

[Insert Table 5 here]

4.1.2. Market Timing

In Table 6, we report tests' results for our market timing hypothesis. We investigate market timing at the market-wide level. Ball et al. (2011) argue that drops in market returns from before to after IPOs, negative market returns after peaks of IPO activity, and negative statistical relationships between IPO activity and subsequent market returns are not sufficient to confirm market-timing at the aggregate level. They point out that a clear indication of market timing implies a drop in returns below the prevailing risk-free rate and a deliberate choice of issuers to time the market. Otherwise, the dynamics could be evidence of pseudo-market timing.

We present the mean and median cumulative equally-weighted market returns over the eight quarters surrounding the firms' IPO date (*−4, −3, −2, −1, +1 +2, +3,* and *+4)*. We also report the changes in quarterly market returns from before to after the IPO date (*−1 vs. +1, −2 vs. +2, −3 vs. +3,* and *−4 vs. +4).* We focus on quarterly returns as market timing should be identifiable shortly after the IPO. The use of value-weighted returns (in unreported results) does not qualitatively change our findings. If post-IPO market returns are lower than pre-IPO market returns, this could be evidence of either opportunistic market timing or non-opportunistic pseudo-market timing (Ball et al., 2011). We validate market-timing if post-IPO returns are negative or too low to be consistent with reliable models of expected returns. Alternatively, we acknowledge pseudo-

market timing if post-IPO returns remain at reasonable levels, not unexpectedly low. In this case, the negative changes in market returns could be attributed to variations in market conditions.

We find that high levels of IPO activity precede important market declines around both negative-earnings and positive-earnings IPOs. Post-IPO returns are significantly lower than pre-IPO returns, and all mean and median changes in quarterly market returns are negative and significant at the 1% level. Also, post-IPO returns remain positive, adding up to a mean (median) annualized return of 7.27% (10.34%) around negative-earnings IPOs and 8.78% (11.73%) around positive-earnings IPOs. These values are above the average one-year Treasury bill rate (estimated at 2.08% for our 1998-2018 study period), indicating a positive risk premium. Thus, post-IPO returns are too high to be consistent with market-wide market timing but provide evidence of pseudo-market timing around sample IPOs.

Overall, results are equivalent for both categories of issuers. We draw similar conclusions when we distinguish zero-revenue IPOs from revenue-generating IPOs. All mean and median changes in quarterly market returns are negative and significant at the 1% level. Post-IPO returns add up to a mean (median) annualized return of 4.36% (7.88%) around zero-revenue IPOs and 8.14% (11.33%) around revenue-generating IPOs. These results are again indicative of pseudo-market timing and equivalent for both categories of firms. Our findings are qualitatively unchanged when considering the matching sample in our analysis.

[Insert Tables 6 here]

4.1.3. M&A Activity

Table 7 reports the number and percentage of firms that become M&A targets and/or acquirers in the three years following their IPO. Panels A through C present results considering

the full sample, while Panels D through F present results considering the matching sample. Panel A of Table 7 shows that more than half of the firms, 802 out of 1,505 (53%), engage in post-IPO M&A activity. Among them, 183 (23%) do so as targets, 448 (56%) as acquirers, and 171 (21%) as both targets and acquirers at some point during the three-year period. In total, 354 (44%) firms become targets and 619 (77%) become acquirers. Panel B provides details about targets, and panel C, about acquirers. We find that negative-earnings issuers represent 71% of M&A targets and 58% of M&A acquirers. In contrast, positive-earnings issuers account for 29% of targets and 42% of acquirers. As for zero-revenue issuers, they represent 6% of targets and 2% of acquirers.

We carry out the analysis again, considering the matching sample. Panel D of Table 7 shows that 65% of negative-earnings issuers and 60% of comparable positive-earnings issuers engage in post-IPO M&A activity. From Panels E and F, we infer that negative-earnings issuers represent 55% of targets and 50% of acquirers, compared to 45% and 50%, respectively, for positive-earnings issuers. Thus, negative-earnings issuers exhibit marginally higher levels of participation in M&A transactions and marginally higher levels of involvement as targets in those transactions. Panel D of Table 7 shows that 26 out of 120 (22%) zero-revenue issuers engage in post-IPO M&A activity, compared to 18 out of 120 (15%) for matching revenue-generating issuers. Among them, zero-revenue issuers account for 61% of targets (33 transactions) and 65% of acquirers (17 transactions).

[Insert Table 7 here]

Table 8 reports our multivariate probit regressions' results regarding the post-IPO involvement of money-losing firms in M&A activity. Models 1 through 4 present results considering the full sample, while models 5 through 8 present results considering the matching

sample. In the first set of regressions, we consider the whole sample of 1,505 firms, and the dependent variable is the likelihood of participating as a target or an acquirer in an M&A transaction. In the second set of regressions, we focus on M&A transactions and we consider as a dependent variable the likelihood of becoming a target rather than an acquirer. Our general regression specification is the following:

$$Likelihood\ of\ participating\ in\ an\ M\&A\ (likelihood\ of\ becoming\ an\ M\&A\ target) = \alpha + \beta_1\ Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\ SOX + \beta_3\ JOBS + \beta_4\ Tech + \beta_5\ Age + \beta_6\ Proceeds + \beta_7\ VC\text{-}backed + \beta_8\ Underwriter\ Prestige + \beta_9\ Institutional\ Ownership + \beta_{10}\ Leverage + \beta_{11}\ Market\text{-}to\text{-}Book\ Ratio + \beta_{12}\ Market\ Momentum + \beta_{13}\ Industry\ Fixed\ Effects + \beta_{14}\ Year\ Fixed\ Effects + \varepsilon \quad (2)$$

The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. Our control variables – SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum – are described in Table 1. Additionally, our regressions consider industry and year fixed effects.

In models 1 and 2 of Table 8, we test the likelihood of participating in an M&A in the three years following the IPO. In model 1, we note no significant difference in participation levels between negative-earnings and positive-earnings issuers. In model 2, we find that zero-revenue issuers are significantly less likely than revenue-generating issuers to become M&A acquirers or targets. Their particularly early stage of development makes them less adequate for M&As.

Models 3 and 4 of Table 8 consider only M&A transactions and focus on the likelihood of becoming a target rather than an acquirer. In model 3, the coefficient of the negative-earnings dummy is positive (0.423) and significant at the 1% level. Therefore, the probability of becoming a target is significantly higher for money-losing firms. In model 4, the coefficient of the zero-

revenue dummy is positive (0.933) and significant at the 1% level. Hence, zero-revenue issuers are also significantly more likely to become targets than revenue-generating issuers. This evidence supports the M&A facilitation hypothesis. Going public facilitates money-losing firms' access to the M&A market.

Models 5 through 8 of Table 8 report results considering the matching sample. In Model 7, the coefficient of the negative-earnings dummy is positive (0.281) and significant at the 10% level, confirming a higher likelihood of becoming a target rather than an acquirer for money-losing firms.

[Insert Table 8 here]

4.1.4. Intended versus actual use of proceeds

For further analysis, we also relate sample firms' IPO motivations as declared in their final prospectus with their actual use of proceeds following the offer. Table 9 reports univariate statistics about negative-earnings and zero-revenue issuers' post-IPO investments in CAPEX and R&D and involvement in the M&A market, considering the firms' intended use of proceeds stated in their prospectus. We categorize sample firms into four sub-groups: *General*, *Investment*, *Debt,* and *Other* based on the intended use of proceeds stated in the final prospectus. We present mean and median values across each sub-group, along with standard deviations. We also report the statistical significance of the mean and median differences between the firms in a given category and the rest of the IPO sample. We find that post-IPO capital expenditures are significantly lower for negative-earnings issuers that state investment purposes. Capital expenditures represent 3.65% (2.37%) of total assets for these firms, compared to 4.78% (3.27%)

for firms that state general purposes, 5.53% (4.30%) for firms that plan debt repayments, and 5.58% (4.08%) for firms that claim other intentions. Mean and median differences are significant at the 10% level. We also find that post-IPO R&D expenses are significantly higher for firms in the *Investment* category. Mean and median differences are significant at the 5% level. R&D expenses represent 24.48% (20.27%) of total assets for these firms, compared to 18.34% (14.60%) for firms in the *General* category, 8.10% (3.58%) for firms in the *Debt* category, and 14.54% (14.66%) for firms in the *Other* category. Thus, for firms that state investment purposes, post-IPO outcomes corroborate intentions in the form of major R&D investments. We further note that R&D expenses are significantly lower for IPOs stated for debt repayment purposes, with mean and median differences significant at the 5% level. Also, the proportion of firms that get involved in the M&A market is marginally higher in this category: 56.58% compared to 54.09% for firms that state general purposes, 47.83% for firms that plan investments, and 28.57% (4.08%) for firms with other intentions. The mean difference is significant at the 10% level. Thus, for IPOs stated to repay debt, investing in growth opportunities is less important than taking advantage of easier access to the M&A market.

Our results for the zero-revenue sample show no significant difference between the two categories of firms represented: *General* and *Investment*. However, considering the matching sample, we find that post-IPO capital expenditures are significantly lower for firms that state investment purposes: 1.65% (1.15%) of total assets compared to 2.71% (1.82%) for firms claiming general purposes. Mean and median differences are significant at the 10% level. Again, we note that capital expenditures are not the main focus of firms that express their intent to use their proceeds for investments.

[Insert Table 9 here]

4.2. IPO valuation

Our next objective is to examine the IPO valuation of money-losing firms relative to that of profitable firms. We build on Aggarwal et al. (2009)'s research and develop a multivariate regression model of the IPO valuation. Our main regression specification is the following:

$$IPO\ Valuation = \alpha + \beta_1\ Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\ SOX + \beta_3\ JOBS + \beta_4\ Pre\text{-}IPO\ IBEIRD + \beta_5\ Pre\text{-}IPO\ BV\ of\ Equity + \beta_6\ Pre\text{-}IPO\ Sales + \beta_7\ Pre\text{-}IPO\ R\&D + \beta_8\ Industry\ IPOs\ PS\ Ratio + \beta_9\ Insider\ Ownership + \beta_{10}\ Underwriter\ Prestige + \beta_{11}\ Boom\ Years + \beta_{12}\ Crash\ Years + \beta_{13}\ Age + \beta_{14}\ Pre\text{-}IPO\ Size + \beta_{15}\ VC\text{-}backed + \beta_{16}\ Pre\text{-}IPO\ Leverage + \beta_{17}\ Market\ Momentum + \varepsilon \quad (3)$$

IPO valuation is the logarithm of the offer price multiplied by the number of shares offered. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. Our set of control variables includes SOX, JOBS, pre-issue firm characteristics and market-level conditions: pre-IPO income before extraordinary items and R&D (IBEIRD), pre-IPO book value (BV) of equity, pre-IPO sales, pre-IPO R&D, the price-to-sales ratio of recent industry IPOs, insider ownership, underwriter prestige, boom years, crash years, age, pre-IPO size, VC-backed, pre-IPO leverage and market momentum. All variables are described in Table 1. We apply a log transformation to all the variables except for the VC-backed, boom years, and crash years dummies. Following (Aggarwal et al., 2009), we perform the following transformation $L(.)$ that allows retaining negative values:

$L(K) = \log(1 + K)$ when $K \geq 0$

$L(K) = -\log(1 - K)$ when $K < 0$

Our model accounts for three components to incorporate the possibility that firms adopt or upgrade to new technology: the replacement cost of the firm's physical capital, the net present value of the firm's expected future cash flows from assets in place, and the value of growth options associated with future technological upgrades. Pre-IPO sales and pre-IPO income before extraordinary items and R&D are proxies for cash flows. Pre-IPO book value of equity is a proxy for the replacement cost of the firm's assets. Pre-IPO R&D and the price-to-sales ratio of recent industry IPOs are proxies for growth opportunities. SOX and JOBS are dummy variables to control for the Sarbanes-Oxley (SOX) Act in 2002 and the Jumpstart Our Business Startups (JOBS) Act in 2012. The boom years and crash years dummies are proxies for changes in the cost of capital (discount rate). Our rationale is that the access to capital is increased (reduced) during boom (crash) years, so the equity risk premium and the cost of capital are lower (higher). Lastly, insider ownership and underwriter prestige are indicative of an IPO's quality.

Table 10 reports our results. Models 1 through 6 present results using the full sample, while models 7 through 12 present results using the matching sample. In models 1 and 2, we consider all sample firms. The negative-earnings dummy (model 1) has a coefficient of -0.025, significant at the 1% level. Thus, negative-earnings issuers obtain significantly lower IPO valuations relative to positive-earnings issuers. We further find that valuations are lower for zero-revenue IPOs than for revenue-generating ones. In model 2, the zero-revenue dummy has a coefficient of -0.033, significant at the 1% level. Since investors value money-losing firms more negatively than the rest, we conclude that the lack of profitability and/or the absence of revenues are more indications of higher uncertainty about future prospects than signals of important growth opportunities.

In models 3 through 6 of Table 10, we perform the IPO valuation regression considering each category of firms separately: negative-earnings (model 3), positive-earnings (model 4), zero-revenue (model 5), and revenue-generating (model 6). Our regression specification is the following:

$$IPO\ Valuation = \alpha + \beta_1\ Pre\text{-}IPO\ IBEIRD + \beta_2\ Pre\text{-}IPO\ BV\ of\ Equity + \beta_3\ Pre\text{-}IPO\ Sales + \beta_4\ Pre\text{-}IPO\ R\&D + \beta_5\ Industry\ IPOs\ PS\ Ratio + \beta_6\ Insider\ Ownership + \beta_7\ Underwriter\ Prestige + \beta_8\ Boom\ Years + \beta_9\ Crash\ Years + \beta_{10}\ Age + \beta_{11}\ Pre\text{-}IPO\ Size + \beta_{12}\ VC\text{-}backed + \beta_{13}\ Pre\text{-}IPO\ Leverage + \beta_{14}\ Market\ Momentum + \varepsilon \quad (4)$$

In models 3 and 4 of Table 10, we assess the relative importance of the valuation factors considered for negative-earnings issuers (model 3) as opposed to positive-earnings issuers (model 4). For both categories of firms, pre-IPO size has a negative effect on valuation (significant coefficients at the 1% or 5% levels), while pre-IPO leverage and the presence of venture capitalists have a positive effect on it (significant coefficients at the 1% level). However, while positive-earnings issuers obtain lower valuations in crash years (negative coefficient, significant at the 5% level), negative-earnings issuers obtain lower valuations in boom years (negative coefficient, significant at the 5% level). Besides, we note that pre-IPO book value of equity and pre-IPO R&D influence the valuation of negative-earnings issuers positively (significant coefficients at the 1% and 5% levels, respectively), while they do not significantly affect the valuation of positive-earnings issuers. These results show that assets' replacement costs and growth opportunities are important factors for the valuation of money-losing firms.

In models 5 and 6 of Table 10, we assess the relative importance of the valuation factors considered for zero-revenue issuers (model 5) instead of revenue-generating issuers (model 6). For both categories of firms, pre-IPO size and a context of boom years decrease IPO valuation

(significant coefficients at the 1 or 5% levels), while pre-IPO book value of equity and pre-IPO leverage increase it (significant coefficients at the 1% or 5% levels). However, pre-IPO sales and the presence of venture capitalists are only relevant in the valuation of revenue-generating issuers (positive and significant coefficients at the 1% level). They have a boosting effect for the firms, unlike crash years and firm age (negative and significant coefficients at the 1% and 10% levels, respectively). Zero-revenue issuers distinguish themselves with a positive coefficient associated with market momentum, significant at the 1% level. Overall, factors related to operational performance matter less in their valuation than ongoing market conditions.

Our results show that money-losing firms obtain significantly lower IPO valuations than profitable firms. Also, the relative importance of factors that influence valuation varies depending on the firms' category. For instance, innovation and growth opportunities (pre-IPO R&D) are two important factors for the valuation of money-losing firms.

In models 7 through 12 of Table 10, we perform the analysis considering the matching sample. Model 7 shows that IPO valuations are equivalent for negative-earnings and comparable positive-earnings issuers. Our assessment of the relative importance of valuation factors remains qualitatively unchanged. However, we note that the price-to-sales ratio of recent industry IPOs has a negative and significant effect on the valuation of negative-earnings issuers (model 8). At the same time, it is not relevant in the valuation of positive-earnings issuers (model 9). In model 10, the coefficient of the zero-revenue dummy is positive (0.202) and significant at the 5% level. Hence, zero-revenue issuers obtain higher valuations than comparable revenue-generating issuers.

[Insert Table 10 here]

4.3. IPO outcomes

Our next objective is to examine IPO outcomes for money-losing firms relative to profitable firms. We focus on underpricing, aftermarket liquidity, trading volume, and volatility, as well as long-term performance and survival.

4.3.1. Underpricing, liquidity, trading volume, and volatility

Table 11 reports univariate statistics about sample firms' underpricing, bid-ask spread, zero-return days, daily trading volume, and stock return volatility. All variables are described in Table 1. We present mean and median values across each category of firms, along with standard deviations. We also report the statistical significance of mean and median differences. For our entire sample, underpricing averages 21.9%. The mean (median) underpricing is 25.44% (20.85%) for negative-earnings issuers, compared to 17.46% (12.77%) for positive-earnings issuers. Both the mean and median differences are significant at the 1% level. In line with previous studies (Rock, 1986; Beatty & Ritter, 1986; Michaely & Shaw, 1994), IPO firms could underprice their shares further to compensate new investors for the augmented risk tied with their lack of profitability and uncertain future cash flows. We note no significant difference in underpricing levels between zero-revenue and revenue-generating issuers.

We calculate the bid-ask spread (as a proxy for stock price liquidity) by dividing the difference between the daily ask and bid prices by the midpoint of the bid and ask prices. We derive the average and median measures from 30 days to 390 days after the IPO. Typically, wider spreads are associated with lower stock liquidity. For negative-earnings issuers, the mean (median) bid-ask spread is 7.05% (6.40%), compared to 4.97% (4.49%) for positive-earnings

issuers. Both the mean and median differences are significant at the 1% level. Thus, negative-earnings issuers have significantly lower aftermarket liquidity than positive-earnings issuers. For zero-revenue issuers, the mean (median) bid-ask spread is 7.40% (7.07%), compared to 6.16% (5.39%) for revenue-generating issuers. All differences are significant at the 1% level. In the negative-earnings category, zero-revenue issuers are, therefore, those that experience the lowest aftermarket liquidity. Due to higher information asymmetry, investors could be less inclined to trade money-losing IPO stocks as frequently.

The daily trading volume is the daily number of trades from 30 days to 390 days after the IPO. We compute a mean (median) volume of 245,057 (159,739) trades for negative-earnings issuers, compared to 268,321 (179,418) for positive-earnings issuers. The mean difference is significant at the 1% level, while the median difference is significant at the 10% level. Thus, the volume of trades is significantly lower for negative-earnings issuers. For zero-revenue issuers, the mean (median) volume is 137,516 (90,476) trades, compared to 264,197 (172,317) for revenue-generating issuers. Both the mean and median differences are significant at the 1% level. Hence, aftermarket trading also involves significantly lower volumes for zero-revenue issuers than revenue-generating issuers.

We compute the stock return volatility as the standard deviation of the firm's daily stock returns minus the standard deviation of the S&P500's daily returns. We derive the average and median measures from 30 days to 390 days after the IPO. For negative-earnings issuers, the mean (median) stock return volatility is 3.69% (3.02%), compared to 2.43% (1.97%) for positive-earnings issuers. Mean and median differences are significant at the 1% level. Thus, IPO volatility is higher for money-losing firms as they are more difficult to value due to higher information

asymmetry. We also find a mean (median) stock return volatility of 3.68% (3.17%) for zero-revenue issuers, compared to 3.17% (2.54%) for revenue-generating issuers. All differences are significant at the 1% level. Our results are qualitatively unchanged when we perform the analysis using the matching sample. However, we note that negative-earnings and comparable positive-earnings issuers have equivalent underpricing levels and daily trading volumes. Zero-revenue issuers show no significant difference in underpricing, bid-ask spread, daily trading volume, and volatility relative to matched revenue-generating issuers.

[Insert Table 11 here]

Table 12 reports our multivariate regressions' results regarding money-losing firms' IPO outcomes. The dependent variables are underpricing, bid-ask spread, daily trading volume, and stock return volatility. Underpricing is the first-day return, while the other variables are measured for the period going from 30 days to 390 days after the IPO date. Our general regression specification is the following:

$$Underpricing\ or\ Bid\text{-}ask\ spread\ or\ Daily\ trading\ volume\ or\ Stock\ return\ volatility = \alpha + \beta_1\ Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\ SOX + \beta_3\ JOBS + \beta_4\ Tech + \beta_5\ Age + \beta_6\ Proceeds + \beta_7\ VC\text{-}backed + \beta_8\ Underwriter\ Prestige + \beta_9\ Institutional\ Ownership + \beta_{10}\ Leverage + \beta_{11}\ Market\text{-}to\text{-}Book\ Ratio + \beta_{12}\ Market\ Momentum + \beta_{13}\ Industry\ Fixed\ Effects + \beta_{14}\ Year\ Fixed\ Effects + \varepsilon \quad (5)$$

The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. Our control variables – SOX, JOBs, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum – are described in Table 1. Additionally, our regressions consider industry and year fixed effects.

Models 1 through 8 of Table 12 present results considering the full sample, while models 9 through 16 present results considering the matching sample. In models 1 and 2 of Table 12, we focus on underpricing as the dependent variable. In model 1, the negative-earnings dummy has a coefficient of 0.030, significant at the 10% level. Thus, negative-earnings IPOs are more underpriced than positive-earnings IPOs, suggesting that unprofitable firms leave more "money on the table" to compensate investors for taking superior risk exposure with their shares. Model 2 suggests that underpricing levels are comparable for zero-revenue and revenue-generating issuers, in line with our univariate findings.

In models 3 and 4 of Table 12, we consider the bid-ask spread as the dependent variable. The coefficients of the negative-earnings dummy (model 3) and of the zero-revenue dummy (model 4) are positive and significant at the 1% level (0.009 and 0.006, respectively). Since a larger bid-ask spread implies lower liquidity, we find that aftermarket trading is significantly less liquid for negative-earnings issuers than for positive-earnings issuers and for zero-revenue issuers as opposed to revenue-generating issuers. Using the matching sample, the coefficient of the negative-earnings dummy (model 11) remains positive and significant at the 1% level (0.009). The coefficient of the zero-revenue dummy (model 12), however, turns out not significant.

In models 5 and 6 of Table 12, we assess daily trading volume. In model 5, the negative-earnings dummy has a coefficient of -0.082, significant at the 10% level. In model 6, the zero-revenue dummy has a coefficient of -0.190, significant at the 5% level. Aftermarket trading, therefore, involves lower volumes for negative-earnings issuers than positive-earnings issuers and, to a greater extent, for zero-revenue issuers as opposed to revenue-generating issuers. Overall, money-losing IPO firms associate with higher information asymmetry, and higher

information asymmetry negatively affects aftermarket liquidity. In models 7 and 8 of Table 12, we investigate stock return volatility. The negative-earnings dummy (model 7) has a coefficient of 0.005, significant at the 1% level. The coefficient of the zero-revenue dummy (model 8) is also positive (0.004) and significant at the 5% level. Therefore, aftermarket volatility is significantly higher for negative-earnings issuers relative to positive-earnings issuers, and for zero-revenue issuers relative to revenue-generating issuers. Due to a higher risk profile, money-losing firms experience more volatile stock returns in the aftermarket. Using our matching sample, the coefficient of the negative-earnings dummy (model 15) remains positive and significant at the 1% level (0.004), while the marginal effect of the zero-revenue dummy is positive but not significant (model 16).

[Insert Table 12 here]

4.3.2. Long-term stock price performance

Figure 1 plots the equal-weighted average market model cumulative abnormal returns (CARs) of sample firms in the 36-months period following their IPO. Chart A presents results for negative-earnings issuers vs. positive-earnings issuers, and chart B presents results for zero-revenue issuers vs. revenue-generating issuers. Charts C and D present results again, in the same order, but considering the matching sample. Overall, abnormal returns follow a negative trend, a result in line with prior studies that document long-term underperformance for IPO firms on average (Ritter, 1991; Loughran, 1993; Loughran & Ritter, 1995). Besides, we note that all four categories of firms have comparable performances up to 6 months after the IPO date.

Chart A shows that negative-earnings issuers underperform positive-earnings issuers. While abnormal returns fluctuate around 0% through the entire period for positive-earnings

issuers, they steadily fall below -20% at month 36 for negative-earnings issuers. Chart B shows that zero-revenue issuers underperform revenue-generating issuers. Abnormal returns reach a level below -10% at month 36 for revenue-generating issuers while plummeting to -30% for zero-revenue issuers. Results are qualitatively unchanged using a matching sample (charts C and D).

Table 13 reports our results for the long-term performance of negative-earnings issuers vs. positive-earnings issuers, while Table 14 reports our results for the long-term stock price performance of zero-revenue issuers vs. revenue-generating issuers. In Panel A, we present event-time results, specifically equal-weighted market model cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs).[11] We focus on the 12-months, 24-months, and 36-months periods following the IPO. In Panel B, we present calendar-time results for the 36-months post-IPO period, based on the Fama & French (1993) and Carhart (1997) four-factor model. We provide event-time and calendar-time results in Panels C and D, respectively, considering the matching sample. The model specification is the following:

$$R_{p,t} = \alpha_{p,t} + \beta_p\, MKT_t + \delta_p\, SMB_t + \omega_p\, HML_t + \varphi_p\, UMD_t + \varepsilon_{p,t} \quad (6)$$

where $R_{p,t}$ is the value-weighted return of portfolio *p* in excess of the one-month T-bill rate in month *t*; $\alpha_{p,t}$ is the abnormal return of portfolio *p* in month *t*; MKT_t is the value-weighted return of the market in excess of the one-month T-bill rate in month *t*; SMB_t is the average return of small firms minus the average return of big firms in month *t*; HML_t is the average return of high book-to-market firms minus the average return of low book-to-market firms in month *t*; UMD_t is the average return of the highest performing firms (up) minus the average return of the lowest-

[11] Using a value-weighting scheme does not alter our main findings. Results are available upon request.

performing firms (down) in month t; β_p, δ_p, ω_p, and φ_p are the coefficients obtained for the MKT_t , SMB_t, HML_t , and UMD_t factors, respectively; and $\varepsilon_{p,t}$ is the error term.

In Panel A of Table 13, average CARs for negative-earnings issuers are -13.49% over 12 months, -24.05% over 24 months, and -23.53% over 36 months, all significant at the 1% level. We also find that, on average, BHARs are -12.72% over 12 months, -21.53% over 24 months, and -21.14% over 36 months, all significant at the 1% level. For positive-earnings issuers, average CARs are -5.27% over 12 months, -7.10 % over 24 months, and -8.17% over 36 months, all significant at the 1% level. Average BHARs are -5.16% over 12 months, -6.88% over 24 months, and -7.90% over 36 months, all significant at the 1% level. Thus, our event-time results show that negative-earnings issuers underperform positive-earnings issuers over the long run. In Panel B of Table 13, we present calendar-time results. The monthly alpha for negative-earnings issuers is -0.75%, significant at the 1% level, while it is -0.08% (but not significant) for positive-earnings issuers. Thus, our calendar-time results confirm the underperformance of negative-earnings issuers relative to positive-earnings issuers. Our results remain qualitatively unchanged using the matching sample (panels C and D).

In Panel A of Table 14, we find that average CARs for zero-revenue issuers are -1.78% over 12 months, -3.27% over 24 months, and -2.77% over 36 months, all significant at the 1% level. Average BHARs are -1.76% over 12 months, -3.22% over 24 months, and -2.74% over 36 months, all significant at the 1% level. Panel B shows that their 36-months alpha is -1.83%, significant at the 1% level. For revenue-generating issuers, average CARs are -16.98% over 12 months, -27.88% over 24 months, and -28.93% over 36 months, all significant at the 1% level. Average BHARs are -15.79% over 12 months, -24.54% over 24 months, and -25.35% over 36 months, all significant at the 1% level. Further, the monthly alpha is -0.44%, significant at the 1% level. In Panels C and D

of Table 14, the matching sample results confirm our previous findings. The analysis of cross-sectional returns (next section) should allow for more conclusive results.

[Insert Figure 1 and Tables 13 and 14 here]

Table 15 reports the cross-sectional analysis of sample firms' 36-months value-weighted cumulative abnormal returns (CARs). Our regression specification is the following:

$$36\text{-}months\ CARs = \alpha + \beta_1\ Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\ SOX\ + \beta_3\ JOBS + \beta_4\ Tech\ + \beta_5\ Age + \beta_6\ Proceeds + \beta_7\ VC\text{-}backed + \beta_8\ Underwriter\ Prestige + \beta_9\ Institutional\ Ownership + \beta_{10}\ Leverage + \beta_{11}\ Market\text{-}to\text{-}Book\ Ratio + \beta_{12}\ Market\ Momentum + \beta_{13}\ Industry\ Fixed\ Effects + \beta_{14}\ Year\ Fixed\ Effects + \varepsilon \quad (7)$$

The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. Our control variables – SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum – are as described in Table 1. Additionally, our regressions include industry and year-fixed effects.

Models 1 and 2 of Table 15 present results considering the full sample, while models 3 and 4 present results considering the matching sample. In model 1, we confirm that negative-earnings issuers significantly underperform positive-earnings issuers over the 36-months period following their IPO. The coefficient of the negative-earnings dummy is -0.168 and significant at the 1% level. Model 2 suggests no significant performance difference between zero-revenue and revenue-generating issuers. This result indicates that generating revenues has no idiosyncratic effect on long-term performance. It is the ability to generate profits, not revenues alone, that predicts a more successful outcome for IPO firms. Our findings hold when we consider the matching sample. The coefficient of the negative-earnings dummy is -0.101 and significant at the

10% level. Overall, our event-time, calendar-time, and cross-sectional results confirm that money-losing firms are poorer performers over the long run.

[Insert Table 15 here]

4.3.3. Survival

In this section, we focus on the survivability on the stock exchange for our sample firms. In Table 11, we calculate delisting rates for each category of IPO firms. The delisting rate represents the percentage of firms that delist for negative reasons (excluding mergers and acquisitions) within three years of their IPO. Typically, delisting firms are liquidated or dropped from their exchange, and they cease to exist as publicly-traded entities. For negative-earnings issuers, the delisting rate is 7.54%, compared to only 1.95% for positive-earnings issuers. The difference is significant at the 1% level, indicating a significantly lower likelihood of survival for negative-earnings issuers. As for zero-revenue issuers, they have comparable delisting rates relative to revenue-generating issuers. We derive the same results from our matching sample.

Table 16 reports results of our multivariate survival analysis. Models 1 through 4 present results using the full sample, while models 5 through 8 present results using our matching sample. In models 1 and 2, we perform probit regressions, where the dependent variable is the likelihood of delisting for negative reasons within three years of the IPO. The dependent variable takes the value 1 if the issuing firm delists, and 0 otherwise. Our specification is the following:

$$\begin{aligned} &Likelihood\ of\ delisting \\ &\quad = \alpha + \beta_1\, Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \beta_2\, Tech \\ &\quad + \beta_3\, Age + \beta_4\, Proceeds + \beta_5\, VC - backed + \beta_6\, Underwriter\ Prestige \\ &\quad + \beta_7\, Institutional\ Ownership + \beta_8\, Leverage + \beta_9\, Market - to \\ &\quad - Book\ Ratio + \beta_{10}\, Market\ Momentum + \varepsilon \quad (8) \end{aligned}$$

In models 3 and 4 of Table 16, we also perform Cox proportional hazards' regressions. Our specification is the following:

$$h_i(t) = h_0(t) \times exp\,(\beta_1\, Negative\text{-}Earnings\ Dummy\ (Zero\text{-}Revenue\ Dummy) + \\ +\beta_2\, Tech + \beta_3\, Age + \beta_4\, Proceeds + \beta_5\, VC - backed + \beta_6\, Underwriter\ Prestige + \\ \beta_7\, Institutional\ Ownership + \beta_8\, Leverage + \beta_9\, Market - to - Book\ Ratio + \\ \beta_{10}\, Market\ Momentum + \varepsilon\,) \quad (9)$$

$h_i(t)$ is the expected hazard for rival firm *i* at time *t*. $h_0(t)$ is the baseline hazard and represents the hazard when all predictors (control variables) are equal to zero. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. Our control variables – Tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum – are described in Table 1.

Model 1 of Table 16 reports our probit regressions' results (coefficients and marginal effects) for negative-earnings issuers. The coefficient of the negative-earnings dummy is positive (0.571) and significant at the 1% level. The likelihood of delisting increases by 5.5 percentage points for negative-earnings issuers relative to positive-earnings issuers. Considering our matching sample, the coefficient of the negative-earnings dummy remains positive (0.542) and significant at the 5% level (model 5). Further, we note that issuers who are older, have higher institutional ownership, and are less levered are more likely to survive after their IPO.

Model 2 of Table 16 presents the probit regressions' results for zero-revenue issuers. The coefficient of the zero-revenue dummy is not statistically significant. Thus, the inability to generate revenues has no significant effect on survival. Further, firm age, IPO size, and institutional ownership decrease the probability of failure, while leverage positively affects it.

In model 3 of Table 16, we report our Cox proportional hazards regressions' results (hazard ratios and coefficients) for negative-earnings issuers. A hazard ratio greater than 1 translates into a positive coefficient and means that a given control variable increases the likelihood of delisting. A hazard ratio smaller than 1 translates into a negative coefficient and means that a given control variable decreases the likelihood of delisting. We find that the negative-earnings dummy has a hazard ratio of 2.167, equivalent to a coefficient of 0.774, significant at the 5% level. Thus, at any particular time, there are twice as many issuers that delist for negative reasons in the negative-earnings category as there are in the positive-earnings category. This result is confirmed when we perform the analysis on the matching sample. The negative-earnings dummy exhibits a hazard ratio of 2.623, equivalent to a coefficient of 0.964, significant at the 10% level (model 7).

Model 4 of Table 16 presents the Cox proportional hazards regressions' results for zero-revenue issuers. The model confirms that the absence of revenues is not a strong determinant of IPO survival.

Overall, we show evidence that it is harder for money-losing firms to meet their exchange listing requirements as the risk of post-IPO failure is high.

[Insert Table 16 here]

4.4. Robustness test: Excluding the technology bubble years

Our IPO sample starts in 1998 and runs until 2018. In this section, we examine the robustness of our findings by excluding the technology bubble years. Table 17 presents our results for IPO motivations, IPO valuation, and IPO outcomes, excluding 1998, 1999, and 2000 from the sample period. For brevity, we only report the coefficients of the negative-earnings

dummy and the zero-revenue dummy variables. Overall, our findings remain qualitatively unchanged, excluding the technology bubble period.

[Insert Table 17 here]

5. Conclusion

Money-losing IPOs have recently raised important cash in the U.S. market, and investors have assigned high valuation premia to these IPOs. Despite recognizing this excitement for unprofitable IPO firms in the current financial press and among practitioners, the academic literature has yet to distinguish money-losing firms from profitable ones when examining the IPO market. Using a sample of 1,505 U.S. IPOs from 1998 to 2018, we investigate how unprofitable IPO firms compare to profitable issuers in terms of motivations for going public, IPO valuation, and post-IPO outcomes. We find that money-losing firms go public to raise the capital needed to fund growth opportunities. They use an extensive portion of their IPO proceeds for R&D investments. We also find that they take advantage of favorable market conditions when going public and that they get actively involved on the M&A market after their IPO, particularly as targets. Going public, therefore, facilitates their access to acquiring firms for the completion of M&A deals that are beneficial to their development. We also find that their IPO valuations are lower than the valuations of profitable issuers. We report that innovation and growth opportunities (pre-IPO R&D) are particularly important factors for their valuation. As for outcomes, we find that money-losing firms face higher underpricing, lower liquidity, lower trading volume, and higher volatility in the aftermarket. Over the long run, they underperform relative to profitable issuers and are significantly less likely to survive.

We also consider the case of zero-revenue IPOs, as a particular subgroup of negative earnings IPOs. These firms have also raised substantial capital in recent years (10% of total sample proceeds from 2014 to 2018). We compare zero-revenue IPOs to revenue-generating IPOs and find that zero-revenue IPO firms are earlier-stage firms that invest an important percentage of their proceeds in R&D. We, however, find that zero-revenue IPOs are less likely to engage in post-IPO M&A activities, obtain lower valuations, and experience lower liquidity, lower trading volume, and higher volatility in the aftermarket. Finally, we find that the absence of revenues has no significant effect on the long-term stock price performance and firms' survivability. It is the ability to generate profits rather than revenues that could predict successful outcomes for IPO firms over the long run. Overall, our results confirm the particularity of these IPOs and should attenuate investors' hype around money-losing IPOs and the belief that these IPOs could become the next Amazon or Netflix. However, caution is in order. Money-losing firms could be profitable if they focus on profit rather than growth. For example, after one year from its IPO, Spotify has become profitable by cutting its marketing and research and development costs. However, this is an exception rather than a rule.

References

Aggarwal, R., Bhagat, S., & Rangan, S. (2009). The impact of fundamentals on IPO valuation. *Financial Management*, *38*(2), 253–284.

Akhigbe, A., Borde, S. F., & Whyte, A. M. (2003). Does an industry effect exist for initial public offerings? *Financial Review*, *38*(4), 531–551. https://doi.org/10.1111/1540-6288.00059

Akhigbe, A., Johnston, J., & Madura, J. (2006). Long-term industry performance following IPOs. *Quarterly Review of Economics and Finance*, *46*(4), 638–651. https://doi.org/10.1016/j.qref.2005.01.004

Aktas, N., Andries, K., Croci, E., & Ozdakak, A. (2019). Stock market development and the financing role of IPOs in acquisitions. *Journal of Banking and Finance*, *98*, 25–38. https://doi.org/10.1016/j.jbankfin.2018.10.015

Alexander, J. C. (1993). The lawsuit avoidance theory of why initial public offerings are underpriced. *UCLA Law Review*, *41*(1), 17–73.

Allen, F., & Faulhaber, G. R. (1989). Signalling by underpricing in the IPO market. *Journal of Financial Economics*, *23*(2), 303–323. https://doi.org/10.1016/0304-405X(89)90060-3

Altinkiliç, O., & Hansen, R. S. (2000). Are there economies of scale in underwriting fees? Evidence of rising external financing costs. *Review of Financial Studies*, *13*(1), 191–218. https://doi.org/10.1093/rfs/13.1.191

Arena, M., & Ferris, S. (2017). A survey of litigation in corporate finance. *Managerial Finance*, *43*(1), 4–18. https://doi.org/10.1108/MF-07-2016-0199

Arena, M., & Julio, B. (2015). The effects of securities class action litigation on corporate liquidity and investment policy. *Journal of Financial and Quantitative Analysis*, *50*(1–2),

251–275. https://doi.org/10.1017/S0022109015000010

Aslan, H., & Kumar, P. (2010). Lemons or cherries? Growth opportunities and market temptations in going public and private. *Journal of Financial and Quantitative Analysis*, *46*(2), 489–526. https://doi.org/10.1017/S0022109010000761

Asquith, P., & Mullins, D. W. (1986). Equity issues and offering dilution. *Journal of Financial Economics*, *15*(1–2), 61–89. https://doi.org/10.1016/0304-405X(86)90050-4

Autore, D. M., Bray, D. E., & Peterson, D. R. (2009). Intended use of proceeds and the long-run performance of seasoned equity issuers. *Journal of Corporate Finance*, *15*(3), 358–367. https://doi.org/10.1016/J.JCORPFIN.2008.12.003

Baker, M. P., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, *57*(1), 1–32. https://doi.org/10.1111/1540-6261.00414

Baker, M., & Wurgler, J. (2000). The equity share in new issues and aggregate stock returns. *The Journal of Finance*, *55*(5), 2219–2257. https://doi.org/10.1111/0022-1082.00285

Ball, E., Chiu, H. H., & Smith, R. (2011). Can VCs time the market? An analysis of exit choice for venture-backed firms. *Review of Financial Studies*, *24*(9), 3105–3138. https://doi.org/10.1093/rfs/hhr042

Banerjee, S., Dai, L., & Shrestha, K. (2011). Cross-country IPOs: what explains differences in underpricing? *Journal of Corporate Finance*, *17*(5), 1289–1305. https://doi.org/10.1016/j.jcorpfin.2011.06.004

Beatty, P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, *15*, 213–232.

Bessler, W., & Thies, S. (2006). Initial public offerings, subsequent seasoned equity offerings, and long-run performance: evidence from IPOs in Germany. *Journal of Entrepreneurial*

Finance, *11*(3), 1–37.

Bradley, D., & Yuan, X. (2013). Information spillovers around seasoned equity offerings. *Journal of Corporate Finance*, *21*(1), 106–118. https://doi.org/10.1016/j.jcorpfin.2013.01.006

Brau, James C; Li, M., & Shi, J. (2007). Do secondary shares in the IPO process have a negative effect on aftermarket performance? *Journal of Banking and Finance*, *31*(9), 2612–2631. https://doi.org/10.1016/j.jbankfin.2006.09.016

Brau, J. C., & Fawcett, S. E. (2006). Initial public offerings: an analysis of theory and practice. *The Journal of Finance*, *61*(1), 399–436.

Braun, M., & Larrain, B. (2009). Do IPOs affect the prices of other stocks? Evidence from emerging markets. *The Review of Financial Studies*, *22*(4), 1505–1544.

Brav, A., & Gompers, P. A. (1997). Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and nonventure capital-backed companies. *The Journal of Finance*, *52*(5), 1791–1821.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, *LII*(1), 57–82.

Carter, R. B., Dark, F. H., & Singh, A. K. (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. *The Journal of Finance*, *53*(1), 285–311.

Celikyurt, U., Sevilir, M., & Shivdasani, A. (2010). Going public to acquire? The acquisition motive in IPOs. *Journal of Financial Economics*, *96*(3), 345–363. https://doi.org/10.1016/j.jfineco.2010.03.003

Chemmanur, T. J., He, S., & Hu, G. (2009). The role of institutional investors in seasoned equity offerings. *Journal of Financial Economics*, *94*(3), 384–411. https://doi.org/10.1016/j.jfineco.2008.12.011

Chemmanur, T. J., He, S., & Nandy, D. K. (2010). The going-public decision and the product market. *Review of Financial Studies*, *23*(5), 1855–1908.

Chemmanur, T. J., Hu, G., & Huang, J. (2010). The role of institutional investors in initial public offerings. *The Review of Financial Studies*, *23*(12), 4496–4540. https://doi.org/10.1093/rfs/hhq109

Chemmanur, T., & Yan, A. (2017). Product market advertising, heterogeneous beliefs, and the long-run performance of initial public offerings. *Journal of Corporate Finance*, *46*, 1–24. https://doi.org/10.1016/j.jcorpfin.2017.06.010

Cliff, M. T., & Denis, D. J. (2004). Do initial public offering firms purchase analyst coverage with underpricing? *Journal of Finance*, *59*(6), 2871–2901. https://doi.org/10.1111/j.1540-6261.2004.00719.x

Corwin, S. A., Harris, J. H., & Lipson, M. L. (2004). The development of secondary market liquidity for NYSE-listed IPOs. *The Journal of Finance*, *59*(5), 2339–2373.

Cotei, C., & Farhat, J. (2013). Informational externalities of initial public offerings: does venture capital backing matter? *Journal of Economics and Finance*, *37*(1), 80–99. https://doi.org/10.1007/s12197-010-9167-2

Dong, M., Michel, J. S., & Pandes, J. A. (2011). Underwriter quality and long-run IPO performance. *Financial Management*, *40*(1), 219–251. https://doi.org/10.1111/j.1755-053X.2010.01140.x

Drake, P. D., & Vetsuypens, M. R. (1993). IPO Underpricing and insurance against legal liability. *Financial Management*, *22*(1), 64. https://doi.org/10.2307/3665966

Ellul, A., & Pagano, M. (2006). IPO underpricing and after-market liquidity. *Review of Financial Studies*, *19*(2), 381–421. https://doi.org/10.1093/rfs/hhj018

Engelen, P. J., Heugens, P., van Essen, M., Turturea, R., & Bailey, N. (2020). The impact of stakeholders' temporal orientaton on short- and long-term IPO outcomes: A meta-analysis. *Long Range Planning*, *53*(2), 101853. https://doi.org/10.1016/j.lrp.2018.10.003

Fama, F., & French, R. (1993). Common risk factors in the returns stocks and bonds. *Journal of Financial Economics*, *33*, 3–56.

Field, L. C., & Lowry, M. (2009). Institutional versus individual investment in IPOs: the importance of firm fundamentals. *Journal of Financial and Quantitative Analysis*, *44*(3), 489–516.

Gounopoulos, D., & Pham, H. (2018). Specialist CEOs and IPO survival. *Journal of Corporate Finance*, *48*, 217–243. https://doi.org/10.1016/j.jcorpfin.2017.10.012

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics*, *60*(2–3), 137–243.

Grinblatt, M., & Hwang, C. Y. (1989). Signalling and the pricing of new issues. *The Journal of Finance*, *44*(2), 393–420. https://www.jstor.org/stable/2328596

Hanley, K. W., & Hoberg, G. (2012). Litigation risk, strategic disclosure and the underpricing of initial public offerings. *Journal of Financial Economics*, *103*(2), 235–254. https://doi.org/10.1016/j.jfineco.2011.09.006

Hao, G. Q. (2011). Securities litigation, withdrawal risk and initial public offerings. *Journal of Corporate Finance*, *17*(3), 438–456. https://doi.org/10.1016/j.jcorpfin.2010.12.005

Hao, Q. (2007). Laddering in initial public offerings. *Journal of Financial Economics*, *85*(1), 102–122. https://doi.org/10.1016/j.jfineco.2006.05.008

Hensler, D. A. (1995). Litigation costs and the underpricing of initial public offerings. *Managerial and Decision Economics*, *16*(2), 111–128. https://doi.org/10.1002/mde.4090160203

Hensler, D. A., Rutherford, R. C., & Springer, T. M. (1997). The survival of initial public offerings in the aftermarket. *The Journal of Financial Research*, *20*(1), 93–110.

Houston, J., James, C., & Karceski, J. (2006). What a difference a month makes: stock analyst valuations following initial public offerings. *Journal of Financial and Quantitative Analysis*, *41*(1), 111–137. https://doi.org/10.1017/S0022109000002441

Hovakimian, A., & Hutton, I. (2010). Merger-motivated IPOs. *Financial Management*, *39*(4), 1547–1573.

Hsieh, J., Lyandres, E., & Zhdanov, A. (2011). A theory of merger-driven IPOs. *The Journal of Financial and Quantitative Analysis*, *46*(5), 1367–1405.

Hsu, H.-C., Reed, A. V, & Rocholl, J. (2010). The new game in town: competitive effects of IPOs. *The Journal of Finance*, *65*(2), 495–528.

Hughes, P. J., & Thakor, A. V. (1992). Litigation risk, intermediation, and the underpricing of initial public offerings. *The Review of Financial Studies*, *5*(4), 709–742.

Ibbotson, R. G. (1975). Price performance of common stock new issues. *Journal of Financial Economics*, *2*(3), 235–272. https://doi.org/10.1016/0304-405X(75)90015-X

Jain, B. A., Jayaraman, N., & Kini, O. (2008). The path-to-profitability of internet IPO firms. *Journal of Business Venturing*, *23*(2), 165–194. https://doi.org/10.1016/j.jbusvent.2007.02.004

Jain, B. A., & Kini, O. (1999). The life cycle of initial public offering firms. *Journal of Business Finance and Accounting*, *26*(9–10), 1281–1307.

Jain, B. A., & Kini, O. (2000). Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance and Accounting*, *27*(9), 1133–1183.

Jain, B. A., & Kini, O. (2008). The impact of strategic investment choices on post-issue operating

performance and survival of US IPO firms. *Journal of Business Finance and Accounting*, *35*(3–4), 459–490. https://doi.org/10.1111/j.1468-5957.2007.02072.x

Karpoff, J. M., Lee, D. S., & Martin, G. S. (2008). The cost to firms of cooking the books. *Journal of Financial and Quantitative Analysis*, *43*(3), 581–611. https://doi.org/10.1017/S0022109000004221

Kim, M., & Ritter, J. R. (1999). Valuing IPOs. *Journal of Financial Economics*, *53*(3), 409–437. https://doi.org/10.1016/S0304-405X(99)00027-6

Kim, W., & Weisbach, M. S. (2008). Motivations for public equity offers: an international perspective. *Journal of Financial Economics*, *87*(2), 281–307. https://doi.org/10.1016/j.jfineco.2006.09.010

Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, *46*(5), 1295–1333. https://doi.org/10.1017/S0022109011000251

Lee, S.-H., Bach, S. B., & Baik, Y. (2011). The impact of IPOs on the values of directly competing incumbents. *Strategic Entrepreneurship Journal*, *5*(2), 158–177. https://doi.org/10.1002/sej

Leland, H. E., & Pyle, D. H. (1977). Informational Asymmetries , Financial Structure , and Financial Intermediation. *The Journal of Finance*, *32*(2), 371–387.

Lerner, J. (1994). Venture capitalists and the decision to go public. *Journal of Financial Economics*, *35*(3), 293–316.

Lin, H. L., Pukthuanthong, K., & Walker, T. J. (2013). An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance*, *19*(1), 56–77. https://doi.org/10.1016/j.jcorpfin.2012.10.003

Loughran, T. (1993). NYSE vs NASDAQ returns: market microstructure or the poor performance of initial public offerings? *Journal of Financial Economics*, *33*(2), 241–260.

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance*, *50*, 23–51. https://doi.org/10.1016/j.jcorp

Loughran, T., & Ritter, J. R. (1997). The operating performance of firms conducting seasoned equity offerings. *The Journal of Finance*, *52*(5), 1823–1850. https://doi.org/10.1111/j.1540-6261.1997.tb02743.x

Loughran, T., & Ritter, J. R. (2004). Why has IPO underpricing changed over time? *Financial Management*, *33*(3), 5–37.

Lowry, M. (2003). Why does IPO volume fluctuate so much? *Journal of Financial Economics*, *67*(November 2001), 3–40.

Lowry, M., Officer, M. S., & Schwert, W. G. (2010). The variability of IPO initial returns. *The Journal of Finance*, *65*(2), 425–465.

Lowry, M., & Shu, S. (2002). Litigation risk and IPO underpricing. *Journal of Financial Economics*, *65*(3), 309–335. https://doi.org/10.1016/S0304-405X(02)00144-7

Maddala, G. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*.

Masulis, R. W., & Korwar, A. N. (1986). Seasoned equity offerings: an empirical investigation. *Journal of Financial Economics*, *15*(1–2), 91–118. https://doi.org/http://dx.doi.org/10.1016/0304-405X(86)90051-6

Matanova, N., Steigner, T., Yi, B., & Zheng, Q. (2019). Going concern opinions and IPO pricing accuracy. *Review of Quantitative Finance and Accounting*, *53*(1), 195–238. https://doi.org/10.1007/s11156-018-0747-0

McGilvery, A., Faff, R., & Pathan, S. (2012). Competitive valuation effects of Australian IPOs.

International Review of Financial Analysis, *24*, 74–83. https://doi.org/10.1016/j.irfa.2012.08.002

Michaely, R., & Shaw, W. H. (1994). The pricing of initial public offerings: tests of adverse-selection and signaling theories. *Review of Financial Studies*, *7*(2), 279–319.

Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, *90*(2), 127–151. https://doi.org/10.1016/j.jfineco.2007.11.008

Ofek, E., & Richardson, M. (2003). Dotcom mania : the rise and fall of internet stock prices. *The Journal of Finance*, *58*(3), 1113–1137.

Pommet, S. (2017). The impact of the quality of VC financing and monitoring on the survival of IPO firms. *Managerial Finance*, *43*(4), 440–451. https://doi.org/10.1108/MF-06-2016-0178

Poulsen, A. B., & Stegemoller, M. (2008). Moving from private to public ownership: selling out to public firms versus initial public offerings. *Financial Management*, *37*(1), 81–101. https://doi.org/10.1111/j.1755-053X.2008.00005.x

Purnanandam, A. K., & Swaminathan, B. (2004). Are IPOs really underpriced? *Review of Financial Studies*, *17*(3), 811–848. https://doi.org/10.1093/rfs/hhg055

Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance*, *46*(1), 3–27.

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing and allocations. *The Journal of Finance*, *57*(4), 1795–1828.

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics*, *15*(1–2), 187–212. https://doi.org/10.1016/0304-405X(86)90054-1

Santos, F. (2017). IPO market timing with uncertain aftermarket retail demand. *Journal of Corporate Finance*, *42*, 247–266. https://doi.org/10.1016/j.jcorpfin.2016.11.013

Saunders, A., & Steffen, S. (2011). The costs of being private: evidence from the loan market. *The Review of Financial Studies*, *24*(12), 4091–4122.

Schenone, C. (2010). Lending relationships and information rents: do banks exploit their information advantages? *The Review of Financial Studies*, *23*(3), 1149–1199.

Schultz, P., & Zaman, M. (2001). Do the individuals closest to internet firms believe they are overvalued? *Journal of Financial Economics*, *59*(3), 347–381.

Signori, A. (2018). Zero-revenue IPOs. *International Review of Financial Analysis*, *57*, 106–121. https://doi.org/10.1016/j.irfa.2018.03.003

Slovin, M. B., Sushka, M. E., & Polonchek, J. A. (1992). Informational externalities of seasoned equity issues: differences between banks and industrial firms. *Journal of Financial Economics*, *32*(1), 87–101. https://doi.org/10.1016/0304-405X(92)90026-T

Spiegel, M., & Tookes, H. (2007). Dynamic competition , innovation and strategic financing. *Working Paper, Yale University*.

Spiess, D. K., & Affleck-Graves, J. (1995). Underperformance in long-run stock returns following seasoned equity offerings. *Journal of Financial Economics*, *38*(3), 243–267. https://doi.org/10.1016/0304-405X(94)00817-K

Szewczyk, S. H. (1992). The intra-industry transfer of information inferred from announcements of corporate security offerings. *The Journal of Finance*, *47*(5), 1935–1945.

Tiniç, S. M. (1988). Anatomy of initial public offerings of common Stock. *The Journal of Finance*, *43*(4), 789–822.

Walker, M. D., & Yost, K. (2008). Seasoned equity offerings: what firms say, do, and how the market reacts. *Journal of Corporate Finance*, *14*, 376–386. https://doi.org/10.1016/j.jcorp

Walker, T., Turtle, H. J., Pukthuanthong, K., & Thiengtham, D. (2015). Legal opportunism,

litigation risk, and IPO underpricing. *Journal of Business Research*, *68*(2), 326–340. https://doi.org/10.1016/j.jbusres.2014.06.025

Welch, I. (1989). Seasoned offerings, imitation costs, and the underpricing of initial public offerings. *The Journal of Finance*, *44*(2), 421–449.

Yi, J. (2001). Pre-offering earnings and the long-run performance of IPOs. *International Review of Financial Analysis*, *10*, 53–67.

Zhu, Y. (2009). The relation between IPO underpricing and litigation risk revisited: changes between 1990 and 2002. *Financial Management*, *38*(2), 323–355. https://doi.org/10.1111/j.1755-053X.2009.01038.x

Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies*, *62*(3), 425–448.

Figure 1. *IPO Long-Term Stock Price Performance*

Figure 1 plots the 36-months equal-weighted market model cumulative abnormal returns (CARs) of our sample IPO firms depending on the category they belong to: negative-earnings, positive-earnings, zero-revenue or positive-revenue. The timeline (in months) is shown on the x-axis, where date zero depicts the firms' IPO date.

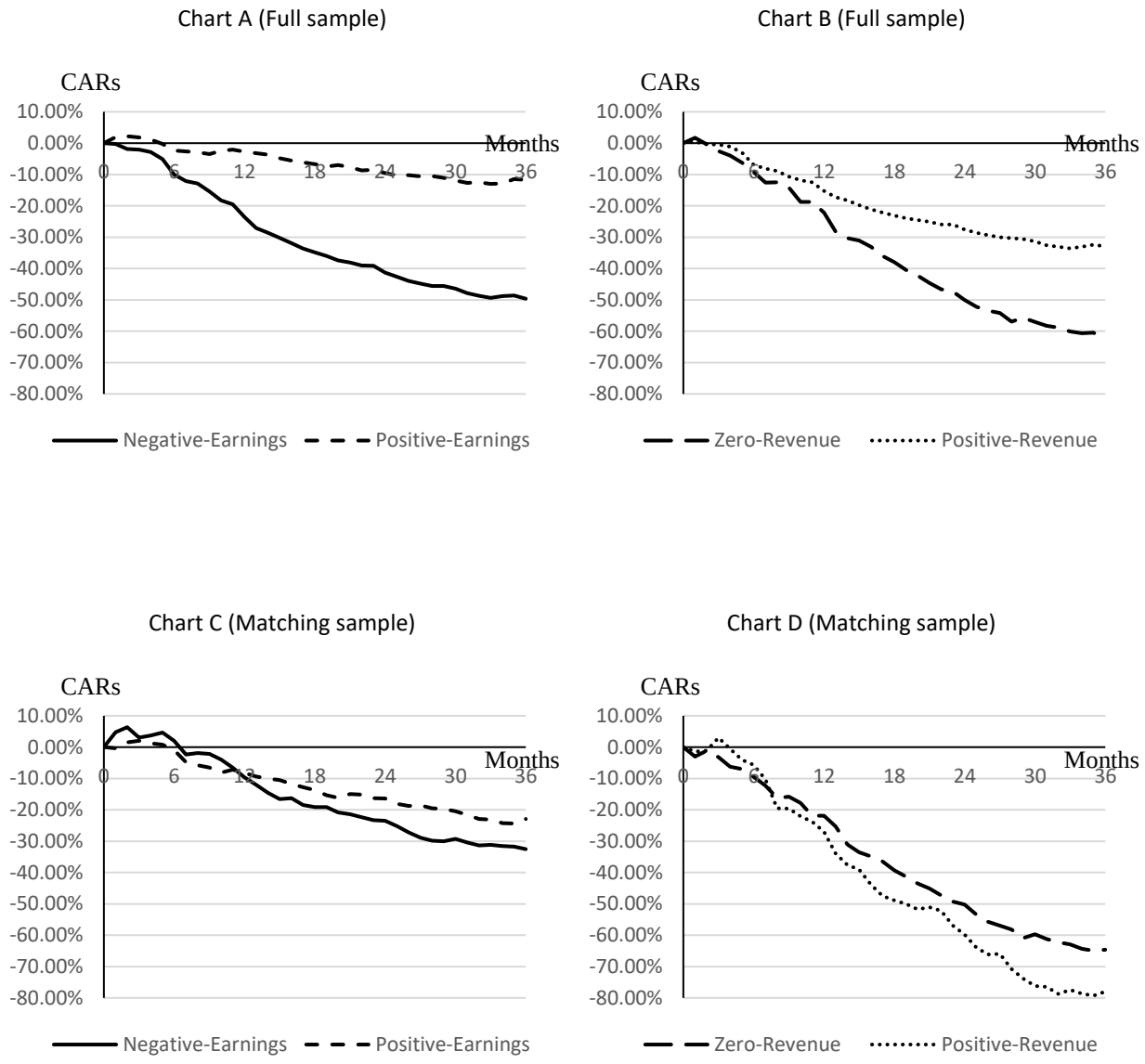

Table 1. *Variable definitions*

Variable	Definition
Before the IPO	
Negative-Earnings Dummy	Dummy variable that takes the value 1 if the net income of the firm is below zero in the year prior to the IPO, and 0 otherwise
Zero-Revenue Dummy	Dummy variable that takes the value 1 if the revenue of the firm is equal to zero in the year prior to the IPO, and 0 otherwise
Pre-IPO IBEIRD	Income before extraordinary items and research and development expenses in the year prior to the IPO
Pre-IPO BV of Equity	Book value of equity in the year prior to the IPO
Pre-IPO Sales	Logarithm of the revenue in the year prior to the IPO
Pre-IPO R&D	Logarithm of the R&D expenses in the year prior to the IPO
Industry IPOs PS Ratio	Average price-to-sales ratio of recent IPOs in the same industry
Insider Ownership	Percentage of the post-IPO firm owned by pre-offering shareholders
Pre-IPO Size	Logarithm of total assets in the year prior to the IPO
Pre-IPO Leverage	Total liabilities divided by total assets in the year prior to the IPO
Boom Years	Dummy variable that takes the value 1 if the IPO occurs between January 1998 and March 2000, and 0 otherwise
Crash Years	Dummy variable that takes the value 1 if the IPO occurs between April 2000 and December 2001, or between December 2007 and June 2009, and 0 otherwise
At the IPO year	
Age	Logarithm of the difference between the IPO year and the founding year (collected from Jay Ritter's website)
Size	Logarithm of total assets
Proceeds	Logarithm of the offer gross proceeds
VC-Backed	Dummy variable that takes the value 1 if the firm is venture-backed, and 0 otherwise
Underwriter Prestige	Logarithm of the underwriter prestige (collected from Jay Ritter's website)
Institutional Ownership	Percentage of the firm owned by institutional investors at the end of the quarter (March 31st, June 30th, September 30st or December 31st) immediately following the IPO
Leverage	Total liabilities divided by total assets
Market-to-Book	Stock price multiplied by the number of shares outstanding, divided by the book value of equity
Market Momentum	S&P500 index return over the 100 trading days before the IPO
Tech	Dummy variable that takes the value 1 if the firm operates in SIC code industries 35 (computer hardware), 36 (communications equipment, electronics), 38 (various devices), 48 (communications services) and 73 (software), and 0 otherwise
IPO Valuation	Logarithm of the product of the offer price and the number of shares offered
SOX	Dummy variable that takes the value 1 if the firm goes public following the SOX Act (July 31st, 2002 and after), and 0 otherwise
JOBS	Dummy variable that takes the value 1 if the firm goes public following the JOBS Act (April 5th, 2012 and after), and 0 otherwise
After the IPO	
CAPEX	3-year average of post-IPO capital expenditures divided by total assets
R&D	3-year average of post-IPO R&D expenses divided by total assets
Underpricing	First-day return computed as the first-day closing price divided by the IPO offer price, minus 1
Bid-Ask Spread	Difference between the ask and bid prices divided by the midpoint of the ask and bid prices, from 30 days to 390 days after the IPO
Daily Trading Volume	Daily number of trades from 30 days to 390 days after the IPO. Logarithm of this number in multivariate regressions
Stock Return Volatility	Standard deviation of the daily stock returns minus standard deviation of the S&P500 index returns, from 30 days to 390 days after the IPO
Delisting Rate	Percentage of firms that delist for reasons other than mergers and acquisitions within 3 years of the IPO

Table 2. *Distribution of IPOs*

This table reports the number and percentage of negative-earnings and zero-revenue IPOs categorized by data year (Panel A) and by industry (Panel B). IPO firms are put in the "negative-earnings" category if they report a net income inferior to zero in the year prior to the offering. IPO firms are placed in the "zero-revenue" category if they report a revenue equal to zero in the year prior to the offering.

	All IPOs	Negative-earnings IPOs		Zero-revenue IPOs	
		Number	*Percentage*	*Number*	*Percentage*
Panel A: Distribution by year					
1998	108	48	44%	1	1%
1999	213	161	76%	8	4%
2000	134	104	78%	6	4%
2001	31	20	65%	1	3%
2002	33	15	45%	0	0%
2003	32	15	47%	1	3%
2004	87	50	57%	6	7%
2005	76	33	43%	1	1%
2006	84	40	48%	5	6%
2007	87	45	52%	6	7%
2008	8	3	38%	0	0%
2009	26	6	23%	0	0%
2010	45	23	51%	1	2%
2011	47	28	60%	4	9%
2012	63	30	48%	5	8%
2013	88	58	66%	6	7%
2014	111	79	71%	21	19%
2015	67	56	84%	17	25%
2016	53	39	74%	8	15%
2017	72	55	76%	15	21%
2018	40	34	85%	12	30%
Total	1,505	942	63%	124	8%
Panel B: Distribution by industry					
Mining	46	23	2%	0	0%
Construction	10	1	0%	0	0%
Manufacturing	662	449	48%	115	93%
Transportation	23	5	1%	0	0%
Communications	56	41	4%	3	2%
Wholesale Trade	36	10	1%	1	1%
Retail Trade	111	34	4%	2	2%
Services	552	372	39%	3	2%
Other	9	7	1%	0	0%
Total	1,505	942	100%	124	100%

Table 3. *Descriptive statistics*

In this table, we report IPO year descriptive statistics for our sample IPO firms depending on their category: negative-earnings or positive-earnings, and zero-revenue or positive-revenue. Age, size, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, market momentum and tech are defined in Table 1. We present value differences between negative-earnings and positive-earnings IPOs, and between zero-revenue and positive-revenue IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings IPOs			Positive-Earnings IPOs			Wilcoxon Difference Significance	
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median
Variable								
Age (years)	11.30	7.00	15.16	25.96	15.00	28.57	-14.66***	-8.00***
Size ($million)	305.61	120.08	518.23	608.34	256.82	732.93	-302.73***	-136.75***
Proceeds ($million)	122.21	75.00	202.85	242.05	104.00	975.64	-119.83***	-29.00***
VC-Backed (% of firms)	71	-	-	30	-	-	41***	-
Underwriter Prestige	7.99	9.10	1.65	7.89	9.10	1.75	0.10	0.00
Institutional Ownership (%)	30.77	25.48	23.94	35.87	27.95	27.31	-5.09***	-2.47
Leverage (%)	34.90	28.51	28.89	47.24	46.10	28.38	-12.34***	-17.59***
Market-to-Book	6.33	4.43	15.14	5.39	3.25	31.41	0.94***	1.18***
Market Momentum (%)	0.99	1.05	1.62	1.13	1.34	1.83	-0.14*	-0.29**
Tech (% of firms)	56.00	-	-	44.00	-	-	12.00**	
N		942			563		Total = 1,505	
	Zero-Revenue IPOs			Positive-Revenue IPOs			Wilcoxon Difference Significance	
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median
Variable								
Age (years)	6.07	5.00	4.66	17.74	9.00	23.05	-11.67***	-4.00***
Size ($million)	128.19	99.21	143.81	444.95	161.22	644.35	-316.76***	-62.02***
Proceeds ($million)	74.88	65.90	50.42	175.32	83.70	646.77	-100.44***	-17.80***
VC-Backed (% of firms)	80	-	-	54	-	-	26***	-
Underwriter Prestige	7.41	8.10	1.88	8.00	9.10	1.66	-0.60***	-1.00
Institutional Ownership (%)	32.20	30.38	22.16	32.71	26.27	25.63	-0.51	4.11
Leverage (%)	20.14	16.03	14.82	41.24	34.65	29.66	-21.11***	-18.62***
Market-to-Book	5.07	3.84	5.08	6.06	4.06	23.58	-0.99	-0.22
Market Momentum (%)	0.77	0.85	1.34	1.07	1.14	1.73	-0.29**	-0.29**
Tech (% of firms)	15	-	-	55	-	-	-40***	
N		124			1,381		Total = 1,505	

Table 4. *IPO motivations – Post-IPO investments – Univariate statistics*

In this table, we report the three-year post-IPO capital expenditures (CAPEX) and research and development expenses (R&D) for our sample IPO firms depending on the category they belong to: negative-earnings or positive-earnings, and zero-revenue or positive-revenue. CAPEX and R&D are defined in Table 1. We present value differences between negative-earnings and positive-earnings IPOs, and between zero-revenue and positive-revenue IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings IPOs			Positive-Earnings IPOs			Wilcoxon Difference Significance	
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*
Full sample								
CAPEX (%)	4.54%	3.18%	4.73%	5.47%	4.15%	5.08%	-0.93%***	-0.97%***
R&D (%)	16.32%	12.33%	16.90%	3.64%	0.00%	6.34%	12.68%***	12.33%***
N		942			563		Total = 1,505	
Matching sample								
CAPEX (%)	5.46%	3.56%	5.37%	5.04%	3.76%	4.99%	0.42%	-0.20%
R&D (%)	12.18%	8.83%	16.22%	6.40%	4.30%	7.74%	5.78%***	4.53%**
N		286			286		Total = 572	

	Zero-Revenue IPOs			Positive-Revenue IPOs			Wilcoxon Difference Significance	
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*
Full sample								
CAPEX (%)	2.17%	1.37%	2.41%	5.16%	3.76%	4.98%	-2.98%***	-2.39%***
R&D (%)	32.20%	30.90%	16.66%	9.09%	3.30%	13.25%	23.11%***	27.60%***
N		124			1,381		Total = 1,505	
Matching sample								
CAPEX (%)	2.16%	1.33%	2.44%	2.25%	1.30%	2.25%	-0.09%	0.03%
R&D (%)	31.31%	30.90%	14.95%	30.15%	23.12%	23.54%	1.16%**	7.78%***
N		120			120		Total = 240	

Table 5. *IPO motivations – Post-IPO investments – Multivariate regressions*

This table reports the regressions' output regarding the three-year post-IPO capital expenditures (CAPEX) and research and development expenses (R&D) of sample IPO firms. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. CAPEX, R&D, SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book and market momentum are defined in Table 1. The regressions account for industry and year fixed effects. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Full sample				Matching sample			
	CAPEX		R&D		CAPEX		R&D	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*
Negative-Earnings Dummy	0.006*		0.055***		0.005		0.044***	
Zero-Revenue Dummy		-0.011*		0.059***		0.002		-0.003
SOX	-0.031	-0.029	-0.017	-0.011	0.023	0.052	0.030	-0.246
JOBS	-0.003	-0.005	-0.012	-0.032	-0.008	-0.007	0.001	0.069
Tech	0.020	0.023	-0.038	-0.033	0.047	0.024	0.121	-0.416
Age	0.000	0.000	-0.001*	-0.001**	0.000	0.000	0.000	-0.005
Proceeds	-0.004*	-0.004**	-0.033***	-0.035***	-0.002	-0.001	-0.022***	-0.039
VC-Backed	0.002	0.003	0.039***	0.052***	0.000	-0.005	0.029**	-0.191***
Underwriter Prestige	0.001	0.001	0.002	0.002	0.002	0.000	0.001	0.015*
Institutional Ownership	-0.005	-0.005	-0.031	-0.030	-0.010	0.000	-0.050**	-0.033
Leverage	-0.006	-0.007	-0.020	-0.004	-0.016	0.022	0.004	-0.227*
Market-to-Book	0.000	0.000	0.000	0.000	0.000	0.001	0.000	-0.013***
Market Momentum	-0.116	-0.116	-0.035	0.013	-0.123	0.024	-0.231	0.301**
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.032	0.033	0.274**	0.279**	-0.001	0.029	0.038	0.574**
N	864	864	658	658	345	112	345	112
Adjusted R^2	0.3528	0.3529	0.4580	0.4431	0.3993	0.3189	0.3675	0.2333

Table 6. *IPO motivations – Aggregate-level market timing*

This table reports the equally-weighted market returns (collected from CRSP) over the eight quarters that surround sample firms' IPO date (*-1, -2, -3, -4, +1, +2, +3,* and *+4)*. We present changes in quarterly market returns (*-1 vs. +1, -2 vs. +2, -3 vs. +3,* and *-4 vs. +4)*, their Wilcoxon test significance, and the significance of the value differences in market returns for negative-earnings IPOs vs. positive-earnings IPOs, and for zero-revenue IPOs vs. positive-revenue IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings IPOs				Positive-Earnings IPOs			
Full sample								
Pre-IPO Quarters	*-1*	*-2*	*-3*	*-4*	*-1*	*-2*	*-3*	*-4*
Mean market returns	4,20%	4,73%	4,56%	3,69%	4,28%	4,76%	4,57%	3,50%
Median market returns	3,97%	4,40%	4,31%*	4,16%	4,16%	4,40%	5,67%	4,03%
Post-IPO Quarters	*+1*	*+2*	*+3*	*+4*	*+1*	*+2*	*+3*	*+4*
Mean market returns	1,54%	2,82%	2,17%	0,74%***	1,18%	2,38%	2,90%	2,32%
Median market returns	2,33%	3,57%	2,88%	1,56%**	2,38%	3,15%	3,09%	3,11%
Mean change	-2,65%***	-1,91%***	-2,40%***	-2,95%***	-3,10%***	-2,38%***	-1,68%***	-1,18%**
Median change	-1,64%***	-0,83%***	-1,44%***	-2,59%***	-1,77%***	-1,25%***	-2,58%***	-0,92%**
Matching sample								
Pre-IPO Quarters	*-1*	*-2*	*-3*	*-4*	*-1*	*-2*	*-3*	*-4*
Mean market returns	4.25%	4.74%	4.54%	5.10%	4.09%	4.07%	4.48%	4.95%
Median market returns	4.72%	5.20%	4.10%	5.77%	4.16%	4.22%	5.62%	5.35%
Post-IPO Quarters	*+1*	*+2*	*+3*	*+4*	*+1*	*+2*	*+3*	*+4*
Mean market returns	1.00%	2.19%	2.97%	0.61%**	1.45%	2.38%	2.99%	1.98%
Median market returns	2.30%	3.88%	3.09%	1.45%**	2.38%	3.15%	3.05%	3.11%
Mean change	-3.25%***	-2.55%**	-1.57%***	-4.49%***	-2.64%***	-1.69%*	-1.49%***	-2.97%***
Median change	-2.43%***	-1.31%**	-1.00%***	-4.32%***	-1.77%***	-1.07%*	-2.58%***	-2.25%***

	Zero-Revenue IPOs				Positive-Revenue IPOs			
Full sample								
Pre-IPO Quarters	*-1*	*-2*	*-3*	*-4*	*-1*	*-2*	*-3*	*-4*
Mean market returns	2,13%***	4,66%	3,91%**	4,07%	4,41%	4,75%	4,63%	3,58%
Median market returns	2,38%***	4,54%	3,09%**	3,98%	4,15%	4,40%	4,95%	4,16%
Post-IPO Quarters	*+1*	*+2*	*+3*	*+4*	*+1*	*+2*	*+3*	*+4*
Mean market returns	0,73%	1,76%	1,20%**	0,67%	1,47%	2,73%	2,55%	1,39%
Median market returns	1,56%	2,94%	1,56%*	1,82%	2,38%	3,57%	3,00%	2,38%
Mean change	-1,40%**	-2,90%***	-2,71%***	-3,40%***	-2,95%***	-2,01%***	-2,08%***	-2,19%***
Median change	-0,82%**	-1,59%***	-1,53%***	-2,16%***	-1,77%***	-0,83%***	-1,95%***	-1,77%***
Matching sample								
Pre-IPO Quarters	*-1*	*-2*	*-3*	*-4*	*-1*	*-2*	*-3*	*-4*
Mean market returns	2.06%	4.60%	3.84%	4.13%	2.83%	5.14%	3.85%	2.96%
Median market returns	2.38%	4.45%	3.09%	3.98%	2.46%	4.95%	3.90%	2.45%
Post-IPO Quarters	*+1*	*+2*	*+3*	*+4*	*+1*	*+2*	*+3*	*+4*
Mean market returns	0.94%**	1.81%	1.17%	0.59%	2.21%	1.09%	2.51%	1.72%
Median market returns	1.56%	3.05%	1.56%	1.82%	2.30%	1.55%	3.84%	1.73%
Mean change	-1.12%*	-2.80%***	-2.67%***	-3.54%***	-0.63%	-4.05%***	-1.34%**	-1.24%
Median change	-0.82%*	-1.40%***	-1.53%***	-2.16%***	-0.16%	-3.40%***	-0.06%**	-0.72%

Table 7. *IPO motivations – M&A activity – Univariate statistics*

This table reports the number and percentage of sample IPO firms involved in M&A activity in the three years following their IPO. We consider whether they become targets or acquirers and account for the category they belong to: negative-earnings or positive-earnings, and zero-revenue or positive-revenue. Panel A provides information about M&A players as a whole, Panel B about targets, and Panel C, about acquirers.

Full sample				
Panel A: M&A targets and acquirers	Count	Sample size	Percentage of sample Size	Percentage of M&A players
All	802	1,505	53%	100%
Targets	354	1,505	24%	44%
Acquirers	619	1,505	41%	77%
As Target Only	183	1,505	12%	23%
As Acquirer Only	448	1,505	30%	56%
As Both Target and Acquirer	171	1,505	11%	21%
Negative-Earnings	498	942	53 %	62%
Positive-Earnings	304	563	54 %	38%
Zero-Revenue	28	124	23%	3%
Positive-Revenue	774	1,381	56%	97%
Panel B: Targets	Count	Percentage		
All	354	100%		
Negative-Earnings	252	71%		
Positive-Earnings	102	29%		
Zero-Revenue	21	6%		
Positive-Revenue	333	94%		
Panel C: Acquirers	Count	Percentage		
All	619	100%		
Negative-Earnings	356	58%		
Positive-Earnings	263	42%		
Zero-Revenue	12	2%		
Positive-Revenue	607	98%		

Matching sample				
Panel D: M&A targets and acquirers	Count	Sample Size	Percentage of Sample Size	Percentage of M&A Players
Matching sample for earnings - All	358	572	63%	100%
As Target Only	69	572	12%	19%
As Acquirer Only	203	572	36%	57%
As Both Target and Acquirer	86	572	15%	24%
Negative-Earnings	185	286	65%	52%
Positive-Earnings	173	286	60%	48%
Matching sample for revenue - All	44	240	18%	100%
As Target Only	27	240	11%	61%
As Acquirer Only	11	240	5%	25%
As Both Target and Acquirer	6	240	2%	14%
Zero-Revenue	26	120	22%	59%
Positive-Revenue	18	120	15%	41%
Panel E: Targets	Count	Percentage		
Matching sample for earnings - All	155	100%		
Negative-Earnings	86	55%		
Positive-Earnings	69	45%		
Matching sample for revenue - All	33	100%		
Zero-Revenue	20	61%		
Positive-Revenue	13	39%		
Panel F: Acquirers	Count	Percentage		
Matching sample for earnings - All	289	100%		
Negative-Earnings	144	50%		
Positive-Earnings	145	50%		
Matching sample for revenue - All	17	100%		
Zero-Revenue	11	65%		
Positive-Revenue	6	35%		

Table 8. *IPO motivations – M&A activity – Multivariate regressions*

This table reports the regressions' output regarding our sample IPO firms' involvement in M&A activity in the three years following their IPO. We perform probit regressions. The dependent variables are the likelihood of becoming an M&A player and, among M&A players, the likelihood of becoming a target rather than an acquirer. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. SOX, JOBs, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book and market momentum are defined in Table 1. The regressions account for industry and year fixed effects. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Full sample				Matching sample			
	Likelihood of M&A transaction		Likelihood of target role in M&A transaction		Likelihood of M&A transaction		Likelihood of target role in M&A transaction	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*
Negative-Earnings Dummy	-0.021		0.423***		0.106		0.281*	
Zero-Revenue Dummy		-0.350**		0.933***		0.150		0.422
SOX	0.608	0.606	0.074	0.007	-0.865	-0.490	-0.347**	-0.152
JOBS	-0.196	-0.187	-0.036	-0.070	-0.756	0.706	-0.089	0.823
Tech	1.037**	1.033**	0.371	0.325	0.605	-0.785	0.621	0.104
Age	0.001	0.001	-0.007	-0.009*	0.004	0.006	-0.009	0.034
Proceeds	0.197***	0.198***	-0.302***	-0.319***	0.173*	-0.100	-0.091	0.838
VC-Backed	0.196**	0.188**	0.090	0.175	0.187	0.473	0.327*	-0.109
Underwriter Prestige	0.007	0.005	0.041	0.053*	0.019	-0.031	-0.001	-0.026
Institutional Ownership	-0.156	-0.168	-0.149	-0.108	-0.625**	-0.411	0.727*	-3.114*
Leverage	-0.129	-0.172	0.464**	0.573**	-0.429*	-1.299	1.148***	3.472
Market-to-Book	-0.002	-0.002	-0.001	-0.001	0.003	0.055	-0.018**	-0.146*
Market Momentum	0.148	-0.010	0.629	0.689*	0.267	-0.279***	0.891*	0.288
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.543	-1.554	-0.620	-0.333	-1.911**	0.490	-1.386	-1.943
N	1,341	1,341	676	676	514	199	316	45
Pseudo R^2	0.1162	0.1186	0.1298	0.1313	0.1602	0.2136	0.1079	0.2576

Table 9. *IPO motivations by intended use of proceeds*

In this table, we report the capital expenditures (CAPEX), research and development expenses (R&D), proportion of firms getting involved in an M&A transaction (M&A) and proportion of firms getting involved as targets in an M&A transaction (M&A Target) in the three years following their IPO, considering the intended use of proceeds stated by the firms in their prospectus. We present results for negative-earnings issuers and for zero-revenue issuers, respectively. CAPEX and R&D are defined in Table 1. We report the statistical significance (t-test, Wilcoxon signed-rank test, and z-test for binary variables) of the value differences between the firms in a given group and the rest of the IPO sample. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	General			Investment			Debt			Other		
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*
Negative-Earnings IPOs												
Full sample												
CAPEX (%)	4.78	3.27	4.86	3.65*	2.37*	4.15	5.53	4.30	5.23	5.38	4.08	5.23
R&D (%)	18.34	14.60	16.37	24.48**	20.27**	17.58	8.10**	3.58**	10.22	14.54	14.66	14.43
M&A (%)	54.09	100.00	49.87	47.83	0.00	50.07	56.58*	100.00	49.89	28.57	0.00	48.80
M&A Target (%)	51.74	100.00	50.04	49.49	0.00	50.25	51.16	100.00	50.58	0.00	0.00	0.00
N		636			207			76			7	
Matching sample												
CAPEX (%)	5.31	3.63	4.76	6.39	3.10	7.32	4.99	3.26	5.06			
R&D (%)	13.40	9.07	17.76	10.62	9.63	12.44	8.50	0.06	11.42			
M&A (%)	68.32	100.00	46.64	55.77	100.00	50.15	55.17**	100.00	50.61			
M&A Target (%)	47.10	0.00	50.10	37.93	0.00	49.38	56.25	100.00	51.23			
N		202			52			29				
Zero-Revenue IPOs												
Full sample												
CAPEX (%)	2.73	1.87	2.89	1.67	1.15	1.72						
R&D (%)	29.60	25.49	18.32	34.53	32.38	14.92						
M&A (%)	21.05	0.00	41.04	25.53	0.00	44.08						
M&A Target (%)	75.00	100.00	44.72	75.00	100.00	45.23						
N		76			47							
Matching sample												
CAPEX (%)	2.71*	1.82*	2.94	1.65*	1.15*	1.75						
R&D (%)	27.48	25.24	14.27	34.82	33.49	15.09						
M&A (%)	21.33	0.00	41.24	22.73	0.00	42.39						
M&A Target (%)	75.00	100.00	44.72	80.00	100.00	42.16						
N		75			44							

Table 10. *IPO valuation – Multivariate regressions*

This table reports the regressions' output regarding the IPO valuation for all sample IPO firms. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. We also report the regressions' output regarding the IPO valuation of each category of firms considered separately: negative-earnings, positive-earnings, zero-revenue, and positive-revenue. IPO valuation, SOX, JOBS, pre-IPO IBEIRD, pre-IPO BV of equity, pre-IPO sales, pre-IPO R&D, industry IPOs PS ratio, insider ownership, underwriter prestige, boom years, crash years, age, pre-IPO size, VC-backed, pre-IPO leverage, and market momentum are defined in Table 1. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Full sample					
	All Firms		Negative-Earnings	Positive-Earnings	Zero-Revenue	Positive-Revenue
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Negative-Earnings Dummy	-0.025***					
Zero-Revenue Dummy		-0.033***				
SOX	0.125	0.104				
JOBS	0.011	0.005				
Pre-IPO IBEIRD	-0.003*	0.000	0.000	0.007	-0.008	0.000
Pre-IPO BV of Equity	0.006***	0.006***	0.010***	0.003	0.010**	0.005***
Pre-IPO Sales	0.005***	0.003	0.000	-0.007	0.000	0.006***
Pre-IPO R&D	0.006***	0.005*	0.007**	-0.004	0.005	0.004
Industry IPOs PS Ratio	0.035	0.034	0.017	0.065	-0.038	0.049
Insider Ownership	-0.001	-0.002	-0.010	0.019	0.048	0.004
Underwriter Prestige	0.010	0.006	0.011	0.014	-0.019	0.004
Boom Years	-0.025***	-0.028***	-0.016**	-0.014	-0.051**	-0.033***
Crash Years	-0.018**	-0.020***	-0.005	-0.028**	0.002	-0.023***
Age	-0.006	-0.006	-0.004	-0.007	-0.001	-0.007*
Pre-IPO Size	-0.060***	-0.055***	-0.069***	-0.025**	-0.033***	-0.053***
VC-Backed	0.044***	0.038***	0.044***	0.031***	0.000	0.036***
Pre-IPO Leverage	2.126***	2.123***	2.150***	2.089***	2.202***	2.115***
Market Momentum	0.054	0.057	0.027	-0.077	0.621***	0.073
Constant	-0.397***	-0.398***	-0.455***	-0.358***	-0.614***	-0.383***
N	937	937	683	254	104	833
Adjusted R^2	0.9995	0.9995	0.9994	0.9996	0.9993	0.9995

	Matching sample					
	All Earnings Types	Negative-Earnings	Positive-Earnings	All Revenue Types	Zero-Revenue	Positive-Revenue
	Model 7	*Model 8*	*Model 9*	*Model 10*	*Model 11*	*Model 12*
Negative-Earnings Dummy	-0.017					
Zero-Revenue Dummy				0.202**		
SOX	-0.039			0.039		
JOBS	0.105			0.122		
Pre-IPO IBEIRD	-0.002	-0.007	0.037**	-0.042*	-0.102	0.006
Pre-IPO BV of Equity	0.006***	0.014***	-0.002	0.013	0.030	0.011
Pre-IPO Sales	-0.017	-0.059	0.097	0.041	0.000	0.045
Pre-IPO R&D	0.049*	0.065**	-0.044	0.114***	0.158**	0.102
Industry IPOs PS Ratio	-0.842***	-1.588***	-0.225	-0.946**	-1.192**	-0.545
Insider Ownership	-0.069	0.058	-0.207	-0.353	-0.313	-0.580*
Underwriter Prestige	0.053***	0.023	0.083***	0.051***	0.038*	0.077***
Boom Years	-0.170**	-0.210**	-0.139	0.144	0.173	0.431*
Crash Years	-0.026	-0.012	-0.106	-0.044	0.018	-0.016
Age	-0.002	0.003	-0.005*	-0.005	-0.009	-0.009
Pre-IPO Size	0.317***	0.324***	0.258***	0.133***	0.059	0.128*
VC-Backed	-0.002	0.089	-0.108	-0.031	0.184	-0.418**
Pre-IPO Leverage	0.129**	0.116**	0.063	0.008	0.001	0.045
Market Momentum	-0.445***	-1.399	-0.692***	-0.413	-0.136	-0.541
Constant	0.167***	0.169***	0.165***	0.173***	0.175***	0.174***
N	379	198	181	211	103	108
Adjusted R^2	0.5165	0.5504	0.5392	0.3363	0.4180	0.2502

Table 11. *IPO outcomes – Univariate statistics*

This table reports the post-IPO underpricing, bid-ask spread, daily trading volume, stock return volatility, and delisting rate for our sample IPO firms depending on the category they belong to: negative-earnings or positive-earnings, and zero-revenue or positive-revenue. Underpricing, bid-ask spread, daily trading volume, stock return volatility, and delisting rate are defined in Table 1. We present value differences between negative-earnings and positive-earnings IPOs, and between zero-revenue and positive-revenue IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings IPOs			Positive-Earnings IPOs			Wilcoxon Difference Significance	
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*
Full sample								
Underpricing	25.44%	20.85%	29.35%	17.46%	12.77%	22.95%	7.98%***	8.08%***
Bid-Ask Spread	7.05%	6.40%	2.88%	4.97%	4.49%	2.02%	2.08%***	1.90%***
Daily Trading Volume	245,057	159,739	230,053	268,321	179,418	229,051	-23,264***	-19,679*
Stock Return Volatility	3.69%	3.02%	2.16%	2.43%	1.97%	1.58%	1.26%***	1.05%***
Delisting Rate	7.54%	-	26.41%	1.95%	-	13.85%	5.58%***	-
N		942			563		Total = 1,505	
Matching sample								
Underpricing	24.89%	18.94%	27.13%	21.72%	16.56%	25.25%	3.17%	2.38%
Bid-Ask Spread	6.77%	5.83%	2.83%	5.66%	5.00%	2.22%	1.11%***	0.83%***
Daily Trading Volume	266,275	163,392	241,116	245,971	164,334	224,720	20,304	-941
Stock Return Volatility	3.55%	2.74%	2.15%	2.96%	2.40%	1.75%	0.59%***	0.35%**
Delisting Rate	8.74%	-	28.29%	2.10%	-	14.36%	6.64%***	-
N		286			286		Total = 572	

	Zero-Revenue IPOs			Positive-Revenue IPOs			Wilcoxon Difference Significance	
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*
Full sample								
Underpricing	24.27%	17.70%	28.37%	22.29%	16.14%	27.32%	1.97%	1.56%
Bid-Ask Spread	7.40%	7.07%	2.01%	6.16%	5.39%	2.82%	1.24%***	1.68%***
Daily Trading Volume	137,516	90,476	143,016	264,197	172,317	233,337	-126,681***	-81,841***
Stock Return Volatility	3.68%	3.17%	1.78%	3.17%	2.54%	2.07%	0.50%***	0.63%***
Delisting Rate	8.06%	-	27.34%	5.21%	-	22.24%	2.85%	-
N		124			1,381		Total = 1,505	
Matching sample								
Underpricing	23.52%	13.93%	28.11%	22.73%	19.49%	28.87%	0.79%	-5.56%
Bid-Ask Spread	7.41%	7.07%	2.04%	7.02%	6.99%	1.94%	0.39%	0.08%
Daily Trading Volume	138,258	82,145	145,285	151,308	94,521	168,491	-13,049.80	-12,376.34
Stock Return Volatility	3.69%	3.17%	1.80%	3.52%	3.05%	1.70%	0.17%	0.13%
Delisting Rate	7.50%	-	26.45%	9.17%	-	28.98%	-1.67%	-
N		120			120		Total = 240	

Table 12. *IPO outcomes – Multivariate regressions*

This table reports the regressions' output regarding the post-IPO underpricing, bid-ask spread, daily trading volume, and stock return volatility of our sample IPO firms. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. Underpricing, bid-ask spread, daily trading volume, stock return volatility, SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum are defined in Table 1. The regressions account for industry and year fixed effects. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Full sample							
	Underpricing		Bid-Ask Spread		Daily Trading Volume		Stock Return Volatility	
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*	*Model 7*	*Model 8*
Negative-Earnings Dummy	0.030*		0.009***		-0.083*		0.005***	
Zero-Revenue Dummy		-0.011		0.006***		-0.190**		0.004**
SOX	-0.032	-0.033	-0.016*	-0.013	-0.111	-0.084	-0.007	-0.005
JOBS	-0.172***	-0.171***	-0.004	-0.005	-0.269	-0.279	-0.001	-0.001
Tech	0.189	0.201	-0.017	-0.012	0.987	0.948	-0.012	-0.009
Age	0.000	0.000	0.000***	0.000***	-0.002**	-0.002*	0.000***	0.000***
Proceeds	-0.068***	-0.069***	-0.004***	-0.005***	0.685***	0.687***	-0.003***	-0.003***
VC-Backed	0.018	0.025	0.005***	0.007***	0.224***	0.203***	0.004***	0.005***
Underwriter Prestige	0.003	0.003	0.000	0.000	0.039***	0.037***	0.000	0.000
Institutional Ownership	-0.060*	-0.061*	-0.005**	-0.005**	-0.404***	-0.408***	-0.004***	-0.004**
Leverage	-0.057**	-0.058*	-0.001	0.000	-0.178**	-0.205***	0.002	0.002*
Market-to-Book	0.001***	0.001***	0.000*	0.000*	0.003***	0.003***	0.000**	0.000**
Market Momentum	0.219	0.243	-0.079**	-0.069**	-0.472***	-0.486***	-0.072***	-0.067***
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.143	0.158	0.099***	0.103***	0.905***	0.903***	0.045***	0.047***
N	1,346	1,346	1,325	1,325	1,358	1,358	1,325	1,325
Adjusted R^2	0.1584	0.1564	0.6419	0.6267	0.4713	0.4721	0.6162	0.6090

	Matching sample							
	Underpricing		Bid-Ask Spread		Daily Trading Volume		Stock Return Volatility	
	Model 9	*Model 10*	*Model 11*	*Model 12*	*Model 13*	*Model 14*	*Model 15*	*Model 16*
Negative-Earnings Dummy	0.030		0.009***		-0.025		0.004***	
Zero-Revenue Dummy		-0.001		0.002		-0.148		0.003
SOX	0.131	-0.125	-0.012	0.044*	0.730	0.610	-0.006	-0.031
JOBS	-0.197***	0.013	-0.003	-0.008	-0.098	0.992	0.005	0.022
Tech	-0.019	0.383	0.030*	-0.010	1.664**	0.273	0.027**	-0.015
Age	0.000	0.000	0.000**	0.000**	-0.006***	-0.015*	0.000**	0.000
Proceeds	-0.033**	-0.071*	-0.003**	-0.011***	0.716***	0.656***	-0.002**	-0.012***
VC-Backed	0.032	-0.035	0.002	0.003	0.203***	0.237	0.003*	0.002
Underwriter Prestige	0.007	-0.006	0.000	0.001**	0.026	-0.014	0.000	0.000
Institutional Ownership	-0.046	0.040	-0.006*	0.010**	-0.431***	0.205	-0.004	0.015**
Leverage	-0.065	-0.027	-0.005	0.003	-0.256*	0.093	-0.001	0.004
Market-to-Book	0.002**	0.007	0.000**	0.000	0.008***	0.050***	0.000***	0.001**
Market Momentum	-0.310	0.569***	-0.071	0.065	-0.547***	0.437	-0.048	0.106
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.283	0.991**	0.017	0.070***	0.700***	0.967***	-0.010	0.047*
N	524	208	514	204	524	208	514	204
Adjusted R^2	0.1830	0.2466	0.6216	0.6444	0.4867	0.4411	0.6449	0.3894

Table 13. *IPO long-term stock price performance*

This table reports event-time (Panels A and C) and calendar-time (Panels B and D) results for the long-term stock price performance of negative-earnings IPOs vs. positive-earnings IPOs. The event-time approach features equal-weighted cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs) considering the market model. The calendar-time approach features the Fama-French-Carhart four-factor model. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings IPOs			Positive-Earnings IPOs		
Full sample						
Panel A: Event-Time Results	12 months	24 months	36 months	12 months	24 months	36 months
CARs	-23.61%***	-41.27%***	-49.63%***	-2.73%**	-9.50%***	-11.70%***
BHARs	-21.31%***	-34.16%***	-39.48%***	-2.75%**	-9.15%***	-11.15%***
Panel B: Calendar-Time Results		36 months			36 months	
Alpha		-0.0075***			-0.0008	
MKT		0.2442***			0.1003***	
SMB		0.6599***			0.6328***	
HML		-0.3750***			-0.0565	
UMD		-0.0378			-0.0835***	
Adjusted R^2		0.5486			0.5305	
Matching sample						
Panel C: Event-Time Results	12 months	24 months	36 months	12 months	24 months	36 months
CARs	-16.79%***	-29.94%***	-37.09%***	-9.02%**	-17.72%***	-22.93%***
BHARs	-15.74%***	-26.21%***	-31.34%***	-8.76%**	-16.42%***	-20.70%***
Panel D: Calendar-Time Results		36 months			36 months	
Alpha		-0.0034*			-0.0006	
MKT		0.2284***			0.1600***	
SMB		0.7013***			0.6675***	
HML		-0.3818***			-0.1767**	
UMD		-0.0780			-0.0469	
Adjusted R^2		0.4396			0.3954	

Table 14. *IPO long-term stock price performance*

This table reports event-time (Panels A and C) and calendar-time (Panels B and D) results for the long-term stock price performance of zero-revenue IPOs vs. positive-revenue IPOs. The event-time approach features equal-weighted cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs) considering the market model. The calendar-time approach features the Fama-French-Carhart four-factor model. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Zero-revenue IPOs			Positive-revenue IPOs		
Full sample						
Panel A: Event-Time Results	12 months	24 months	36 months	12 months	24 months	36 months
CARs	-22.17%***	-50.00%***	-63.20%***	-15.22%***	-27.54%***	-32.95%***
BHARs	-20.19%***	-39.84%***	-47.36%***	-14.27%***	-24.27%***	-28.28%***
Panel B: Calendar-Time Results		36 months			36 months	
Alpha		-0.0183***			-0.0044***	
MKT		0.2024*			0.1861***	
SMB		0.9146***			0.6401***	
HML		-0.2935**			-0.2603***	
UMD		-0.0558			-0.0633**	
Adjusted R^2		0.2199			0.6089	
Matching sample						
Panel C: Event-Time Results	12 months	24 months	36 months	12 months	24 months	36 months
CARs	-22.20%***	-50.39%***	-64.27%***	-32.46%***	-62.53%***	-79.26%***
BHARs	-20.24%***	-40.08%***	-47.93%***	-28.53%***	-47.38%***	-55.63%***
Panel D: Calendar-Time Results		36 months			36 months	
Alpha		-0.0178***			-0.0141***	
MKT		0.2480**			0.0294*	
SMB		0.9198***			0.6678***	
HML		-0.2714*			-0.2836*	
UMD		-0.0371			-0.0219	
Adjusted R^2		0.2285			0.1870	

Table 15. *IPO long-term stock price performance – Multivariate cross-sectional regressions*

This table reports the cross-sectional analysis of the 36-months cumulative abnormal returns (CARs) for our sample IPO firms. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. SOX, JOBS, tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum are defined in Table 1. The regressions account for industry and year fixed effects. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	36-months CARs			
	Full sample		Matching sample	
	Model 1	Model 2	Model 3	Model 4
Negative-Earnings Dummy	-0.168***		-0.159**	
Zero-Revenue Dummy		-0.094		0.086
SOX	-0.023	-0.071	0.457	-0.486***
JOBS	-0.033	-0.010	0.146	-0.545
Tech	-0.114	-0.183	-0.134	-0.193
Age	0.000	0.000	-0.003	0.019*
Proceeds	0.098***	0.104***	0.049	0.510***
VC-Backed	-0.121**	-0.159***	-0.153**	-0.162
Underwriter Prestige	0.001	-0.001	-0.009	0.003
Institutional Ownership	0.245***	0.243**	0.128	-0.388
Leverage	-0.066	-0.084	0.081	-0.245
Market-to-Book	-0.001	-0.001	-0.000	-0.025*
Market Momentum	-0.246	-0.429	-0.375	0.456
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Constant	-0.258***	-0.265***	-0.403	-0.301**
N	1,358	1,358	524	208
Adjusted R^2	0.1423	0.1352	0.1355	0.3912

Table 16. *IPO outcomes - Survival analysis*

This table reports the regressions' output regarding our sample IPO firms' survival in the three years following their IPO. We perform probit regressions, the dependent variable being the likelihood of delisting for reasons other than mergers and acquisitions. We also perform Cox proportional hazards regressions for which we report both hazard ratios and corresponding coefficients. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer and 0 otherwise. Tech, age, proceeds, VC-backed, underwriter prestige, institutional ownership, leverage, market-to-book, and market momentum are defined in Table 1. ***, **and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Full sample							
	Probit Model Likelihood of Delisting				Cox Proportional Hazards Model			
	Model 1		Model 2		Model 3		Model 4	
	Coefficients	Marginal Effects	Coefficients	Marginal Effects	Hazard Ratios	Coefficients	Hazard Ratios	Coefficients
Negative-Earnings Dummy	0.571***	0.055***			2.167**	0.774**		
Zero-Revenue Dummy			0.219	0.022			0.799	-0.224
Tech	-0.138	-0.013	-0.075	-0.007	0.996	-0.004	0.948	-0.054
Age	-0.025***	-0.002***	-0.030***	-0.003***	0.941***	-0.060***	0.929***	-0.074***
Proceeds	-0.131	-0.013	-0.154*	-0.015*	0.737*	-0.305*	0.693**	-0.367**
VC-Backed	-0.178	-0.017	-0.056	0.006	0.649*	-0.433*	0.732	-0.312
Underwriter Prestige	-0.025	-0.002	-0.019	-0.002	1.011	0.010	1.013	0.013
Institutional Ownership	-1.023***	-0.099***	-0.940***	-0.093***	0.087***	-2.446***	0.090***	-2.411***
Leverage	0.644***	0.062***	0.654***	0.064***	2.301***	0.833***	2.263***	0.817***
Market-to-Book	0.000	0.000	0.000	0.000	1.000	0.001	1.000	0.000
Market Momentum	-0.516	-0.050	-0.521	-0.052	0.002	-0.617	0.003	-0.587
Constant	-0.760*		-0.387					
Pseudo R^2	0.1168		0.0966					
N	1,358		1,358		1,358		1,358	

	Matching sample							
	Probit Model Likelihood of Delisting				Cox Proportional Hazards Model			
	Model 5		Model 6		Model 7		Model 8	
	Coefficients	Marginal Effects	Coefficients	Marginal Effects	Hazard Ratios	Coefficients	Hazard Ratios	Coefficients
Negative-Earnings Dummy	0.542**	0.043**			2.623*	0.964*		
Zero-Revenue Dummy			-0.169	-0.024			0.731	-0.313
Tech	-0.047	-0.004	0.833***	0.116***	0.044	-0.083	1.018***	0.232***
Age	-0.036**	-0.003**	-0.011	-0.002	0.909**	-0.095**	0.965	-0.036
Proceeds	-0.041	-0.003	-0.210	-0.029	0.689	-0.372	0.618	-0.481
VC-Backed	0.310	0.025	0.323	0.045	1.464	0.381	2.806	1.032
Underwriter Prestige	-0.055	-0.004	0.003	0.000	1.010	0.010	1.095	0.091
Institutional Ownership	-0.846	-0.067	-1.268	-0.177	0.162	-1.819	0.063	-2.766
Leverage	0.684*	0.054*	0.380	0.053	2.849*	1.047*	1.515	0.415
Market-to-Book	-0.003	0.000	0.042	0.006	0.995	-0.005	1.076	0.073
Market Momentum	-1.262**	-0.101**	4.919	0.686	0.000	-1.486	2.766	1.096
Constant	-0.933		-0.850					
Pseudo R^2	0.1497		0.1447					
N	524		208		524		208	

Table 17. *Robustness test – Excluding the technology bubble years*

This table reports the regressions' output regarding issuing firms' IPO motivations, IPO valuation and IPO outcomes when we exclude the technology bubble years (1998-2000) from the analysis. We report the coefficients of the negative-earnings dummy and the zero-revenue dummy variables. All control variables and industry and year fixed effects considered in the original corresponding tables are included in the regressions. The negative-earnings dummy takes the value 1 if the firm is a negative-earnings issuer, and 0 otherwise. The zero-revenue dummy takes the value 1 if the firm is a zero-revenue issuer, and 0 otherwise. All variables are defined in Table 1. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Negative-Earnings Dummy		Zero-Revenue Dummy	
	Full sample	Matching sample	Full sample	Matching sample
IPO motivations				
CAPEX	0.007*	0.008	-0.008	0.002
R&D	0.060***	0.044***	0.059***	0.001
Likelihood of M&A transaction	0.018	0.107	-0.345*	0.166
Likelihood of target role in M&A transaction	0.500***	0.299*	1.355***	0.444
IPO valuation				
IPO valuation	-0.038	-0.146	0.360**	-0.044
IPO outcomes				
Underpricing	0.017	-0.059	-0.038	-0.019
Bid-Ask Spread	0.004***	0.004***	0.003**	0.001
Daily Trading Volume	-0.005*	-0.068	-0.173**	-0.021
Stock Return Volatility	0.002**	0.002*	0.003*	0.003
36-months CARs	-0.144***	-0.143**	-0.069	0.035

PAPER 3. LITIGATION RISK, UNDERPRICING, AND MONEY-LOSING IPOS

ABSTRACT

We examine the impact of firms' pre-IPO earnings on the relation between litigation risk and IPO underpricing. We hypothesize that issuers with negative earnings have stronger incentives to avoid the costs associated with litigation than do positive-earnings issuers. We find that the insurance effect of the lawsuit avoidance hypothesis predominantly applies within a subsample of negative-earnings issuers. At the same time, we find limited evidence for the deterrence effect, only for negative-earnings issuers. Our results are robust to the timelines over which sample firms were sued, to alternative underpricing measures, and to the addition of various control variables to our baseline regression models. We also explore the effect litigation risk and pre-IPO earnings have on underwriter gross spreads. Our evidence indicates that when dealing with firms facing a high risk of litigation, underwriters charge significantly higher spreads to negative-earnings issuers than to profitable IPO firms.

JEL Classification: G24; G32; K22; K40

Keywords: Initial public offerings; IPO underpricing; Securities litigation; Earnings; Lawsuit avoidance

1. Introduction

Under Section 11 of the Securities Act of 1933, shareholders have the right to sue IPO firms for material misstatements and omissions in their prospectuses. Damages claimable by direct purchasers and aftermarket purchasers who rely on the prospectus are directly related to the offer price. Thus, IPO firms can lower the potential damages that plaintiffs may hope to recover through aggressive underpricing and decrease their probability of being sued. The lawsuit avoidance hypothesis has been the focus of several studies (e.g., Alexander, 1993; Arena & Ferris, 2017; Drake & Vetsuypens, 1993; Hanley & Hoberg, 2012; Hao, 2011; Hensler, 1995; Hughes & Thakor, 1992; Ibbotson, 1975; Lowry & Shu, 2002; Matanova et al., 2019; Tiniç, 1988; Walker et al., 2015; Zhu, 2009). Along with the information asymmetry and signaling hypotheses (Rock, 1986; Welch, 1989, among others), it is arguably one of the most plausible explanations for the IPO underpricing phenomenon.

Using a simultaneous equations model to control for endogeneity, Lowry & Shu (2002) show that underpricing and litigation exhibit both an insurance and a deterrence effect. Specifically, they document that firms with a higher litigation risk underprice their IPOs more as a form of insurance against future lawsuits (insurance effect). They also report that firms with higher underpricing face lower expected litigation costs (deterrence effect). While their study sheds light on the average relation between litigation risk and IPO underpricing, it does not fully address the determinants of cross-sectional variations in either their results or the findings of subsequent studies on the topic. Over the past years, the IPO scene has been largely dominated by negative-earnings issuers. An increasingly high

percentage of U.S.-listed IPOs (over 80% of issues in 2018's first three quarters12) involves firms that lost money in the year prior to their offering. Sustained profitability is no longer a prerequisite to going public, and the market is favorably inclined towards these investments. Anecdotal evidence shows that these firms typically project high growth prospects that make them attractive to investors. For example, DoorDash Inc., a food delivery company that disclosed losses of $667 million in 2019, successfully raised $3.37 billion through its IPO in December 2020, with a first-day return exceeding 85%. The ongoing trend often features high initial returns for deep money-losers, which raises the question of the relationship between pre-IPO earnings, underpricing, and litigation risk.

Negative-earnings issuers have not yet proven themselves capable of running a profitable business. Thus, they may lack confidence about their own ability to deliver on the statements and projections made in their IPO prospectus. Moreover, the consequences of a lawsuit could be particularly damaging in their case, as they are financially less equipped than profitable issuers to cope with all the costs associated with litigation (e.g., legal fees, settlement payments, reputational losses, etc.). For these reasons, we posit that negative-earnings issuers have more incentives than positive-earnings issuers to use underpricing as a mechanism to reduce litigation risk.

In light of this argument, the main goal of our study is to examine the relation between litigation risk and IPO underpricing while considering the differentiating effect of negative/positive pre-IPO earnings in the equational framework. We also investigate the effect of litigation risk and pre-IPO earnings on underwriter gross spreads. Indeed, similar

12 Driebusch, C. & Farrell, M. (2018, October 1). *IPO Market Has Never Been This Forgiving to Money-Losing Firms*. Wall Street Journal. https://www.wsj.com/articles/red-ink-floods-ipo-market-1538388000/

to IPO firms, underwriters also have incentives to mitigate their litigation exposure, which could transpire through their fees.

Using a sample of 1,505 IPOs from 1998 to 2018, we identify 108 firms that were sued within three years of their offering under Section 11 of the Securities Act of 1933. We summarize our results as follows. We find that the insurance effect of the lawsuit avoidance hypothesis predominantly applies within a subsample of negative-earnings issuers. Our evidence indicates that while positive-earnings issuers with higher litigation risk also appear to increase their underpricing for insurance purposes, the effect is statistically more significant for negative-earnings issuers. Further, we do not find evidence of a deterrence effect on average or when we consider negative-earnings and positive-earnings issuers separately in the analysis. However, when we consider the full IPO sample and include interaction terms in our regression framework, we find that underpricing deters Section 11 lawsuits only in the case of negative-earnings issuers. Our results turn out more economically important with the exclusion of dismissed and withdrawn cases. Our findings are robust to the time horizons over which the sample firms were sued, to the consideration of alternative underpricing measures, and to the addition of various control variables to our baseline regression models. Hence, we document that negative-earnings issuers make the most extensive use of underpricing as a hedging mechanism against litigation. We argue that avoiding the costs associated with litigation is a more pressing issue for unprofitable issuers than for profitable ones.

As noted earlier, our study is in part motivated by the skyrocketing number of negative-earnings issues that have taken place in recent years. As a robustness check and

to shed some light on the interaction between underpricing and litigation over time, we examine how the insurance and deterrence effects of the lawsuit avoidance hypothesis have evolved during our sample period. Specifically, we compare the 2002-2012 period that was dominated by positive-earnings issuers to the 2013-2018 negative-earnings trend. The earlier period is characterized by an annual percentage of negative-earnings issuers below 60% (averaging 46.5%), while the 2013-2018 period exhibits an annual percentage of negative-earnings issuers above 60% (averaging 76%). We find that the insurance effect of underpricing was equivalent in statistical strength for positive-earnings and negative-earnings issuers in the 2002-2012 period. However, our evidence indicates that the effect became more statistically significant for negative-earnings issuers in the 2013-2018 period. Further, we find that the deterrence effect of underpricing was not particularly related to negative-earnings issuers in the 2002-2012 period, while it became specific to them in the 2013-2018 period. Thus, our results suggest that the predominance of unprofitable IPO firms in recent years gave rise to an intensified use of underpricing as a strategy to lower the risk of being sued.

We also investigate the effect of litigation risk and pre-IPO earnings on underwriter gross spreads. On average, we find no support for the notion that firms with higher litigation risk pay higher spreads. However, our evidence indicates that when determining their fees for firms facing a high risk of litigation, underwriters charge significantly higher spreads to negative-earnings issuers than to profitable IPO firms. This result suggests that underwriters associate unprofitable issuers with higher expected litigation costs. Consequently,

underwriters appear to take additional protective measures (in the form of higher fees) when dealing with these firms.

Our study contributes to several strands of the related academic literature. First, we complement prior research on the lawsuit avoidance hypothesis (Alexander, 1993; Arena & Ferris, 2017; Drake & Vetsuypens, 1993; Hanley & Hoberg, 2012; Hao, 2011; Hensler, 1995; Hughes & Thakor, 1992; Ibbotson, 1975; Lowry & Shu, 2002; Matanova et al., 2019; Tiniç, 1988; Walker et al., 2015; Zhu, 2009). To the best of our knowledge, we are the first to investigate the effect of pre-IPO earnings on the relationship between litigation risk and IPO underpricing. We also examine the relation between litigation risk, pre-IPO earnings, and underwriter gross spreads and consider a large IPO sample over an extended period of time.

Second, we complement previous studies that examine the impact of pre-IPO earnings on corporate outcomes. Yi (2001) analyzes the long-run stock price performance of IPO firms with respect to pre-IPO earnings. He finds that although the median IPO severely underperforms the NASDAQ total return index and a set of control firms, only firms going public with negative earnings have statistically and economically significant negative abnormal mean returns in the three-year period following the issue. He further reports that investors tend to be too optimistic about the future prospects of IPO firms, especially in the case of negative-earnings issuers. Jain & Kini (2008) point out that firms that are unprofitable at the time of their IPO are more likely to experience failure. Aggarwal et al. (2009) focus on IPO valuations and find that the income of positive-earnings IPOs is positively correlated with value, while the income of negative-earnings IPOs is negatively correlated with value. We contribute to this growing literature by documenting that the use

of underpricing as a means to reduce litigation risk is mostly associated with IPO firms that exhibit negative earnings when they go public.

The remainder of the paper is organized as follows. Section 2 presents previous research relevant to our study. Section 3 formulates our hypotheses. Section 4 provides data collection details and presents our descriptive statistics. Section 5 reports and comments on our empirical results. Section 6 concludes.

2. Literature Review

In this section, we discuss prior studies that focus on litigation risk as an important determinant of IPO underpricing. The majority of shareholder class action lawsuits against IPO issuers and their underwriters are initiated under Sections 11 and 12 of the Securities Act of 1933 and Section 10(b) of the Securities Exchange Act of 1934 (Lowry & Shu, 2002). Under Section 11 of the Securities Act of 1933, damages for direct purchasers are based on the difference between the offer price and either the sale price or the price at the time of the lawsuit. Damages for aftermarket purchasers who can demonstrate reliance on the IPO prospectus are based on the lower of the offer price and the purchase price of the security. Hence, for all lawsuits brought under Section 11, damages are directly related to the offer price. Consequently, more aggressive underpricing implies a lower offer price, which in turn implies lower potential damages in the event of a lawsuit and a lower probability of being sued. Indeed, the expected settlement cost is a major determinant of the probability of being sued (Alexander, 1993; T. Walker et al., 2015). Therefore, lower potential damages

due to higher underpricing suggest that plaintiffs have fewer incentives to bring a lawsuit against a firm.

Several studies investigate the connections between litigation risk and IPO underpricing, as outlined by Arena & Ferris (2017)'s review of the existing literature on the topic. Ibbotson (1975) reports that IPO firms underprice their shares to protect themselves against the risk of being sued. Tiniç (1988) develops a model that portrays underpricing as an efficient form of insurance against potential legal liabilities. He compares underpricing before and after the Securities Act of 1933, and finds that underpricing was significantly higher in the later period, consistent with the lawsuit avoidance hypothesis. Hughes & Thakor (1992) build on Tiniç's model and examine an underwriter's trade-off between current revenue loss from underpricing and expected future litigation costs. They specify the conditions for reaching equilibrium underpricing in support of the lawsuit avoidance theory. Hensler (1995) also proposes a variation of Tiniç's model in line with the lawsuit avoidance hypothesis. They investigate how an entrepreneur must balance underpricing costs and litigation costs while selecting a retained ownership percentage that maximizes his expected utility of wealth. Drake & Vetsuypens (1993) argue that Tiniç's empirical results may be driven by factors other than litigation risk. They report that underpricing is neither a sufficient nor an efficient way of avoiding lawsuits. Alexander (1993) also raises doubts about the lawsuit avoidance hypothesis, given the high costs of underpricing relative to the average lawsuit settlement costs, especially considering that lawsuits are relatively not frequent

However, endogeneity concerns challenge the validity of earlier studies. Under the lawsuit avoidance hypothesis, underpricing is an increasing function of litigation risk. At the same time, litigation risk also depends on underpricing. Specifically, the probability of a lawsuit is likely to decrease with higher underpricing, as plaintiffs have fewer incentives to sue firms when recoverable damages are lower (Alexander, 1993; T. Walker et al., 2015). Thus, litigation risk is an endogenous variable making the comparison of initial returns across sued and non-sued firms problematic. Lowry & Shu (2002) adjust for endogeneity bias by examining the lawsuit avoidance hypothesis using a simultaneous equations model. They find that firms with higher litigation risk purchase more insurance against potential lawsuits in the form of higher underpricing (the insurance effect). They further document that firms that choose higher levels of underpricing are less likely to be sued (the deterrence effect). Zhu (2009) focuses on the Private Securities Litigation Reform Act of 1995 (meant to discourage abusive lawsuits) and finds that in the three years following the reform, traditional IPO lawsuits were associated with a less significant insurance effect and a more significant deterrence effect of underpricing, relative to the pre-enactment period. She further reports that, due to the predominance of allocation lawsuits targeting underwriters in the early 2000s, higher underpricing did not reduce litigation risk during that period. Hao (2011) documents a positive relation between IPO withdrawal risk and IPO litigation risk but does not find that firms with higher litigation risk underprice their shares more in the 1996-2005 period. Walker et al. (2015) also do not find support for the lawsuit avoidance hypothesis in the 1996-2008 period. They show that the main predictors of litigation and settlement amounts are the monetary damages that plaintiffs can claim and the remaining

wealth available in the firm. Hanley & Hoberg (2012) perform a word content analysis on IPO prospectuses and report that strategic disclosure and underpricing act as substitutes for hedging litigation risk. Matanova et al. (2019) examine how both underpricing and the presence of going concern opinions (GCOs) in the IPO prospectus affect the probability of future class-action lawsuits. They find that underpricing successfully deters Section 11 lawsuits and that GCO IPOs are more likely than non-GCO IPOs to be subject to Section 10b litigation. Several studies conduct their analyses in a cross-country setting. Banerjee et al. (2011) examine 36 countries and find a positive relation between country-level accessibility of legal recourse and IPO underpricing. They argue that procedural simplicity in a given country increases the chance of litigation and makes the insurance against such litigation valuable. Similarly, Lin et al. (2013) investigate IPO firms in 40 countries and report that litigation risk is positively related to average IPO underpricing in a given country. They conclude that differences in legal risk factors can partially explain differences in underpricing across countries.

3. Hypothesis Development

In this section, we develop our hypotheses regarding the potential impact of pre-IPO earnings on the relationship between litigation risk and IPO underpricing and on the relation between litigation risk and underwriter gross spreads.

3.1. Litigation risk, pre-IPO earnings, and IPO underpricing

Prior studies control for various firm characteristics when examining the lawsuit avoidance hypothesis. However, little attention has been given to firms' profitability status

at the time they go public. We posit that pre-IPO earnings are a significant determinant of cross-sectional variation in the dynamics between litigation risk and IPO underpricing. Our rationale is based on issuers' relative level of confidence about their own prospects and on the relative strength of their incentives to avoid the costs associated with litigation.

Lawsuits typically follow significant aftermarket price declines that are triggered by unfavorable news about the firms' financial position. Plaintiffs claim that corporate insiders knew about the adverse prospects of their firm prior to the IPO but failed to disclose that information in the prospectus. We hypothesize that a situation of unpromising prospects is more likely to occur when unprofitable issuers are involved. Indeed, such firms tend to be at an earlier stage of their life cycle, making them less prepared to withstand challenges as newly public firms. Jain & Kini (2008) point out that unprofitable IPO firms are more vulnerable to face product and capital market shocks. Yi (2001) reports that issuers with losses at the IPO significantly underperform issuers with profits over the one-year, two-year, and three-year periods following the offer. Thus, we posit that unprofitable issuers may be less confident about their ability to deliver on the statements and projections made in their prospectus, which could inspire them to insure themselves more strongly against litigation through higher underpricing.

Further, lawsuits are often synonymous with substantial costs for sued firms (Lowry & Shu, 2002). Direct costs include legal fees, damages, and settlement payments that can all be considerable. For instance, a sued company in our sample (SureBeam Corporation) had to pay a settlement amount of $32.75 million, which represented no less than 60% of the proceeds raised through its IPO. Arena & Julio (2015) report that firms with higher

litigation risk tend to hold significantly larger amounts of cash in anticipation of future settlements and other related costs. Relatedly, Arena & Ferris (2017) point out that litigation insurance coverage tends to be limited. Thus, direct costs can significantly negatively affect firms' cash holdings, profitability, and value. Litigation also comes with costs that are not directly observable. Sued firms have to face the opportunity costs of management time and resources dedicated to the lawsuit and reputation costs. Karpoff et al. (2008) report that the reputational losses of firms targeted by enforcement actions for financial misrepresentation are 7.5 times higher than their legal penalties. Indirect costs can therefore have an even more detrimental effect on sued firms than direct legal costs.

We conjecture that the perspective of facing these costs is especially worrisome for negative-earnings issuers. The monetary burden associated with lawsuits is heavier to bear in their case, as they do not possess financial resources as abundant as positive-earnings issuers. Moreover, as they have not yet reached profitability, perceived uncertainty surrounding their ability to achieve the goals projected in their IPO prospectus is high. A public allegation of misconduct can only increase that uncertainty further, with the consequence of losing credibility in the eyes of customers, suppliers, and capital providers. Jain et al. (2008) point out that the risk of post-IPO failure is particularly high for unprofitable firms, as negative market perceptions regarding the firms' prospects could lead to a shutdown of external financing sources. As a result, lawsuits could be particularly threatening to the survival of unprofitable firms. Thus, we hypothesize that negative-earnings issuers have more incentives to insure themselves against litigation costs through higher underpricing. Our first hypothesis is the following:

Hypothesis 1. The insurance and deterrence effects of the lawsuit avoidance hypothesis are significantly stronger for negative-earnings issuers than for positive-earnings issuers.

3.2. Litigation risk, pre-IPO earnings, and underwriter gross spreads

Our study also investigates underwriter gross spreads. Our rationale is that litigation risk, along with pre-IPO earnings, also affects underwriting fees. Similar to issuers, underwriters have incentives to mitigate their exposure to the risk of being sued. For underwriters, potential litigation is an additional cost to bear on top of underwriting risk, as their reputation and market share are at stake in the event of a lawsuit. Hanley & Hoberg (2012) point out that underwriters are the primary beneficiary of aggressive underpricing strategies meant to deter Section 11 lawsuits. They further report that underwriters who fail to adequately hedge litigation risk experience economically large penalties. Hao (2011) documents that underwriters charge higher gross spreads to firms with higher litigation risk. We conjecture that negative-earnings IPO firms are the most vulnerable to litigation. Thus, underwriters are likely to associate these firms with higher risk exposure for themselves and a higher chance of reputational losses and market share declines in the future. As a result, we hypothesize that underwriters require higher compensation when dealing with unprofitable issuers with higher litigation risk. Our second hypothesis thus reads as follows:

Hypothesis 2. Underwriter gross spreads are significantly higher for negative-earnings issuers than for positive-earnings issuers among firms with higher litigation risk.

4. Data

4.1. Data sources

We collect a sample of IPOs issued between January 1998 and December 2018 from the Securities Data Corporation (SDC) New Issues database. Following the IPO literature, we focus exclusively on U.S. common shares issues with an offer price above $5.00. We exclude ADRs, unit offers, closed-end funds, REITs, natural resource-limited partnerships, best-effort offers, and offers in the financial and utility sectors (SIC codes 6000 to 6999 and 4900 to 4949, respectively). We further restrict the sample to NASDAQ, NYSE, and AMEX issues. For the remaining firms, we collect stock returns, market returns, and the volume of shares traded from the Center for Research in Security Prices (CRSP). Underwriter prestige levels and firms' founding years, used to derive their age, are collected from Jay Ritter's IPO Data website (https://site.warrington.ufl.edu/ritter/ipo-data/). We obtain financial statement data from Compustat, the number of analysts following the firms from the Institutional Brokers' Estimate System (IBES) database, and institutional holdings data from the Thomson Reuters Institutional (13f) Holdings database. Our final sample consists of 1,505 IPOs in 53 different Compustat two-digit SIC code industries. We define negative-earnings issuers as IPO firms with a net income below zero in the year preceding their IPO year and positive-earnings issuers as IPO firms with a net income above zero in the year preceding their IPO year. IPO underpricing is the percentage return from the SDC offer price to the first-day closing price on CRSP.

We measure litigation risk as an indicator variable equal to one if sample firms become defendants of a Section 11 lawsuit filed within three years of their IPO and zero

otherwise. We focus exclusively on lawsuits brought under Section 11 of the Securities Act of 1933 because damages are a direct function of the IPO offer price for these cases. We collect data on securities class actions from Stanford University's Securities Class Action Clearinghouse (SCAC, http://securities.stanford.edu). Our lawsuit dataset goes beyond our IPO sample period as we look for cases in the three years following the issues. We exclude laddering cases that are filed against underwriters and only name issuing firms as co-defendants. As noted by (Hao, 2007), laddering is the illegal practice of offering investors IPO allocations at the offer price if they agree to purchase additional shares at a higher price in the aftermarket. The practice artificially inflates aftermarket stock prices, allowing insiders to buy at a low price with the guarantee of selling later at a higher price. Laddering cases involve deliberate underpricing by underwriters and are therefore inappropriate for a study of the lawsuit avoidance hypothesis (Hao, 2007; Walker et al., 2015). With our filters, we identify 108 IPO firms that became the target of a Section 11 lawsuit within a period of three years following their IPO. For each case, we collect the filing date, the date of final judgment, and the status as of May 2021 (settled, dismissed/withdrawn, or ongoing). We obtain settlement amounts for 27 of the 58 settled cases. Table 1 defines all the variables we consider in our study.

[Insert Table 1 here]

4.2. Sample distribution

Table 2 reports the distribution of IPOs, negative-earnings IPOs, sued IPOs, and negative-earnings sued IPOs by year (Panel A) and by industry (Panel B). Out of all 1,505

sample IPOs, 942 (62.6%) are negative-earnings issues. Among the 108 (7.2%) sued firms, 68 (63%) are negative-earnings issuers. These observations show that most IPOs are completed by money-losing firms and that litigation occurs to these particular IPOs in similar proportions.

In Panel A of Table 2, column 2 presents the number of IPOs in a given year, while columns 3 and 4 present the number and percentage of negative-earnings IPOs in the same year, respectively. Over time, the percentage of negative-earnings IPOs has evolved in line with the major economic events that have impacted the United States' financial market. We find that the percentage of unprofitable IPOs went from 44.4% in 1998 to more than 75% during the technology bubble years 1999 and 2000. These years were indeed characterized by a large number of highly risky firms going public despite their lack of profitability[13]. Following the bursting of this bubble in 2001, the percentage of negative-earnings IPOs was about half of all annual IPOs until 2007. Then, the financial crisis hit in 2008, leading IPO activity to a low point. The percentage of negative-earnings IPOs fell to 37.5% in 2008 and 23.1% in 2009. As the economy gradually recovered, unprofitable IPOs represented about half of all annual issues until 2012. Since 2013, however, a new trend has emerged. The percentage of negative-earnings IPOs has become exceptionally high, above 65% of total IPOs every year, averaging 76% over the 2013-2018 period, and reaching 85% in 2018.

[13] See Ofek & Richardson (2003) for further details about the dot.com bubble.

In Panel A of Table 2, columns 5 and 6 present, respectively, the number and percentage of sued IPO firms in a given year. The average (median) number of sued firms is 5.14 (5.00) per year during our sample period. From 1998 to 2006, the number of sued firms remained below average. In 2007, however, it rose to nine cases, possibly in relation to the financial crisis. The year 2008 was also highly litigious, as 25% of the few firms that went public (eight firms) were sued. Since 2011, the annual number of sued IPOs has been, for the most part, above average, reaching eight cases in 2013, nine cases in 2015, and twelve cases in 2017. Litigation occurs more frequently, with the proportion of sued firms close to or exceeding 10% in most years. In particular, the percentage of sued firms reached 16.7% in 2017 and 17.5% in 2018. This may suggest that IPO firms have complied less with the securities laws in recent years. However, it could also indicate that IPO investors increasingly rely on legal recourse when facing unfavorable aftermarket outcomes.

In Panel A of Table 2, columns 7 and 8 present, respectively, the number and percentage of negative-earnings sued IPOs in a given year. We note that negative-earnings issuers comprise less than 35% of yearly sued firms in the 2013-2018 period characterized by a large predominance of unprofitable issuers. Therefore, the rising number of sued firms in recent years is not particularly related to the rise of negative-earnings IPOs as of late. In Panel B of Table 2, the distribution of IPOs by industry shows that the great majority of negative-earnings issues, sued issues, and negative-earnings sued issues occur in the services and manufacturing industries (comprising close to and above 40% of all issues in these sectors, respectively).

[Insert Table 2 here]

4.3. Lawsuit characteristics

Table 3 provides descriptive statistics for our lawsuit dataset. Panel A presents details about the time to lawsuit filing. The average (median) lawsuit was filed approximately one year (eleven months) after the IPO date. The majority of cases (61) were filed in the first year following the IPO, 36 in the second year, and 11 in the third year. The minimum time to lawsuit filing is as short as six days.

Panel B of Table 3 reports the time to resolution of the settled or dismissed/withdrawn lawsuits. Proceedings took an average (median) period of 2.56 years (2.32 years) from the filing date. A total of 28 cases were solved within one and a half years, while 40 took between one and a half and three years, and 30 took longer than three years. The maximum time to resolution in our dataset is 6.5 years.

Panel C of Table 3 presents the number and percentage of settled, dismissed/withdrawn lawsuits, or are still ongoing as of May 2021. We report statistics considering all IPO cases and distinguishing between negative-earnings IPO cases and positive-earnings IPO cases. Out of the 108 lawsuits, 58 (53.7%) were settled, 40 (37%) were dismissed/withdrawn, and ten (9.3%) were ongoing. Settlements are, therefore, the most common type of case resolution that we record. Although settlements are not an admission of guilt, we infer that plaintiffs' allegations were plausible enough in more than half of the cases to withstand the defendants' motions to dismiss the respective cases. The majority of IPOs are completed by money-losing firms, and lawsuits target these issuers in similar proportions (63%). Among negative-earnings IPO cases, 36 (52.9%) were settled, 24 (35.3%)

were dismissed/withdrawn, and eight (11.8%) were ongoing. Among positive-earnings IPO cases, 22 (55%) were settled, 16 (40%) were dismissed/withdrawn, and two (5%) were ongoing. Thus, we note that the two categories of firms exhibit a similar frequency of settlements.

Panel D of Table 3 presents the median settlement amount for lawsuits that resulted in a settlement and for which this information is available (27 cases out of 58). Considering all IPO cases, the median settlement amount is $4.20 million, equivalent to 5% of the median proceeds raised by the firms. This amount is higher for negative-earnings IPO cases ($5.18 million, based on 16 cases) than for positive-earnings IPO cases ($3.80 million, based on 11 cases).

[Insert Table 3 here]

4.4. Firm characteristics

Table 4 provides descriptive statistics for our sample IPO firms. We present mean and median values for all variables that our study considers and that Table 1 defines. Using a t-test of differences in means and a Wilcoxon test of differences in medians, we compare the characteristics of sued and non-sued firms as well as the characteristics of negative-earnings sued firms and positive-earnings sued firms. Sued firms have an average (median) initial return of 20.27% (15.69%) compared to 21.26% (12.95%) for non-sued firms. Mean and median differences are not statistically significant. Further, the percentage of technology firms, the number of secondary shares offered, the percentage of venture-backed firms, the market returns prior to the IPO, and the insider ownership after the offer

are comparable for sued and non-sued firms. However, we also identify differences between the two groups. Sued firms are larger, raise more capital through their IPO, and exhibit higher post-offer market capitalizations. Mean differences are significant at the 1% level. Hence, we infer that plaintiffs prefer initiating lawsuits against better established firms with more funds, as the latter associate with higher recoverable damages. Our statistics also indicate that sued firms hire higher-ranked underwriters on average, possibly to lower their chances of being sued. Besides, the median sued firm is significantly older than its non-sued counterpart, consistent with sued firms being more established. We also find that sued firms have more volatile stock returns and a higher stock turnover in the aftermarket. Moreover, they have a much worse first-year return than non-sued firms, with a mean (median) difference in returns of -32.75% (-41.54%), significant at the 1% level. This adverse performance explains, at least partially, why these firms were sued. In terms of IPO pricing, we find that the mean (median) offer price update from the midpoint of the filing range is 3.49% (5.56%) for sued firms, compared to 0.80% (0.00%) for non-sued firms. Thus, firms that engage in more aggressive pricing are more likely to be sued. Furthermore, sued firms are followed by more analysts in the year following the IPO and exhibit a higher level of institutional ownership. These observations could be related to the firms' larger size.

Finally, while underwriter gross spreads are clustered at 7% for IPOs, we find that sued firms pay significantly lower spreads than non-sued firms. The mean (median) spread for sued firms is 6.51% (7%) compared to 6.86% (7%) for non-sued firms, with the mean difference significant at the 1% level. Spreads typically fall as more capital is raised (Altinkiliç

& Hansen, 2000, among others). Thus, this result could be related to the larger proceeds raised by sued firms.

We perform the same analysis comparing negative-earnings sued firms to positive-earnings sued firms. We find that negative-earnings sued firms have an average (median) initial return of 20.36% (14.58%) compared to 20.11% (16%) for positive-earnings sued firms. However, the mean and median differences are not statistically significant. This result is in no way suggestive of an absence of cross-sectional variation based on pre-IPO earnings for the lawsuit avoidance hypothesis of underpricing. After controlling for the potential endogeneity bias, our hypotheses can still be verified. We find that negative-earnings sued firms are similar to positive-earnings sued firms in terms of underwriter rank, age, percentage of technology firms, stock turnover, market returns prior to the IPO, offer price update, insider ownership, and institutional ownership following the offer. However, the two categories of firms exhibit differences in other areas. Unprofitable sued firms are smaller, raise lower proceeds, and have lower post-offer market capitalizations. They sell a smaller percentage of secondary shares in the IPO, and they are more likely to be backed by venture capitalists. These characteristics are consistent with their status as emerging firms at an earlier stage of their life cycle. Our statistics also indicate that unprofitable sued firms experience more volatile trading in the aftermarket. Moreover, they significantly underperform profitable sued firms in the year following the IPO. The mean (median) difference in returns is -17.62% (-14.79%), significant at the 5% level. Our result is consistent with Yi (2001), although we focus specifically on firms with higher litigation risk in our analysis. This underperformance suggests that negative-earnings issuers could indeed be

less confident in their prospects at the time of going public, which could induce them to purchase more insurance in the form of underpricing. We also find that negative-earnings sued firms are followed by a lower number of analysts. Finally, they pay significantly higher underwriter gross spreads than positive-earnings sued firms. The mean (median) spread for money-losing sued IPOs is 6.69% (7%) compared to 6.22% (7%) for profitable sued IPOs. The mean difference is significant at the 5% level.

[Insert Table 4 here]

5. Empirical results

5.1. Litigation risk, pre-IPO earnings, and IPO underpricing

IPO firms face a trade-off when they price their issue. On the one hand, a higher offer price (lower underpricing) is preferable to boost IPO proceeds. On the other hand, a lower offer price (higher underpricing) is preferable when striving to minimize expected litigation costs. As a result, firms must carefully select the level of underpricing that will maximize their net benefits (i.e., proceeds minus expected litigation costs). Based on this rationale, firms with higher expected litigation costs should opt for higher underpricing, with the intent of insuring themselves against the risk of being sued (insurance effect). Moreover, because higher underpricing implies lower recoverable damages for plaintiffs, firms with higher underpricing should be less likely to be sued (deterrence effect). Following Lowry & Shu (2002), we implement a simultaneous equation model to control for endogeneity between litigation risk and initial returns as we examine the insurance and deterrence effects of the lawsuit avoidance hypothesis.

Table 5 reports our results. We perform two-stage least squares (2SLS) regressions. The predicted values from the first-stage estimations are included as explanatory variables in the second stage estimations. We draw our inferences from the second-stage regressions. Our system is specified as follows

Insurance effect

First stage (probit): $Lawsuit = \alpha + \beta_1\, Market\ cap + \beta_2\, Underwriter\ rank + \beta_3\, (Age > 5) + \beta_4\, Tech + \beta_5\, Insider\ sales + \beta_6\, VC\text{-}backed + \beta_7\, Standard\ deviation\ match + \beta_8\, Turnover\ match + \beta_9\, Offer\ price\ update + \varepsilon$ (1)

Second stage (OLS): $Initial\ return = \alpha + \beta_1\, Lawsuit\ instrument + \beta_2\, Market\ cap + \beta_3\, Underwriter\ rank + \beta_4\, (Age > 5) + \beta_5\, Tech + \beta_6\, Insider\ sales + \beta_7\, VC\text{-}backed + \beta_8\, Standard\ deviation\ match + \beta_9\, Prior\ market\ returns + \beta_{10}\, Offer\ price\ update + \varepsilon$ (2)

Deterrence effect

First stage (OLS): $Initial\ return = \alpha + \beta_1\, Market\ cap + \beta_2\, Underwriter\ rank + \beta_3\, (Age > 5) + \beta_4\, Tech + \beta_5\, Insider\ sales + \beta_6\, VC\text{-}backed + \beta_7\, Standard\ deviation\ match + \beta_8\, Prior\ market\ returns + \beta_9\, Offer\ price\ update + \varepsilon$ (3)

Second stage (probit): $Lawsuit = \alpha + \beta_1\, Initial\ return\ instrument + \beta_2\, Market\ cap + \beta_3\, Underwriter\ rank + \beta_4\, (Age > 5) + \beta_5\, Tech + \beta_6\, Insider\ sales + \beta_7\, VC\text{-}backed + \beta_8\, Standard\ deviation\ match + \beta_9\, Turnover\ match + \beta_{10}\, Offer\ price\ update + \varepsilon^*$ (4)

Table 1 provides all variable definitions. *Turnover match* is a valid instrumental variable to measure the insurance effect as it satisfies two conditions: it is significantly correlated to *Lawsuit* and exogenous to *Initial return*. Similarly, *Prior market returns* is a valid instrument

to measure the deterrence effect as it is significantly correlated to *Initial return* and exogenous to *Lawsuit*.

The dependent variable for the insurance effect, *Initial return*, is continuous, while the dependent variable for the deterrence effect, *Lawsuit*, is dichotomous. This complicates the estimation of the simultaneous equations system, and we cannot fully recover the parameters in equations (2) and (4). Following Lowry & Shu (2002) and relying on Maddala (1983), we correct for this by implementing the following structural change:

Insurance effect

Second stage (OLS): $$Initial\ return = \alpha + \beta_1\ Lawsuit\ instrument \times \sigma_{\varepsilon^*} + \beta_2\ Market\ cap + \beta_3\ Underwriter\ rank + \beta_4\ (Age > 5) + \beta_5\ Tech + \beta_6\ Insider\ sales + \beta_7\ VC\text{-}backed + \beta_8\ Standard\ deviation\ match + \beta_9\ Prior\ market\ returns + \beta_{10}\ Offer\ price\ update + \varepsilon \quad (5)$$

Deterrence effect

Second stage (probit): $$Lawsuit = \alpha + \frac{1}{\sigma_{\varepsilon^*}}[\beta_1\ Initial\ return\ instrument + \beta_2\ Market\ cap + \beta_3\ Underwriter\ rank + \beta_4\ (Age > 5) + \beta_5\ Tech + \beta_6\ Insider\ sales + \beta_7\ VC\text{-}backed + \beta_8\ Standard\ deviation\ match + \beta_9\ Turnover\ match + \beta_{10}\ Offer\ price\ update] + \varepsilon \quad (6)$$

where σ_{ε^*} is the standard deviation of the error term ε^*. While we cannot separately estimate the coefficients of the *Lawsuit instrument* and *Initial return instrument* variables, we can assess whether they are significantly different from zero, and make inferences on the statistical significance of the insurance and deterrence effects.

We split our sample of IPO firms into two subsamples: negative-earnings issuers and positive-earnings issuers. We provide results for each subsample separately and compare

the coefficients obtained for the *Lawsuit instrument* and *Initial return instrument*, respectively. We consider all litigation cases (in Panel A) and carry out the analysis, excluding dismissed and withdrawn cases (in Panel B). Dismissed/withdrawn cases can be viewed as cases that should have never been initiated. They were withdrawn by the plaintiffs or considered too weak by the judges (dismissed) as the link between the IPO and the events leading to the lawsuit was hard to establish. Excluding these cases improves the estimation of litigation risk.

In models 1 and 2 of Table 5, we examine the insurance effect of the lawsuit avoidance hypothesis. The dependent variable is the *Initial return,* and the tested variable is the *Lawsuit instrument*. In model 1 for negative-earnings issuers, the coefficient of the *Lawsuit instrument* is positive (21.43) and statistically significant at the 1% level. When we exclude dismissals/withdrawals in Panel B, the coefficient increases to 30.519 and remains significant at the 1% level. In model 2 for positive-earnings issuers, the coefficient of the *Lawsuit instrument* is positive (2.48) and statistically significant at the 1% level. It increases to 6.37, significant at the 1% level, when we exclude dismissals/withdrawals. Thus, the coefficients obtained for the *Lawsuit instrument* are much higher in magnitude for negative-earnings issuers than for positive-earnings issuers. Differences are significant at the 1% level. Therefore, while we find evidence of an insurance effect for all IPO firms, the effect is stronger for negative-earnings issuers.

In models 3 and 4 of Table 5, we investigate the deterrence effect of underpricing. The dependent variable is the probability of being sued (*Lawsuit*), and the tested variable is the *Initial return instrument*. In model 3 for negative-earnings issuers, we find that the

coefficient of the *Initial return instrument* is negative (-0.145) but not statistically significant. In model 4 for positive-earnings issuers, the coefficient of the *Initial return instrument* is lower in magnitude (-0.119) but also statistically insignificant. Thus, we find no evidence of a deterrence effect of underpricing, regardless of the subsample analyzed. We confirm this result when excluding dismissed/withdrawn cases in Panel B.

To summarize, our findings support Hypothesis 1. The insurance effect of the lawsuit avoidance hypothesis is significantly stronger for negative-earnings issuers than for positive-earnings issuers. Thus, the dynamics between litigation risk and IPO underpricing depend on a firm's profitability status at the time of going public. Among firms with higher litigation risk, negative-earnings issuers have the strongest incentive to avoid the costs associated with litigation. Therefore, they make the most extensive use of underpricing in order to achieve that goal.

[Insert Table 5 here]

5.1.1. Sensitivity analysis

We perform a battery of tests to assess the robustness of our findings. First, we conduct a sensitivity analysis over the timeline during which sample firms were sued relative to the IPO dates. Our main tests in Table 5 consider lawsuits filed within three years of the IPO. In this section, we investigate the sensitivity of our findings to other filing windows. Table 6 reports our results. As Panel A shows, we consider four filing windows: within one year (61 cases, 39 excluding dismissals/withdrawals), within one and a half years (87 cases, 56 excluding dismissals/withdrawals), within two years (97 cases, 62 excluding

dismissals/withdrawals), and within three years (108 cases, 68 excluding dismissals/withdrawals) of the IPO.

Panel B of Table 6 focuses on the insurance effect of the lawsuit avoidance hypothesis. The dependent variable is the *Initial return*. We report second-stage regression coefficients and *p*-values for the *Lawsuit instrument* variable. We find that the coefficient of the *Lawsuit instrument* is positive and significant at the 1% level in every filing window. More importantly, the coefficient is consistently higher in magnitude for negative-earnings issuers than for positive-earnings issuers. For instance, for cases filed within one and a half years of the IPO date, the coefficient is 22.46 for negative-earnings issuers compared to 3.103 for positive-earnings issuers (all cases). Thus, our sensitivity analysis shows that the insurance effect is prevalent among unprofitable issuers regardless of the time the lawsuits were filed.

In Panel C of Table 6, we focus on underpricing's deterrence effect. The dependent variable is *Lawsuit*. We report second-stage regression coefficients and *p*-values for the *Initial return instrument* variable. No matter the filing window, we find no evidence of a deterrence effect of underpricing for any of the categories of firms in our sample.

[Insert Table 6 here]

5.1.2. Alternative underpricing measures

For our next test, we consider different underpricing measures. So far, the initial return is computed as the percentage change between the IPO offer price and the first-day

closing price. However, the first day of trading could be too short of a period to fully reflect the extent of underpricing chosen by issuing firms. Therefore, we measure initial returns over alternative periods of three, five, and ten days, and we assess if our previous findings still hold.

Table 7 presents our results. In Panel A, we examine the insurance effect. The dependent variable is the *Initial return*. We report second-stage regression coefficients and *p*-values for the *Lawsuit instrument* variable. We find that the coefficient of the *Lawsuit instrument* remains positive and statistically significant at the 1% level, regardless of the specification of the initial return. The coefficient increases in magnitude as the period of initial IPO returns lengthens. These observations remain unchanged following the exclusion of dismissed/withdrawn cases. Further, we confirm our prior results: the evidence of an insurance effect is stronger for negative-earnings issuers. For example, with the 10-day underpricing specification, the *Lawsuit instrument* coefficient is 29.113 for negative-earnings issuers compared to 8.185 for positive-earnings issuers (excluding dismissals/withdrawals).

In Panel B of Table 7, we investigate the deterrence effect of underpricing. The dependent variable is *Lawsuit*. We report second-stage regression coefficients and *p*-values for the *Initial return instrument* variable. Although we note that the coefficient of *Initial return instrument* decreases in absolute value as the period of initial IPO returns lengthens, we still find no evidence of a deterrence effect for our sample of IPO firms.

[Insert Table 7 here]

5.1.3. Additional control variables

For our next analysis, we include additional control variables in our baseline regression models to minimize any potentially omitted variable biases. In untabulated results, we derive mean and median statistics for negative-earnings and positive-earnings issuers considering the entire IPO sample (not only sued firms as in Table 4). We identify three variables that distinguish negative-earnings issuers from positive-earnings issuers, which could be related to IPO underpricing: *Analyst following*, *Insider ownership,* and *Institutional ownership*. Indeed, we find that negative-earnings issuers have significantly lower analyst coverage, lower insider ownership, and lower institutional ownership than positive-earnings issuers. The mean and median differences are significant at the 1% level. Hence, we include these variables as we re-examine the lawsuit avoidance hypothesis.

Table 8 reports our results. In Panel A, we examine the insurance effect of the lawsuit avoidance hypothesis. The dependent variable is the *Initial return*. We report second-stage regression coefficients for the *Lawsuit instrument* and the additional variables. The first control variable added is *Analyst following* proxied by the average number of analysts covering the firms in the twelve months following the IPO. We assume a positive correlation between the level of coverage after the issue and the level of coverage before the issue. Cliff & Denis (2004) document a positive relationship between IPO underpricing and analyst coverage by the lead underwriter. They argue that underpricing could be a form of compensation for post-IPO analyst coverage or a deliberate attempt to attract analysts' attention. However, higher pre-IPO analyst coverage should lower

information asymmetry regarding issuing firms, which could, in turn, induce lower underpricing (Beatty & Ritter, 1986; Michaely & Shaw, 1994). In model 1 of Table 8, we find that the coefficient of *Analyst following* is negative and significant at the 1% level. Further, the coefficient of the *Lawsuit instrument* is 21.167 for unprofitable issuers compared to 3.077 for profitable firms (significant at the 1% level). Thus, the insurance effect remains prevalent for negative-earnings issuers when we include analyst coverage in the analysis. The results are qualitatively unchanged, excluding dismissals/withdrawals in Panel B.

The second control variable added is *Insider ownership*, proxied by the percentage of the post-IPO firm owned by pre-issue shareholders. Model 2 of Table 8 shows that the coefficient of *Insider ownership* is significant at the 1% level, negative for negative-earnings issuers, and positive for positive-earnings issuers. Leland & Pyle (1977) argue that higher ownership retention by corporate insiders signals superior firm quality to outside investors. Allen & Faulhaber (1989), Grinblatt & Hwang (1989), and Welch (1989) further report that issuing firms signal their quality through higher underpricing. Our findings may be driven by these dynamics. Further, the coefficient of the *Lawsuit instrument* remains significant at the 1% level and is higher for unprofitable issuers (29.961) than for profitable IPO firms (2.449). Thus, our earlier evidence of the insurance effect for negative-earnings issuers continues to hold following the inclusion of the insider ownership variable.

The third control variable added is *Institutional ownership* proxied by the percentage of the firm owned by institutional investors at the end of the quarter following the IPO. In model 3 of Table 8, we find that *Institutional ownership* is negatively and significantly related to underpricing at the 1% level. This result is consistent with previous studies.

Chemmanur et al. (2010) document that while institutions obtain large percentages of allocations in "hotter" (i.e., more underpriced) IPOs, they typically hold these allocations for a shorter period of time. As a result, they exhibit lower ownership of more underpriced IPOs in the quarter-end following the issue. Further, we find that the coefficient of the *Lawsuit instrument* is 22.564 for unprofitable issuers compared to 2.955 for profitable firms (significant at the 1% level).

In model 4 of Table 8, we include all three variables (*Analyst following, Insider ownership,* and *Institutional ownership*) in the analysis. Once more, we confirm the prevalence of the insurance effect within our subsample of negative earnings issuers. Therefore, the cross-sectional variation in our results based on pre-IPO earnings is robust to the inclusion of these additional explanatory variables.

In Panel B of Table 8 (models 5 through 8), we assess the deterrence effect of underpricing. The dependent variable is *Lawsuit*. We report second-stage regression coefficients for the *Initial return instrument* and the additional variables. Overall, the coefficient of the *Initial return instrument* is not statistically different from zero. Thus, we confirm the lack of a significant deterrence effect when we include additional control variables.

[Insert Table 8 here]

5.2. Litigation risk, pre-IPO earnings, and underwriter gross spreads

In this section, we investigate the relationship between litigation risk, pre-IPO earnings, and underwriter gross spreads. We estimate ordinary least squares (OLS) regressions and consider all litigation cases. Our regression specification is the following:

$$Underwriter\ gross\ spread = \alpha + \beta_1\ Lawsuit + \beta_2\ Proceeds + \beta_3\ Underwriter\ rank + \beta_4\ (Age > 5) + \beta_5\ Tech + \beta_6\ Insider\ sales + \beta_7\ VC\text{-}backed + \beta_8\ Standard\ deviation\ match + \beta_9\ Turnover\ match + \beta_{10}\ Prior\ market\ returns + \beta_{11}\ Offer\ price\ update + \varepsilon \quad (7)$$

Table 1 defines all variables, and Table 9 reports our results. We consider two subsamples of IPO firms: negative-earnings issuers and positive-earnings issuers. We provide results for each subsample separately and compare the coefficients obtained for the *Lawsuit* variable.

In model 1 of Table 9, the coefficient of *Lawsuit* is positive (0.04) and statistically significant at the 10% level for negative-earnings issuers, while it is negative (-0.251) and statistically significant at the 5% level for positive-earnings issuers. The relation between spreads and proceeds could drive our observations for sued positive-earnings firms. Prior research documents that gross spreads typically fall as more capital is raised (Altinkiliç & Hansen, 2000, among others). According to Table 4, sued positive-earnings firms raise the highest proceeds compared to the rest of the IPO sample. Consequently, they may pay lower spreads. Our observations for sued negative-earnings firms, however, are not driven by the same dynamics. Among negative-earnings firms, we find that sued firms exhibit higher proceeds than non-sued firms. Thus, one plausible explanation for our results is that underwriters charge especially high spreads to unprofitable issuers with a higher litigation risk.

Further, we find that spreads are higher for negative-earnings (positive-earnings) issuers that raise lower proceeds, are venture-backed, and exhibit a lower (higher) offer price update and a higher stock turnover prior to the offer based on matching non-issuing firms.

In model 3 of Table 9, we include the same additional control variables as in Table 8: *Analyst following, Insider ownership,* and *Institutional ownership*. Our results are unchanged. The sign and statistical significance of the coefficient of *Lawsuit* are robust to the inclusion of additional explanatory variables. We note that firms with more analyst coverage pay lower spreads, consistent with the prior literature (Cliff & Denis, 2004).

Our results support Hypothesis 2. Underwriter gross spreads are significantly higher for negative-earnings issuers than for positive-earnings issuers among firms with higher litigation risk. Underwriters seem to associate unprofitable issuers with their own superior expected litigation costs (i.e., reputation loss or market share declines in the future). Therefore, underwriters may require higher compensation when dealing with these firms.

[Insert Table 9 here]

5.3. Robustness checks: alternative approach

To test the robustness of our results, we re-run our analyses adopting a different methodological approach for the relation between litigation risk, pre-IPO earnings, and IPO underpricing, and the relation between litigation risk, pre-IPO earnings, and underwriter gross spreads.

5.3.1. IPO underpricing

Rather than examining negative-earnings and positive-earnings issuers separately, we consider the full IPO sample and include interaction terms in our regression framework. Table 10 reports our results focusing on IPO underpricing. Our new simultaneous equations system includes the *Negative-earnings dummy* variable in all regressions. Moreover, the second stage regressions now consider the *Lawsuit instrument*NE* interaction term for the insurance effect, and the *Initial return instrument*NE* interaction term for the deterrence effect, respectively. We apply the same structural change as in Table 5 to these regressions.

In model 1 of Table 10, we examine the insurance effect, regardless of the firms' profitability status at the IPO. In Panel A, the coefficient of the *Lawsuit instrument* is positive (12.27) and statistically significant at the 1% level. Thus, consistent with Lowry & Shu (2002), we find that, on average, IPO firms with a higher litigation risk underprice their shares by a greater amount as a form of insurance against future lawsuits. This result is confirmed when we exclude dismissals/withdrawals in Panel B.

In model 2 of Table 10, we account for firms' pre-IPO earnings and examine the insurance effect. We find that both the *Lawsuit instrument* and the *Lawsuit instrument*NE* variables have a positive and significant coefficient at the 1% level: 9.025 and 2.737, respectively. Thus, the evidence of an insurance effect is pertinent to all IPO firms, especially those with negative-earnings at the time of going public. We confirm this observation when we exclude dismissed/withdrawn cases. We further note that the *Negative-earnings dummy* has a positive and significant relation with underpricing.

Model 3 of Table 10 investigates the deterrence effect of underpricing without considering firms' pre-IPO earnings. The coefficient of the *Initial return instrument* is negative (-0.112) but not statistically significant. Thus, we find no evidence of underpricing's deterrence effect for our IPO sample, on average, which is also confirmed when we exclude dismissed/withdrawn cases in Panel B.

In model 4 of Table 10, we re-examine the deterrence effect of underpricing accounting for firms' pre-IPO earnings in the analysis. The coefficient of the *Initial return instrument* is negative (-0.073) but not significant, while the coefficient of the *Initial return instrument*NE* is negative (-0.085) and significant at the 5% level. Therefore, we find that higher underpricing deters Section 11 lawsuits, but only for negative-earnings issuers. We confirm these results in Panel B. The coefficient of the *Initial return instrument*NE* (-0.089) is significant at the 1% level. Further, the *Negative-earnings dummy* has a positive and significant coefficient at the 5% level.

To summarize, our results support Hypothesis 1 and corroborate our findings in Table 5. With this methodological approach, we find that both the insurance and the deterrence effects of the lawsuit avoidance hypothesis are significantly stronger for negative-earnings issuers.[14]

[Insert Table 10 here]

[14] In untabulated results, we also confirm these findings using a matching procedure based on the IPO year.

5.3.2. IPO underpricing: Time period comparison

As Table 2 shows, the 2013-2018 period exhibits an annual percentage of negative-earnings issuers above 60% (with an average of 76%),15 highlighting the predominance of money-losing IPO firms in recent years. We investigate whether the use of underpricing to avoid lawsuits has consequently intensified over the same period.

Table 11 reports our results. We divide the sample period into two subperiods: 2002-2012 and 2013-2018. We select the 2002-2012 subperiod as our benchmark period for two reasons. First, this period exhibits an annual percentage of negative-earnings issuers consistently below 60%, with a 46.5% average. Second, the number of sued firms in this period is equivalent to those in the 2013-2018 period. Panel A of Table 11 reports 46 cases for 2002-2012 and 45 cases for 2013-2018. Thus, from a litigation frequency standpoint, the two periods are comparable. Panel A also shows that unprofitable issuers were targeted in 23 of the 46 cases (50%) in 2002-2012, compared to 33 of the 45 cases (73%) in 2013-2018. These observations confirm the rise of lawsuits targeting unprofitable issuers in recent years.

In Panel B of Table 11,16 we focus on the insurance effect. For both periods, we find that the *Lawsuit instrument* and the *Lawsuit instrument*NE* have positive and significant coefficients. The coefficient of the *Lawsuit instrument* is significant at the 1% level in 2002-2012 (17.507), while it is significant at the 5% level in 2013-2018 (8.86). In contrast, the coefficient of the *Lawsuit instrument*NE* is significant at the 5% level in 2002-2012 (2.012),

15 A minimum of 65.9% in 2013 and a maximum of 85% in 2018.
16 In this section, for the purpose of our analysis, we do not run tests excluding dismissals/withdrawals, as it would further reduce the number of cases.

while it becomes significant at the 1% level in 2013-2018 (1.568). Thus, we note that the insurance effect becomes statistically more significant for negative-earnings issuers in recent years, suggesting that the rise of unprofitable issuers explains, in part, the greater use of underpricing for insurance purposes.

In Panel C of Table 11, we examine the deterrence effect of underpricing. For the 2002-2012 period, we find that the coefficient of the *Initial return instrument* is negative and significant at the 5% level (-0.304), while the coefficient of the *Initial return instrument*NE* is not statistically significant. In contrast, the 2013-2018 period exhibits an insignificant coefficient for the *Initial return instrument* and a negative and significant coefficient at the 5% level for the *Initial return instrument*NE* (-0.093). Therefore, while the deterrence effect did not particularly relate to negative-earnings issuers in 2002-2012, it became specific to these IPOs in 2013-2018. Once more, our findings indicate a positive relationship between the increasing number of money-losing IPO firms and the intensity of the use of underpricing for lawsuit avoidance purposes.

[Insert Table 11 here]

5.3.3. Underwriter spreads

Table 12 reports our results focusing on underwriter gross spreads. We re-estimate ordinary least squares (OLS) regressions, including the *Negative-earnings dummy* variable and the *Lawsuit*NE* interaction term. In model 1, we focus mainly on the *Lawsuit* variable. In model 2, the tested variables are *Lawsuit* and *Lawsuit*NE*. In model 3, we assess how the inclusion of additional control variables affects our results.

In model 1 of Table 12, the coefficient of *Lawsuit* is not statistically significant. Thus, contrary to Hao (2011), we do not find that firms with higher litigation risk pay higher gross spreads, on average. The *Negative-earnings dummy* is also insignificant, indicating that spreads are comparable for positive-earnings and negative-earnings issuers.

In model 2 of Table 12, we find that the coefficient of *Lawsuit* is negative (-0.247) and significant at the 5% level, while the coefficient of *Lawsuit*NE* is positive (0.291) and significant at the 5% level. Thus, in the group of sued firms, positive-earnings issuers pay significantly lower spreads while negative-earnings issuers pay significantly higher spreads. On average, the lower and higher spreads offset each other, explaining the insignificant *Lawsuit* coefficient observed in model 1. This result is in line with our findings in Table 9.

In model 3 of Table 12, we include *Analyst following, Insider ownership,* and *Institutional ownership* as additional control variables. We find that the sign and statistical significance of the *Lawsuit* and *Lawsuit*NE* coefficients are robust to their inclusion in the model. To summarize, our results support Hypothesis 2. We confirm that underwriter gross spreads are significantly higher for negative-earnings issuers than for positive-earnings issuers among firms with higher litigation risk.

[Insert Table 12 here]

6. Conclusion

We examine the impact of pre-IPO earnings on the relationship between litigation risk and IPO underpricing. Specifically, we hypothesize that the lawsuit avoidance hypothesis as it pertains to underpricing is more relevant to negative-earnings issuers than to positive-earnings issuers. We argue that unprofitable issuers are less prepared to face

shocks as public firms and may therefore be less confident in their prospects at the time of going public. In addition, unprofitable issuers have a stronger incentive to avoid the numerous costs associated with litigation. Both aspects could induce unprofitable issuers to choose higher levels of underpricing as a form of insurance against future lawsuits.

Using a simultaneous equations model, we find that underpricing's insurance and deterrence effects on litigation are predominant among negative-earnings issuers. While positive-earnings issuers with a higher litigation risk also underprice their shares by a greater amount for insurance purposes, the effect is statistically more significant for negative-earnings issuers. Further, when we consider an approach involving interaction terms, we find that higher underpricing deters Section 11 lawsuits only in the case of negative-earnings issuers. Our findings are robust to the time horizons over which sample firms were sued, to different underpricing measures, and to the inclusion of additional control variables to our models. Thus, we confirm that the use of underpricing to reduce litigation risk is mostly associated with firms with negative earnings at the time of going public.

We also explore the relation between litigation risk, pre-IPO earnings, and underwriter gross spreads. We find that underwriters charge significantly higher spreads to negative-earnings issuers among firms with higher litigation risk. Our results, therefore, suggest that the cost of potential litigation is perceived to be higher for negative-earnings issuers.

References

Aggarwal, R., Bhagat, S., & Rangan, S. (2009). The impact of fundamentals on IPO valuation. *Financial Management*, *38*(2), 253–284.

Akhigbe, A., Borde, S. F., & Whyte, A. M. (2003). Does an industry effect exist for initial public offerings? *Financial Review*, *38*(4), 531–551. https://doi.org/10.1111/1540-6288.00059

Akhigbe, A., Johnston, J., & Madura, J. (2006). Long-term industry performance following IPOs. *Quarterly Review of Economics and Finance*, *46*(4), 638–651. https://doi.org/10.1016/j.qref.2005.01.004

Aktas, N., Andries, K., Croci, E., & Ozdakak, A. (2019). Stock market development and the financing role of IPOs in acquisitions. *Journal of Banking and Finance*, *98*, 25–38. https://doi.org/10.1016/j.jbankfin.2018.10.015

Alexander, J. C. (1993). The lawsuit avoidance theory of why initial public offerings are underpriced. *UCLA Law Review*, *41*(1), 17–73.

Allen, F., & Faulhaber, G. R. (1989). Signalling by underpricing in the IPO market. *Journal of Financial Economics*, *23*(2), 303–323. https://doi.org/10.1016/0304-405X(89)90060-3

Altinkiliç, O., & Hansen, R. S. (2000). Are there economies of scale in underwriting fees? Evidence of rising external financing costs. *Review of Financial Studies*, *13*(1), 191–218. https://doi.org/10.1093/rfs/13.1.191

Arena, M., & Ferris, S. (2017). A survey of litigation in corporate finance. *Managerial Finance*, *43*(1), 4–18. https://doi.org/10.1108/MF-07-2016-0199

Arena, M., & Julio, B. (2015). The effects of securities class action litigation on corporate liquidity and investment policy. *Journal of Financial and Quantitative Analysis*, *50*(1–2), 251–275. https://doi.org/10.1017/S0022109015000010

Aslan, H., & Kumar, P. (2010). Lemons or cherries? Growth opportunities and market temptations in going public and private. *Journal of Financial and Quantitative Analysis*, *46*(2), 489–526. https://doi.org/10.1017/S0022109010000761

Asquith, P., & Mullins, D. W. (1986). Equity issues and offering dilution. *Journal of Financial Economics*, *15*(1–2), 61–89. https://doi.org/10.1016/0304-405X(86)90050-4

Autore, D. M., Bray, D. E., & Peterson, D. R. (2009). Intended use of proceeds and the long-run performance of seasoned equity issuers. *Journal of Corporate Finance*, *15*(3), 358–367. https://doi.org/10.1016/J.JCORPFIN.2008.12.003

Baker, M. P., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance*, *57*(1), 1–32. https://doi.org/10.1111/1540-6261.00414

Baker, M., & Wurgler, J. (2000). The equity share in new issues and aggregate stock returns. *The Journal of Finance*, *55*(5), 2219–2257. https://doi.org/10.1111/0022-1082.00285

Ball, E., Chiu, H. H., & Smith, R. (2011). Can VCs time the market? An analysis of exit choice for

venture-backed firms. *Review of Financial Studies*, *24*(9), 3105–3138. https://doi.org/10.1093/rfs/hhr042

Banerjee, S., Dai, L., & Shrestha, K. (2011). Cross-country IPOs: what explains differences in underpricing? *Journal of Corporate Finance*, *17*(5), 1289–1305. https://doi.org/10.1016/j.jcorpfin.2011.06.004

Beatty, P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, *15*, 213–232.

Bessler, W., & Thies, S. (2006). Initial public offerings, subsequent seasoned equity offerings, and long-run performance: evidence from IPOs in Germany. *Journal of Entrepreneurial Finance*, *11*(3), 1–37.

Bradley, D., & Yuan, X. (2013). Information spillovers around seasoned equity offerings. *Journal of Corporate Finance*, *21*(1), 106–118. https://doi.org/10.1016/j.jcorpfin.2013.01.006

Brau, James C; Li, M., & Shi, J. (2007). Do secondary shares in the IPO process have a negative effect on aftermarket performance? *Journal of Banking and Finance*, *31*(9), 2612–2631. https://doi.org/10.1016/j.jbankfin.2006.09.016

Brau, J. C., & Fawcett, S. E. (2006). Initial public offerings: an analysis of theory and practice. *The Journal of Finance*, *61*(1), 399–436.

Braun, M., & Larrain, B. (2009). Do IPOs affect the prices of other stocks? Evidence from emerging markets. *The Review of Financial Studies*, *22*(4), 1505–1544.

Brav, A., & Gompers, P. A. (1997). Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and nonventure capital-backed companies. *The Journal of Finance*, *52*(5), 1791–1821.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance*, *LII*(1), 57–82.

Carter, R. B., Dark, F. H., & Singh, A. K. (1998). Underwriter reputation, initial returns, and the long-run performance of IPO stocks. *The Journal of Finance*, *53*(1), 285–311.

Celikyurt, U., Sevilir, M., & Shivdasani, A. (2010). Going public to acquire? The acquisition motive in IPOs. *Journal of Financial Economics*, *96*(3), 345–363. https://doi.org/10.1016/j.jfineco.2010.03.003

Chemmanur, T. J., He, S., & Hu, G. (2009). The role of institutional investors in seasoned equity offerings. *Journal of Financial Economics*, *94*(3), 384–411. https://doi.org/10.1016/j.jfineco.2008.12.011

Chemmanur, T. J., He, S., & Nandy, D. K. (2010). The going-public decision and the product market. *Review of Financial Studies*, *23*(5), 1855–1908.

Chemmanur, T. J., Hu, G., & Huang, J. (2010). The role of institutional investors in initial public offerings. *The Review of Financial Studies*, *23*(12), 4496–4540. https://doi.org/10.1093/rfs/hhq109

Chemmanur, T., & Yan, A. (2017). Product market advertising, heterogeneous beliefs, and the long-run performance of initial public offerings. *Journal of Corporate Finance*, *46*, 1–24. https://doi.org/10.1016/j.jcorpfin.2017.06.010

Cliff, M. T., & Denis, D. J. (2004). Do initial public offering firms purchase analyst coverage with underpricing? *Journal of Finance*, *59*(6), 2871–2901. https://doi.org/10.1111/j.1540-6261.2004.00719.x

Corwin, S. A., Harris, J. H., & Lipson, M. L. (2004). The development of secondary market liquidity for NYSE-listed IPOs. *The Journal of Finance*, *59*(5), 2339–2373.

Cotei, C., & Farhat, J. (2013). Informational externalities of initial public offerings: does venture capital backing matter? *Journal of Economics and Finance*, *37*(1), 80–99. https://doi.org/10.1007/s12197-010-9167-2

Dong, M., Michel, J. S., & Pandes, J. A. (2011). Underwriter quality and long-run IPO performance. *Financial Management*, *40*(1), 219–251. https://doi.org/10.1111/j.1755-053X.2010.01140.x

Drake, P. D., & Vetsuypens, M. R. (1993). IPO Underpricing and insurance against legal liability. *Financial Management*, *22*(1), 64. https://doi.org/10.2307/3665966

Ellul, A., & Pagano, M. (2006). IPO underpricing and after-market liquidity. *Review of Financial Studies*, *19*(2), 381–421. https://doi.org/10.1093/rfs/hhj018

Engelen, P. J., Heugens, P., van Essen, M., Turturea, R., & Bailey, N. (2020). The impact of stakeholders' temporal orientaton on short- and long-term IPO outcomes: A meta-analysis. *Long Range Planning*, *53*(2), 101853. https://doi.org/10.1016/j.lrp.2018.10.003

Fama, F., & French, R. (1993). Common risk factors in the returns stocks and bonds. *Journal of Financial Economics*, *33*, 3–56.

Field, L. C., & Lowry, M. (2009). Institutional versus individual investment in IPOs: the importance of firm fundamentals. *Journal of Financial and Quantitative Analysis*, *44*(3), 489–516.

Gounopoulos, D., & Pham, H. (2018). Specialist CEOs and IPO survival. *Journal of Corporate Finance*, *48*, 217–243. https://doi.org/10.1016/j.jcorpfin.2017.10.012

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics*, *60*(2–3), 137–243.

Grinblatt, M., & Hwang, C. Y. (1989). Signalling and the pricing of new issues. *The Journal of Finance*, *44*(2), 393–420. https://www.jstor.org/stable/2328596

Hanley, K. W., & Hoberg, G. (2012). Litigation risk, strategic disclosure and the underpricing of initial public offerings. *Journal of Financial Economics*, *103*(2), 235–254. https://doi.org/10.1016/j.jfineco.2011.09.006

Hao, G. Q. (2011). Securities litigation, withdrawal risk and initial public offerings. *Journal of Corporate Finance*, *17*(3), 438–456. https://doi.org/10.1016/j.jcorpfin.2010.12.005

Hao, Q. (2007). Laddering in initial public offerings. *Journal of Financial Economics*, *85*(1), 102–122. https://doi.org/10.1016/j.jfineco.2006.05.008

Hensler, D. A. (1995). Litigation costs and the underpricing of initial public offerings. *Managerial and Decision Economics*, *16*(2), 111–128. https://doi.org/10.1002/mde.4090160203

Hensler, D. A., Rutherford, R. C., & Springer, T. M. (1997). The survival of initial public offerings in the aftermarket. *The Journal of Financial Research*, *20*(1), 93–110.

Houston, J., James, C., & Karceski, J. (2006). What a difference a month makes: stock analyst valuations following initial public offerings. *Journal of Financial and Quantitative Analysis*, *41*(1), 111–137. https://doi.org/10.1017/S0022109000002441

Hovakimian, A., & Hutton, I. (2010). Merger-motivated IPOs. *Financial Management*, *39*(4), 1547–1573.

Hsieh, J., Lyandres, E., & Zhdanov, A. (2011). A theory of merger-driven IPOs. *The Journal of Financial and Quantitative Analysis*, *46*(5), 1367–1405.

Hsu, H.-C., Reed, A. V, & Rocholl, J. (2010). The new game in town: competitive effects of IPOs. *The Journal of Finance*, *65*(2), 495–528.

Hughes, P. J., & Thakor, A. V. (1992). Litigation risk, intermediation, and the underpricing of initial public offerings. *The Review of Financial Studies*, *5*(4), 709–742.

Ibbotson, R. G. (1975). Price performance of common stock new issues. *Journal of Financial Economics*, *2*(3), 235–272. https://doi.org/10.1016/0304-405X(75)90015-X

Jain, B. A., Jayaraman, N., & Kini, O. (2008). The path-to-profitability of internet IPO firms. *Journal of Business Venturing*, *23*(2), 165–194. https://doi.org/10.1016/j.jbusvent.2007.02.004

Jain, B. A., & Kini, O. (1999). The life cycle of initial public offering firms. *Journal of Business Finance and Accounting*, *26*(9–10), 1281–1307.

Jain, B. A., & Kini, O. (2000). Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance and Accounting*, *27*(9), 1133–1183.

Jain, B. A., & Kini, O. (2008). The impact of strategic investment choices on post-issue operating performance and survival of US IPO firms. *Journal of Business Finance and Accounting*, *35*(3–4), 459–490. https://doi.org/10.1111/j.1468-5957.2007.02072.x

Karpoff, J. M., Lee, D. S., & Martin, G. S. (2008). The cost to firms of cooking the books. *Journal of Financial and Quantitative Analysis*, *43*(3), 581–611. https://doi.org/10.1017/S0022109000004221

Kim, M., & Ritter, J. R. (1999). Valuing IPOs. *Journal of Financial Economics*, *53*(3), 409–437. https://doi.org/10.1016/S0304-405X(99)00027-6

Kim, W., & Weisbach, M. S. (2008). Motivations for public equity offers: an international perspective. *Journal of Financial Economics*, *87*(2), 281–307. https://doi.org/10.1016/j.jfineco.2006.09.010

Krishnan, C. N. V., Ivanov, V. I., Masulis, R. W., & Singh, A. K. (2011). Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis*, *46*(5), 1295–1333. https://doi.org/10.1017/S0022109011000251

Lee, S.-H., Bach, S. B., & Baik, Y. (2011). The impact of IPOs on the values of directly competing incumbents. *Strategic Entrepreneurship Journal*, *5*(2), 158–177. https://doi.org/10.1002/sej

Leland, H. E., & Pyle, D. H. (1977). Informational Asymmetries , Financial Structure , and Financial Intermediation. *The Journal of Finance*, *32*(2), 371–387.

Lerner, J. (1994). Venture capitalists and the decision to go public. *Journal of Financial Economics*, *35*(3), 293–316.

Lin, H. L., Pukthuanthong, K., & Walker, T. J. (2013). An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance*, *19*(1), 56–77. https://doi.org/10.1016/j.jcorpfin.2012.10.003

Loughran, T. (1993). NYSE vs NASDAQ returns: market microstructure or the poor performance of initial public offerings? *Journal of Financial Economics*, *33*(2), 241–260.

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance*, *50*, 23–51. https://doi.org/10.1016/j.jcorp

Loughran, T., & Ritter, J. R. (1997). The operating performance of firms conducting seasoned equity offerings. *The Journal of Finance*, *52*(5), 1823–1850. https://doi.org/10.1111/j.1540-6261.1997.tb02743.x

Loughran, T., & Ritter, J. R. (2004). Why has IPO underpricing changed over time? *Financial Management*, *33*(3), 5–37.

Lowry, M. (2003). Why does IPO volume fluctuate so much? *Journal of Financial Economics*, *67*(November 2001), 3–40.

Lowry, M., Officer, M. S., & Schwert, W. G. (2010). The variability of IPO initial returns. *The Journal of Finance*, *65*(2), 425–465.

Lowry, M., & Shu, S. (2002). Litigation risk and IPO underpricing. *Journal of Financial Economics*, *65*(3), 309–335. https://doi.org/10.1016/S0304-405X(02)00144-7

Maddala, G. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*.

Masulis, R. W., & Korwar, A. N. (1986). Seasoned equity offerings: an empirical investigation. *Journal of Financial Economics*, *15*(1–2), 91–118. https://doi.org/http://dx.doi.org/10.1016/0304-405X(86)90051-6

Matanova, N., Steigner, T., Yi, B., & Zheng, Q. (2019). Going concern opinions and IPO pricing accuracy. *Review of Quantitative Finance and Accounting*, *53*(1), 195–238. https://doi.org/10.1007/s11156-018-0747-0

McGilvery, A., Faff, R., & Pathan, S. (2012). Competitive valuation effects of Australian IPOs. *International Review of Financial Analysis*, *24*, 74–83.

https://doi.org/10.1016/j.irfa.2012.08.002

Michaely, R., & Shaw, W. H. (1994). The pricing of initial public offerings: tests of adverse-selection and signaling theories. *Review of Financial Studies*, *7*(2), 279–319.

Nahata, R. (2008). Venture capital reputation and investment performance. *Journal of Financial Economics*, *90*(2), 127–151. https://doi.org/10.1016/j.jfineco.2007.11.008

Ofek, E., & Richardson, M. (2003). Dotcom mania : the rise and fall of internet stock prices. *The Journal of Finance*, *58*(3), 1113–1137.

Pommet, S. (2017). The impact of the quality of VC financing and monitoring on the survival of IPO firms. *Managerial Finance*, *43*(4), 440–451. https://doi.org/10.1108/MF-06-2016-0178

Poulsen, A. B., & Stegemoller, M. (2008). Moving from private to public ownership: selling out to public firms versus initial public offerings. *Financial Management*, *37*(1), 81–101. https://doi.org/10.1111/j.1755-053X.2008.00005.x

Purnanandam, A. K., & Swaminathan, B. (2004). Are IPOs really underpriced? *Review of Financial Studies*, *17*(3), 811–848. https://doi.org/10.1093/rfs/hhg055

Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance*, *46*(1), 3–27.

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing and allocations. *The Journal of Finance*, *57*(4), 1795–1828.

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics*, *15*(1–2), 187–212. https://doi.org/10.1016/0304-405X(86)90054-1

Santos, F. (2017). IPO market timing with uncertain aftermarket retail demand. *Journal of Corporate Finance*, *42*, 247–266. https://doi.org/10.1016/j.jcorpfin.2016.11.013

Saunders, A., & Steffen, S. (2011). The costs of being private: evidence from the loan market. *The Review of Financial Studies*, *24*(12), 4091–4122.

Schenone, C. (2010). Lending relationships and information rents: do banks exploit their information advantages? *The Review of Financial Studies*, *23*(3), 1149–1199.

Schultz, P., & Zaman, M. (2001). Do the individuals closest to internet firms believe they are overvalued? *Journal of Financial Economics*, *59*(3), 347–381.

Signori, A. (2018). Zero-revenue IPOs. *International Review of Financial Analysis*, *57*, 106–121. https://doi.org/10.1016/j.irfa.2018.03.003

Slovin, M. B., Sushka, M. E., & Polonchek, J. A. (1992). Informational externalities of seasoned equity issues: differences between banks and industrial firms. *Journal of Financial Economics*, *32*(1), 87–101. https://doi.org/10.1016/0304-405X(92)90026-T

Spiegel, M., & Tookes, H. (2007). Dynamic competition , innovation and strategic financing. *Working Paper, Yale University*.

Spiess, D. K., & Affleck-Graves, J. (1995). Underperformance in long-run stock returns following seasoned equity offerings. *Journal of Financial Economics*, *38*(3), 243–267. https://doi.org/10.1016/0304-405X(94)00817-K

Szewczyk, S. H. (1992). The intra-industry transfer of information inferred from announcements of corporate security offerings. *The Journal of Finance*, *47*(5), 1935–1945.

Tiniç, S. M. (1988). Anatomy of initial public offerings of common Stock. *The Journal of Finance*, *43*(4), 789–822.

Walker, M. D., & Yost, K. (2008). Seasoned equity offerings: what firms say, do, and how the market reacts. *Journal of Corporate Finance*, *14*, 376–386. https://doi.org/10.1016/j.jcorp

Walker, T., Turtle, H. J., Pukthuanthong, K., & Thiengtham, D. (2015). Legal opportunism, litigation risk, and IPO underpricing. *Journal of Business Research*, *68*(2), 326–340. https://doi.org/10.1016/j.jbusres.2014.06.025

Welch, I. (1989). Seasoned offerings, imitation costs, and the underpricing of initial public offerings. *The Journal of Finance*, *44*(2), 421–449.

Yi, J. (2001). Pre-offering earnings and the long-run performance of IPOs. *International Review of Financial Analysis*, *10*, 53–67.

Zhu, Y. (2009). The relation between IPO underpricing and litigation risk revisited: changes between 1990 and 2002. *Financial Management*, *38*(2), 323–355. https://doi.org/10.1111/j.1755-053X.2009.01038.x

Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies*, *62*(3), 425–448.

Table 1. *Variable definitions*

Variable	Definition
Negative-earnings dummy	Dummy variable that takes on a value of 1 if the net income of the firm is below zero in the year prior to the IPO, and 0 otherwise
Lawsuit	Dummy variable that takes on a value of 1 if the firm was sued under Section 11 of the Securities Act of 1933 within 3 years of its IPO, and 0 otherwise
Lawsuit*NE	Interaction term multiplying the variables *Lawsuit* and *Negative-earnings dummy*
Lawsuit instrument	Fitted (predicted) value from the first-stage regression of *Lawsuit*, used as an instrument in the second-stage regression of *Initial return*
Lawsuit instrument*NE	Interaction term multiplying the variables *Lawsuit instrument* and *Negative-earnings dummy*
Initial return	Percentage change between the IPO offer price and the closing price on the first trading day (third trading day for the three-day specification, fifth trading day for the fifth-day specification, and tenth trading day for the ten-day specification)
Initial return instrument	Fitted (predicted) value from the first-stage regression of *Initial return*, used as an instrument in the second-stage regression of *Lawsuit*
Initial return instrument*NE	Interaction term multiplying the variables *Initial return instrument* and *Negative-earnings dummy*
Assets	Logarithm of total assets
Proceeds	Logarithm of the offer gross proceeds
Market capitalization (cap.)	Logarithm of the number of shares outstanding multiplied by the closing price on the first trading day
Underwriter rank	Logarithm of the underwriter rank, collected from Jay Ritter's IPO Data website (https://site.warrington.ufl.edu/ritter/ipo-data/)
Age	Logarithm of the difference between the IPO year and the firm founding year (collected from Jay Ritter's IPO Data website (https://site.warrington.ufl.edu/ritter/ipo-data/)
Age > 5	Dummy variable that takes the value 1 if the firm is over five years of age, and 0 otherwise
Tech	Dummy variable that takes the value 1 if the firm operates in SIC code industries 35 (computer hardware), 36 (communications equipment, electronics), 38 (various devices), 48 (communications services) and 73 (software), and 0 otherwise
Secondary shares	Number of shares sold by pre-issue shareholders divided by the total number of shares sold in the IPO
Insider sales	Dummy variable that takes on a value of 1 if any shares in the IPO were sold by pre-issue shareholders, and 0 otherwise
VC-backed	Dummy variable that takes on a value of 1 if the firm is venture-backed, and 0 otherwise
Standard deviation	Standard deviation of daily stock returns of the IPO firm from 30 days to 390 days after the IPO
Standard deviation match	Standard deviation of daily stock returns of a matched non-issuing firm from 390 to 30 days before the IPO (matching based on 3-digit SIC code and market capitalization around the IPO date)
Turnover	Proportion of IPO shares traded at least once from 30 days to 390 days after the IPO as: $1 - \prod_t (1 - \frac{volume\ traded_t}{total\ shares\ outstanding_t})$
Turnover match	Turnover of a matched non-issuing firm from 390 to 30 days before the IPO (matching based on 3-digit SIC code and market capitalization around the IPO date)
First-year return	IPO firm stock return (compounded daily) from 30 days to 390 days after the IPO
Prior market returns	S&P500 index return (compounded daily) over the 15 trading days prior to the IPO
Offer price update	Percentage change between the midpoint of the file range and the IPO offer price
Analyst following	Average monthly number of analysts following the firm in the 12 months after the IPO
Insider ownership	Percentage of the post-IPO firm owned by pre-issue shareholders
Institutional ownership	Percentage of the firm owned by institutional investors at the end of the quarter following the IPO (March 31st, June 30th, September 30st, or December 31st)
Underwriter gross spread	Gross spread paid to the underwriter as a percentage of the IPO offer price

Table 2. *Distribution of IPO firms*

In this table, we report the number and percentage of IPOs, negative-earnings IPOs, sued IPOs, and negative-earnings sued IPOs included in our sample. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. IPO firms are put in the "negative-earnings" category if they report a net income inferior to zero in the year prior to the offering. They are placed in the "positive-earnings" category if they report a net income superior to zero in the year prior to the offering. Panel A presents results by data year and Panel B, results by industry.

	All IPOs	Negative-earnings IPOs		Sued IPOs		Negative-earnings sued IPOs	
	Number	*Number*	*Percentage*	*Number*	*Percentage*	*Number*	*Percentage*
Panel A: Distribution by year							
1998	108	48	44.4	4	3.7	2	50.0
1999	213	161	75.6	5	2.3	2	40.0
2000	134	104	77.6	5	3.7	0	0.0
2001	31	20	64.5	3	9.7	1	33.3
2002	33	15	45.5	2	6.1	0	0.0
2003	32	15	46.9	2	6.3	1	50.0
2004	87	50	57.5	5	5.7	1	20.0
2005	76	33	43.4	3	3.9	1	33.3
2006	84	40	47.6	5	6.0	2	40.0
2007	87	45	51.7	9	10.3	5	55.6
2008	8	3	37.5	2	25.0	1	50.0
2009	26	6	23.1	1	3.8	1	100.0
2010	45	23	51.1	5	11.1	3	60.0
2011	47	28	59.6	6	12.8	4	66.7
2012	63	30	47.6	6	9.5	4	66.7
2013	88	58	65.9	8	9.1	2	25.0
2014	111	79	71.2	5	4.5	0	0.0
2015	67	56	83.6	9	13.4	3	33.3
2016	53	39	73.6	4	7.5	1	25.0
2017	72	55	76.4	12	16.7	4	33.3
2018	40	34	85.0	7	17.5	2	28.6
Total	1,505	942	62.6	108	7.2	68	63.0
Panel B: Distribution by industry							
Mining	46	23	2.4	4	3.7	3	4.4
Construction	10	1	0.1	0	0.0	0	0.0
Manufacturing	662	449	47.7	47	43.5	28	41.2
Transportation	23	5	0.5	2	1.9	1	1.5
Communications	56	41	4.4	6	5.6	4	5.9
Wholesale Trade	36	10	1.1	1	0.9	0	0.0
Retail Trade	111	34	3.6	9	8.3	3	4.4
Services	552	372	39.5	39	36.1	29	42.6
Other	9	7	0.7	0	0.0	0	0.0
Total	1,505	942	100	108	100	68	100

Table 3. *Lawsuits' characteristics – Descriptive statistics*

In this table, we report the characteristics of the lawsuits that were filed against sample IPO firms. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. Panel A presents details about the timeframe in which sample firms were sued, relative to the IPO dates. Panel B provides details about the time to resolution of the cases. Panel C presents the number and percentage of cases that were settled, dismissed/withdrawn or ongoing as of May 2021. Panel D reports the median settlement amount for cases that were settled and for which this information is available.

Panel A: Time to lawsuit filing (years)		
Average	1.01	
Median	0.88	
Count – Post-IPO year 1	61	
Count – Post-IPO year 2	36	
Count – Post-IPO year 3	11	
Panel B: Time to resolution (years)		
Average	2.56	
Median	2.32	
Count – Within 1.5 years	28	
Count – Between 1.5 and 3 years	40	
Count – Above 3 years	30	
Panel C: Case status	*Number*	*Percentage*
All IPO cases	108	100.0
Settled	58	53.7
Dismissed/withdrawn	40	37.0
Ongoing	10	9.3
Negative-earnings IPO cases	68	63.0
Settled	36	52.9
Dismissed/withdrawn	24	35.3
Ongoing	8	11.8
Positive-earnings IPO cases	40	37.0
Settled	22	55.0
Dismissed/withdrawn	16	40.0
Ongoing	2	5.0
Panel D: Median settlement amount ($millions)		
All IPO cases	4.20	
Negative-earnings IPO cases	5.18	
Positive-earnings IPO cases	3.80	

Table 4. *Firm characteristics – Descriptive statistics*

In this table, we report IPO year descriptive statistics for sample IPO firms. We compare sued to non-sued firms, and negative-earnings sued firms to positive-earnings sued firms. Table 1 defines all variables. We present mean and median values, as well as value differences between the compared groups. We also provide the Wilcoxon test significance of the differences. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	All IPOs						Sued IPOs					
	Sued		Non-sued		Difference significance		Negative-earnings		Positive-earnings		Difference significance	
	Mean	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*
Initial return (%)	20.27	15.69	21.26	12.95	-0.99	2.75	20.36	14.58	20.11	16.00	0.25	-1.42
Assets ($million)	585.24	197.50	405.99	148.79	179.25***	48.72**	470.36	145.05	780.54	442.73	-310.18**	-297.68**
Proceeds ($million)	568.53	122.00	136.01	79.80	432.52***	42.20***	242.56	100.75	1,122.66	153.35	-880.10**	-52.60***
Market cap. ($million)	941.20	570.54	642.92	384.55	298.28***	185.99***	834.65	473.67	1,122.33	884.53	-287.68*	-410.87**
Underwriter rank	8.28	9.10	7.93	9.10	0.34**	0.00	8.20	9.10	8.40	9.10	-0.20	0.00
Age (years)	16.39	11.00	16.88	9.00	-0.49	2.00*	14.19	10.00	20.03	11.50	-5.84	-1.50
Tech (% of firms)	53.70	-	51.54	-	2.16	-	55.88	-	50.00	-	5.88	-
Secondary shares (%)	11.68	0.00	10.60	0.00	1.09	0.00	6.49	0.00	20.51	7.01	-14.02***	-7.01***
VC-backed (% of firms)	51.85	-	56.09	-	-4.24	-	60.29	-	37.50	-	22.79**	-
Standard deviation (%)	4.36	3.97	4.07	3.51	0.29*	0.46**	4.70	4.09	3.77	3.61	0.93**	0.49
Turnover	0.80	0.84	0.75	0.78	0.05**	0.06**	0.78	0.81	0.82	0.86	-0.04	-0.04
First-year return (%)	-42.37	-51.22	-9.62	-9.68	-32.75***	-41.54***	-48.89	-54.10	-31.27	-39.31	-17.62**	-14.79**
Prior market returns (%)	-0.02	0.25	0.41	0.65	-0.43	-0.40	-0.23	-0.12	0.34	0.69	-0.57	-0.81**
Offer price update (%)	3.49	5.56	0.80	0.00	2.69**	5.56***	3.02	3.57	4.26	6.07	-1.23	-2.49
Analyst following	6.07	4.73	4.70	4.09	1.37***	0.64	5.31	4.09	7.33	6.00	-2.02**	-1.91*
Insider ownership	45.34	45.50	43.92	45.50	1.42	0.00	46.06	45.50	44.26	45.50	1.79	0.00
Institutional ownership	40.01	30.94	32.08	25.94	7.93***	5.01**	38.72	32.05	42.21	28.88	-3.49	3.17
Underwriter gross spread (%)	6.51	7.00	6.86	7.00	-0.35***	0.00	6.69	7.00	6.22	7.00	0.47**	0.00
N	108		1,397		Total = 1,505		68		40		Total = 108	

Table 5. *Litigation risk, pre-IPO earnings, and underpricing*

In this table, we report the two-stage least squares (2SLS) regressions output as we examine the insurance and deterrence effects of the lawsuit avoidance hypothesis for sample IPO firms. Table 1 defines all variables. We consider two separate subsamples: negative-earnings issuers and positive-earnings issuers, respectively. Panel A presents results accounting for all cases (settled, dismissed/withdrawn, and ongoing cases), and Panel B, results excluding dismissals/withdrawals. Panel C reports the significance of the difference in coefficients for negative-earnings vs. positive-earnings issuers. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Insurance effect				Deterrence effect			
	Negative-earnings		Positive-earnings		Negative-earnings		Positive-earnings	
2SLS analysis	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*
Dependent variable	Lawsuit	Initial return	Lawsuit	Initial return	Initial return	Lawsuit	Initial return	Lawsuit
	(1)		(2)		(3)		(4)	
Panel A: All cases								
Lawsuit instrument		21.430***		2.480***				
Initial return instrument						-0.145		-0.119
Market cap.	0.101	0.043***	0.219**	0.011*	0.129***	0.022	0.038***	0.017
Underwriter rank	0.003	-0.005	0.047	-0.007*	-0.006	0.001	-0.001	0.003
Age > 5	0.432***	-0.352***	0.158	-0.021	-0.051***	0.007	-0.000	0.008
Tech	0.011	0.073***	0.056	0.025	0.106***	0.016	0.028*	0.006
Insider sales	0.074	-0.089***	0.008	-0.016	-0.013	0.001	-0.012	0.002
VC-backed	0.131	0.170***	0.116	0.055***	0.091***	0.009	0.087***	0.017
Standard deviation match	-0.127	-0.131**	-0.933	0.217***	-0.052	-0.003	-0.102	-0.039
Turnover match	0.523*		1.474***			0.017*		0.083***
Prior market returns		0.433**		0.290*	0.424*		0.357*	
Offer price update	0.002	0.028**	0.597	0.584***	0.040***	0.006	0.756***	0.124
Intercept	-2.724***	1.202***	-4.536***	0.370***	-0.581***	-5.239*	-0.097*	-4.740***
N	869	864	535	533	864	869	533	535
Pseudo/Adjusted R^2	0.0337	0.3753	0.0883	0.3713	0.3056	0.0356	0.3423	0.0887
Panel B: Excluding dismissals/withdrawals								
Lawsuit instrument		30.519***		6.370***				
Initial return instrument						-0.196		-0.077
Market cap.	0.126	0.007*	0.311**	0.045**	0.128***	0.029	0.034***	0.016
Underwriter rank	0.006	-0.012***	0.057	-0.015***	-0.006	0.001	-0.001	0.002
Age > 5	0.322*	-0.319***	0.076	-0.018	-0.054***	0.001	-0.001	0.003
Tech	0.260	0.136***	0.200	-0.022	0.113***	0.029	0.025	0.010
Insider sales	0.018	-0.020	0.044	-0.029*	-0.014	0.003	-0.012	0.001
VC-backed	0.326*	0.359***	0.228	0.018	0.095***	0.009	0.095***	0.017
Standard deviation match	-0.588	-0.545***	-0.172	0.121*	-0.051	-0.007	-0.090	-0.000
Turnover match	0.431*		0.740*			0.012*		0.031*
Prior market returns		0.416**		0.347*	0.399*		0.412*	
Offer price update	0.041	0.062***	0.586	0.506***	0.039***	0.007	0.747***	0.082
Intercept	-3.065***	1.871***	-5.002***	1.093***	-0.581***	-7.118**	-0.077*	-5.156***
N	846	841	520	518	841	846	518	520
Pseudo/Adjusted R^2	0.0428	0.3812	0.0975	0.3705	0.3138	0.0476	0.3434	0.0979
Panel C: Difference significance: negative-earnings vs. positive-earnings								
	All cases				Excluding dismissals/withdrawals			
Lawsuit instrument	p-value = 0.0000				p-value = 0.0000			
Initial return instrument	p-value = 0.7730				p-value = 0.4934			

Table 6. *Sensitivity analysis – Time to the lawsuit filing*

In this table, we report sensitivity analysis results regarding the insurance and deterrence effects of the lawsuit avoidance hypothesis for sample IPO firms. Panel A presents the number of sued firms in each filing window. Panel B provides results for the insurance effect, and Panel C results for the deterrence effect. We consider two separate subsamples: negative-earnings issuers and positive-earnings issuers, and report second-stage regressions' coefficients and *p*-values for the variables *Lawsuit instrument* and *Initial return instrument*. Table 1 defines all variables. We present results accounting for all cases (settled, dismissed/withdrawn, and ongoing cases) and results excluding dismissals/withdrawals. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Number of sued IPO firms

	All cases	Excluding dismissals/withdrawals
Within 1 year	61	39
Within 1.5 years	87	56
Within 2 years	97	62
Within 3 years	108	68

Panel B: Insurance effect (dependent variable = Initial return)

	Lawsuit instrument			
	Negative-earnings		Positive-earnings	
	Coefficient	*p-value*	*Coefficient*	*p-value*
All cases				
Within 1 year	9.574***	0.000	5.979***	0.000
Within 1.5 years	22.460***	0.000	3.103***	0.000
Within 2 years	21.989***	0.000	2.750***	0.000
Within 3 years	21.430***	0.000	2.480***	0.000
Excluding dismissals/withdrawals				
Within 1 year	13.919***	0.000	7.019***	0.000
Within 1.5 years	34.256***	0.000	5.510***	0.000
Within 2 years	30.603***	0.000	5.510***	0.000
Within 3 years	30.519***	0.000	6.370***	0.000

Panel C: Deterrence effect (dependent variable = Lawsuit)

	Initial return instrument			
	Negative-earnings		Positive-earnings	
	Coefficient	*p-value*	*Coefficient*	*p-value*
All cases				
Within 1 year	-0.096	0.620	-0.107	0.648
Within 1.5 years	-0.124	0.366	-0.069	0.833
Within 2 years	-0.131	0.366	-0.131	0.705
Within 3 years	-0.145	0.361	-0.119	0.748
Excluding dismissals/withdrawals				
Within 1 year	-0.039	0.820	-0.108	0.561
Within 1.5 years	-0.136	0.278	-0.084	0.769
Within 2 years	-0.167	0.233	-0.084	0.769
Within 3 years	-0.196	0.229	-0.077	0.800

Table 7. *Insurance and deterrence effects – Alternative underpricing measures*

In this table, we report results for the insurance and deterrence effects of the lawsuit avoidance hypothesis for sample IPO firms. As a robustness check, we consider alternative underpricing measures computed over three, five, and ten days after the IPO, respectively. Panel A provides results for the insurance effect, and Panel B results for the deterrence effect. We consider two separate subsamples: negative-earnings issuers and positive-earnings issuers, and report second-stage regressions' coefficients and *p*-values for the variables *Lawsuit instrument* and *Initial return instrument*. Table 1 defines all variables. We present results accounting for all cases (settled, dismissed/withdrawn, and ongoing cases) and results excluding dismissals/withdrawals. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Insurance effect (dependent variable = Initial return)				
	Lawsuit instrument			
	Negative-earnings		Positive-earnings	
	Coefficient	*p-value*	*Coefficient*	*p-value*
All cases				
3-day	17.960***	0.000	2.596***	0.000
5-day	19.051***	0.000	2.767***	0.000
10-day	20.476***	0.000	3.057***	0.000
Excluding dismissals/withdrawals				
3-day	25.475***	0.000	6.819***	0.000
5-day	27.109***	0.000	7.368***	0.000
10-day	29.113***	0.000	8.185***	0.000

Panel B: Deterrence effect (dependent variable = Lawsuit)				
	Initial return instrument			
	Negative-earnings		Positive-earnings	
	Coefficient	*p-value*	*Coefficient*	*p-value*
All cases				
3-day	-0.103	0.361	-0.199	0.748
5-day	-0.086	0.361	-0.127	0.748
10-day	-0.058	0.361	-0.106	0.748
Excluding dismissals/withdrawals				
3-day	-0.133	0.229	-0.114	0.800
5-day	-0.111	0.229	-0.079	0.800
10-day	-0.075	0.229	-0.066	0.800

Table 8. *Insurance and deterrence effects – Additional control variables*

In this table, we report the two-stage least squares (2SLS) regressions output as we examine the insurance and deterrence effects of the lawsuit avoidance hypothesis for sample IPO firms. We include additional control variables in our analysis: *Analyst following*, *Insider ownership,* and *Institutional ownership*. Panel A provides results for the insurance effect, and Panel B results for the deterrence effect. We consider two separate subsamples: negative-earnings issuers and positive-earnings issuers, and report second-stage regressions' coefficients for the variables *Lawsuit instrument, Initial return instrument, Analyst following*, *Insider ownership,* and *Institutional ownership*. Table 1 defines all variables. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Insurance effect (dependent variable = Initial return)

	Negative-earnings				Positive-earnings			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
All cases								
Lawsuit instrument	21.167***	29.961***	22.564***	20.981***	3.077***	2.449***	2.955***	3.521***
Analyst following	-0.003***			-0. 073***	-0.018***			-0.013***
Insider ownership		-0.901***		-0.818***		0.117***		0.097**
Institutional ownership			-0.469***	-0.632***			-0.165***	-0.204***
Excluding dismissals/withdrawals								
Lawsuit instrument	32.816***	34.934***	33.633***	26.370***	9.874***	5.284***	7.807***	9.131***
Analyst following	-0.013***			-0.076***	-0.033***			-0.022***
Insider ownership		-1.355***		-1.201***		0.129***		0.071*
Institutional ownership			-0.459***	-0.561***			-0.173***	-0.250***

Panel B: Deterrence effect (dependent variable = Lawsuit)

	Negative-earnings				Positive-earnings			
	(5)	(6)	(7)	(8)	(5)	(6)	(7)	(8)
All cases								
Initial return instrument	-0.122	-0.267	-0.161	-0.200	-0.137	-0.013	-0.082	-0.006
Analyst following	-0.002			-0.004	0.002			0.002
Insider ownership		0.043		0.039		-0.009		-0.006
Institutional ownership			0.002	0.013			0.019	0.041
Excluding dismissals/withdrawals								
Initial return instrument	-0.158	-0.421	-0.214	-0.336	-0.111	-0.117	-0.061	-0.172
Analyst following	-0.002			-0.005	0.002			0.001
Insider ownership		0.060*		0.051*		-0.009		-0.020
Institutional ownership			0.007	0.007			0.006	0.015

Table 9. *Litigation risk, pre-IPO earnings, and underwriter gross spreads*

In this table, we report the ordinary least squares (OLS) regressions output as we examine the underwriter gross spread of sample IPO firms. Specifically, we investigate the impact of litigation risk, along with firms' pre-IPO earnings, on the size of this spread. We consider two separate subsamples: negative-earnings issuers and positive-earnings issuers, respectively. Table 1 defines all variables. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Underwriter gross spread			
	Negative-earnings		Positive-earnings	
	(1)	(2)	(1)	(2)
Lawsuit	0.040*	0.029*	-0.251**	-0.278**
Analyst following		-0.038***		-0.088***
Insider ownership		-0.057		-0.121
Institutional ownership		-0.013		0.149
Proceeds	-0.425***	-0.300***	-0.519***	-0.309***
Underwriter rank	0.006	0.005	0.010	0.016
Age > 5	0.004	0.021	0.020	-0.020
Tech	-0.022	0.016	-0.023	0.004
Insider sales	0.048	0.004	0.112	0.046
VC-backed	0.145***	0.182***	0.047*	0.158**
Standard deviation match	-0.196	-0.274	-0.320	-0.493
Turnover match	0.196**	0.219**	0.255*	0.429**
Prior market returns	0.480	0.488	-0.530	-0.049
Offer price update	-0.063*	-0.068**	0.858***	0.687**
Intercept	8.455***	8.064***	8.881***	8.218***
N	868	759	533	417
Pseudo/Adjusted R^2	0.2896	0.2139	0.3647	0.3334
	Difference significance: negative-earnings vs. positive-earnings			
	(1)		(2)	
Lawsuit	p-value = 0.0728		p-value = 0.0612	

Table 10. *Robustness check: Litigation risk, pre-IPO earnings, and underpricing*

In this table, we report the two-stage least squares (2SLS) regressions output as we examine the insurance and deterrence effects of the lawsuit avoidance hypothesis for sample IPO firms. Table 1 defines all variables. The variables *Negative-earnings dummy*, *Lawsuit instrument*NE,* and *Initial return instrument*NE* are specific to the models that consider pre-IPO earnings into the equation. Panel A presents results accounting for all cases (settled, dismissed/withdrawn, and ongoing cases), and Panel B, results excluding dismissals/withdrawals. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Insurance effect				Deterrence effect			
2SLS analysis	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*	*1st stage*	*2nd stage*
Dependent variable	Lawsuit	Initial return	Lawsuit	Initial return	Initial return	Lawsuit	Initial return	Lawsuit
	(1)		(2)		(3)		(4)	
Panel A: All cases								
Lawsuit instrument		12.270***		9.025***				
Lawsuit instrument*NE				2.737***				
Initial return instrument						-0.112		-0.073
Initial return instrument*NE								-0.085**
Negative-earnings dummy			0.099	0.125**			0.002	0.023**
Market cap.	0.137**	0.036***	0.140**	0.036***	0.102***	0.016	0.102***	0.018
Underwriter rank	0.014	-0.010***	0.014	-0.010***	-0.002	0.000	-0.002	0.000
Age > 5	0.357***	-0.193***	0.373***	-0.203***	-0.049***	0.007	-0.048***	0.008
Tech	0.032	0.057***	0.026	0.056***	0.087***	0.011	0.086***	0.012
Insider sales	0.006	-0.030**	0.034	-0.040***	-0.011	0.001	-0.010	0.000
VC-backed	0.003	0.073***	0.026	0.087***	0.094***	0.010	0.094***	0.011
Standard deviation match	-0.212	0.106**	-0.189	0.095**	0.018	-0.005	0.018	-0.004
Turnover match	0.855***		0.857***			0.030***		0.037***
Prior market returns		0.363**		0.360**	0.413**		0.414**	
Offer price update	0.015	0.038***	0.013	0.038***	0.063***	0.008	0.063***	0.010
Intercept	-3.378***	0.805***	-3.462***	0.720***	-0.448***	-4.801***	-0.449***	-5.227***
N	1,404	1,397	1,404	1,397	1,397	1,404	1,397	1,404
Pseudo/Adjusted R^2	0.0382	0.3377	0.0391	0.3401	0.2586	0.0392	0.2581	0.0481
Panel B: Excluding dismissals/withdrawals								
Lawsuit instrument		25.333***		17.659***				
Lawsuit instrument*NE				4.646***				
Initial return instrument						-0.117		-0.091
Initial return instrument*NE								-0.089***
Negative-earnings dummy			0.090	0.198***			0.001	0.024**
Market cap.	0.182***	0.027**	0.186***	-0.026**	0.100***	0.016	0.100***	0.021
Underwriter rank	0.020	-0.017***	0.020	-0.016***	-0.002	0.000	-0.002	0.000
Age > 5	0.237	-0.198***	0.253*	-0.208***	-0.051***	0.000	-0.051***	0.000
Tech	0.258*	0.096***	0.251*	0.092***	0.091***	0.017	0.091***	0.021
Insider sales	0.002	-0.030**	0.028	-0.046***	-0.012	0.001	-0.012	0.001
VC-backed	0.093	0.138***	0.115	0.155***	0.098***	0.009	0.098***	0.010
Standard deviation match	-0.305	0.192***	-0.321	0.199***	0.014	-0.010	0.014	-0.013
Turnover match	0.552*		0.549*			0.015*		0.019*
Prior market returns		0.372**		0.368**	0.414**		0.414**	
Offer price update	0.018	0.056***	0.019	0.056***	0.061***	0.007	0.061***	0.010
Intercept	-3.723***	1.817***	-3.801***	1.652***	-0.439***	-5.706***	-0.439***	-6.388***
N	1,366	1,359	1,366	1,359	1,359	1,366	1,359	1,366
Pseudo/Adjusted R^2	0.0413	0.3411	0.0421	0.3463	0.2634	0.0435	0.2629	0.0587

Table 11. *Insurance and deterrence effects – Time periods comparison*

In this table, we report results for the insurance and deterrence effects of underpricing on the litigation risk of sample IPO firms. We consider two separate time periods: 2002-2012 and 2013-2018. The 2002-2012 period is characterized by an annual percentage of negative-earnings issuers below 60% and averaging 46.5% (see Table 2). In contrast, the 2013-2018 period is characterized by a large predominance of negative-earnings issuers, with an annual percentage above 60% and averaging 76%. Panel A presents the number of sued firms, and negative-earnings sued firms in each period. Panel B provides results for the insurance effect, and Panel C presents results for the deterrence effect. We report second-stage regressions' coefficients and *p*-values for the variables *Lawsuit instrument*, *Lawsuit instrument*NE*, *Initial return instrument*, *Initial return instrument*NE,* and *Negative-earnings dummy*. Table 1 defines all variables. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Panel A: Number of sued IPO firms		
	All	Negative-earnings
2002-2012: Before the rise of unprofitable IPOs	46	23
2013-2018: During the rise of unprofitable IPOs	45	33

Panel B: Insurance effect (dependent variable = Initial return)						
	Lawsuit instrument		Lawsuit instrument*NE		Negative-earnings dummy	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
2002-2012	17.507***	0.000	2.012**	0.036	0.238***	0.000
2013-2018	8.860**	0.000	1.568***	0.005	0.140*	0.097

Panel C: Deterrence effect (dependent variable = Lawsuit)						
	Initial return instrument		Initial return instrument*NE		Negative-earnings dummy	
	Coefficient	*p-value*	*Coefficient*	*p-value*	*Coefficient*	*p-value*
2002-2012	-0.304**	0.042	-1.568	0.133	0.009	0.431
2013-2018	-0.177	0.319	-0.093**	0.038	0.033**	0.008

Table 12. *Robustness check: Litigation risk, pre-IPO earnings, and underwriter gross spreads*

In this table, we report the ordinary least squares (OLS) regressions output as we examine the underwriter gross spread of sample IPO firms. Specifically, we investigate the impact of litigation risk, along with firms' pre-IPO earnings, on the size of this spread. Table 1 defines all variables. We consider 108 class actions brought under Section 11 of the Securities Act of 1933 within three years of the IPOs. ***, **and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Underwriter gross spread		
	(1)	(2)	(3)
Lawsuit	-0.067	-0.247**	-0.286**
Lawsuit*NE		0.291**	0.310**
Negative-earnings dummy	-0.028	-0.051	-0.091
Analyst following			-0.056***
Insider ownership			-0.060
Institutional ownership			0.063
Proceeds	-0.463***	-0.460***	-0.307***
Underwriter rank	0.009	0.009	0.010
Age > 5	0.006	0.002	0.017
Tech	-0.024	-0.024	0.017
Insider sales	0.076**	0.075**	0.021
VC-backed	0.112***	0.116***	0.176***
Standard deviation match	-0.231*	-0.234*	-0.338**
Turnover match	0.258***	0.262***	0.344***
Prior market returns	0.042	0.051	0.358
Offer price update	-0.041	-0.040	-0.055
Intercept	8.613***	8.612***	8.125***
N	1,401	1,401	1,176
Pseudo/Adjusted R^2	0.3262	0.3282	0.2746