On the Importance of Accounting Information in Early-Stage Financing

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ABSTRACT

This paper asks whether available accounting information is important in early-stage financing. We use detailed administrative records from Norway to build a measure of a startup's ex ante innovation potential before it receives financing. This approach allows us to look beyond the set of venture-backed startups to circumvent the endogenous demand for accounting information. The lagged book value of equity, disaggregated into earnings and contributed capital, captures between 27% and 34% of the total variation in valuations across financing rounds. Current earnings not only aggregate the underlying non-financial firm characteristics but also contain incremental information. The latter relates more to the financing decision and amount than to the implied valuations per se. Overall, our findings speak to the importance of accounting information for reducing information asymmetries even in highly uncertain settings, in which investing based on "gut feeling" may be the norm.

I. INTRODUCTION

Early-stage, innovative firms rely critically on outside equity financing to fund their growth and development. Because they pursue highly uncertain business ideas, have short financial and operating histories and, in many cases, lack robust reporting processes and internal controls, many innovative firms are highly opaque (Hellmann and Puri 2002). Potential investors must overcome enormous information asymmetries to provide financing for such firms. The conventional wisdom is that venture capitalists (VC) and other early-stage equity investors rely primarily on "gut feeling" and a variety of non-financial characteristics to make investment decisions (Huang and Pearce 2015; Gompers, Gornall, Kaplan, and Strebulaev 2020). If this is the case, the importance of financial accounting information, whose primary role is to reduce information asymmetries, becomes unclear. If available at all, does accounting information aggregate non-financial firm characteristics at the time of the early-stage investment decision and is it even incrementally informative for predicting market valuations and for whether a firm receives financing in the first place?

The goal of this paper is to address these questions. Doing so requires us to confront a number of empirical challenges. The first is sample selection. Because investors choose in which firms to invest and *not* to invest, we cannot answer this question by sampling only firms that receive venture financing. If accounting information absorbs information that serves the investment selection process, conditioning the sample on firms' receipt of venture backing would remove precisely the variation required to identify the importance of accounting information. To address this issue, we must also observe firms that were ex ante similar to venture-backed firms but did not receive funding. The second, closely-related, challenge is the availability of granular financial accounting data. To determine whether accounting information is relevant, we must identify a setting in which high-quality, standardized accounting data are publicly and exogenously available—that is, not merely as an endogenous result of investor demand.[1] Outside such a setting, we would be unable to distinguish the unavailability of accounting data from its lack of relevance.

1. For example, VCs face strong reporting requirements from their limited partners (LPs), in turn generating endogenous demand for accounting information from their portfolio firms.

These challenges preclude us from using U.S. data in particular because U.S. financial statements are not publicly available for early-stage, privately-held firms. Indeed, it is not even clear whether relevant and representative accounting data exist for these firms; if they do, their availability is likely a result of endogenous catering to investor demand. Instead, we exploit a large, detailed administrative dataset from Norway. Most new Norwegian firms choose to establish as limited liability companies; as such, regardless of firm age or size, they are required to submit standardized financial statements (in particular, a balance sheet and an income statement)[2] prepared in accordance with Norwegian GAAP (or IFRS) no later than eighteen months after their incorporation. This practice implies that the resulting accounting information for just-established firms conforms to a common set of standards (see Mjøs and Selle 2022). In addition, the Norwegian Tax Authority has provided us with tax declarations containing information about all (gross) share purchase and sales values and dates for the entire population of equity investors in all limited liability companies in Norway. This information is collected for the calculation of the wealth tax and allows us to calculate equity valuations for each firm in Norway based on real transactions, regardless of investor type.[3]

With these data, we begin by building ex ante empirical measures of future innovation potential. These allow us to identify a set of firms observably similar to those that will later receive venture funding. We rely on the core idea in Guzman and Stern (2015, 2020) that entrepreneurs make choices at the time of firm registration based on their ambitions and expectations, which then predict actual entrepreneurial quality. We adapt this logic to our empirical setting by identifying three indicators for high innovation propensity (HIP) based on firm characteristics observable at incorporation. The indicators are based on the firm's having an English-language name, being located near the largest university cities, and having at least one geographically distant board member.[4] Less than 60% of the overall population of newly established firms in potentially innovative industries satisfies any of the HIP flag criteria, but these firms include 90% of all firms that receive venture funding. Our flags are also strong predictors of firm-level

2. See, e.g., Breuer (2021) for an overview of the full financial reporting requirement thresholds.

3. Norway is one of only five OECD countries implementing a wealth tax on individuals such that this type of data is available (Source: OECD Stat).

4. We exclude financial services, real estate and firms operating in non-innovative industries before we apply our HIP indicators. For more details see Section 4.

revenue growth, patent applications and positive later-stage firm exits such as through M&As and IPOs. This sampling procedure allows us to study the set of firms that might appear at the "top of the funnel" of venture investors (see Gompers et al. 2020).

We next examine the relevance of book value of equity in the equity valuations in financing rounds (Holthausen and Watts 2001; Barth, Beaver, and Landsman 2001). Similarly to Ball, Gerakos, Linnainmaa, and Nikolaev (2020), we disaggregate the book value of equity one year prior to the financing round into contributed capital and earnings and find that it captures approximately 27%–34% of the total variation in pre-money valuations in early-stage, innovative firms.[5] However, in contrast to the previous literature (Hand 2005; Armstrong, Davila, and Foster 2006; Sievers, Mokwa, and Keienburg 2013), we need to adjust the traditional value-relevance model by Barth, Beaver, and Landsman (1998) for the fact that, in financing rounds, the equity ownership stake purchased in connection with the investment amount effectively determines the market value of the firm, instead of prices being set through secondary trades in liquid public markets. Specifically, in public markets, differences of opinion among outside investors result in trades that affect stock prices. These stock price changes do not immediately impact a firm's cash for operations or working capital. In contrast, in early-stage financing rounds, the information flow is not between arms-length outsiders but between the firm itself and its investors. We demonstrate that after adjusting the model to the early-stage setting the incremental relevance of earnings drops dramatically (from 4.5% to 0.6%) in our sample of HIP firms and even more so (from 16.5% to 3.0%) in firms that actually receive venture funding. This result also illustrates the selection bias that arises from ex post selection on VC financing.

Because the incremental explanatory value of earnings is relatively small, we further test whether more granular accounting information has greater relevance for early-stage valuations or whether non-financial publicly or privately observable firm characteristics simply do a better job in this setting. We find that the inclusion of more granular financial statement items increases the adjusted R-squared by 1.8 percentage points, which is approximately the same magnitude as the total incremental explanatory power of publicly observable characteristics

5. In contrast, the explanatory power of the disaggregated book value of equity is almost 46% for non-innovative firms, i.e., firms not satisfying at least one HIP flag (non-HIP firms), in line with previous findings on the increasing role of intangibles in high-growth, innovative firms.

(2.0 percentage points) such as financing round, firm age, industry and calendar year, and even larger than the additional explanatory power of privately observable characteristics (1.0 percentage point) such as the number of investors, board members, patent applications or firm bank rating. However, once we condition on the knowledge of publicly observable firm characteristics, we do not observe any incremental increase in the explanatory power from the inclusion of the more granular financial statement data. This leads us to question whether earnings simply aggregate non-financial (publicly or privately observable) firm characteristics or whether they are incrementally informative for early-stage valuations. We find that such firm characteristics explain in total only slightly more than 20% of the variation in positive earnings and approximately 30% of the variation in negative earnings. The results indicate that, while earnings aggregate the underlying non-financial firm characteristics, they can also provide incremental information for valuations in financing rounds.

The last analyses acknowledge that the traditional value-relevance model reflects only one part of the early-stage financing process and that earnings also reflect information contained in the equity amounts raised, which, in turn, determine the valuation. To account for this, we decompose the entire early-stage financing process into three, potentially simultaneous, investor decisions: whether to provide financing for the firm, how much financing to provide, and how much ownership to require for the amount of funding provided, which, in turn determines the firm's valuation. In the spirit of Heckman (1979), we use our three HIP indicators to identify a first-stage selection equation in which the outcome is a dummy variable for whether a firm is observed to raise external equity financing. Using the Mills ratio from this first stage to instrument for the selection effects, we observe that the incremental power of earnings is larger in the selection model (1.8%) and even more so in the outcome model predicting current round size (7.4%). This implies that the incremental information contained in earnings relates more to the financing decision itself than to the implied valuations per se. The incremental value of earnings, however, increases up to 9%–18% when we evaluate investor type–specific valuations. The current round size and valuations set by corporate, VC and, especially, foreign investors can be incrementally explained by current earnings to a larger extent than those set by individual investors.

Literature on entrepreneurial accounting remains scarce. Beuselinck, Elfers, Gassen, and Pierk (2023) provide an overview. Contributions include work on the adoption of management accounting systems (e.g., Davila and Foster 2007), on private equity financing and reporting (e.g., Armstrong, Davila, Foster, and Hand 2007), and on the reporting of startup firms (e.g., Cassar 2009). An important difference between our research here and prior work is that we focus exclusively on young businesses rather than small (or simply private) businesses, the vast majority of which are older businesses with no growth ambitions (see Decker, Haltiwanger, Jarmin, and Miranda 2014; Haltiwanger, Jarmin, and Miranda 2013; and Hurst and Pugsley 2011). Our exclusive consideration of young businesses with the potential to grow and innovate distinguishes this paper from the prior work on value relevance in entrepreneurial firms, which is understandably limited to the study of nonrandom samples for which accounting data were available, such as VC-backed and/or pre-IPO firms (e.g., Hand 2005; Armstrong et al. 2006; Sievers et al. 2013). Such firms have successfully attracted venture investors: prior work shows that earnings quality in the IPO year is higher in VC-backed firms (Morsfield and Tan 2006; Hochberg 2011; Wongsunwai 2013). The endogeneity of these outcomes raises questions about external validity for non-VC-backed firms. Likewise, public market requirements on financial reporting quality determine the demand for accounting information in the pre-IPO periods (e.g., Hope, Thomas, and Vyas 2013).

The difference in liquidity conditions in public and private markets and the difference in the price-setting dynamics in primary (financing round) and secondary transactions complicate direct comparisons of our results with those from the established literature on value relevance in well-established public firms (e.g., Collins, Maydew, and Weiss 1997; Barth et al. 1998; Core, Guay, and Van Buskirk 2003). In addition, there are considerable sample composition differences with regard to loss-making firms or firms with negative book value of equity among our firms given their early-stage nature, in contrast to samples of established public or private firms. In general, prior financial accounting research (for an exhaustive overview see Barth, Li, and McClure 2023) finds that value relevance of accounting information has declined and attributes this fact to the increasing role of intangible assets and growth opportunities in the economy. A large strand of literature, in turn, has emerged to suggest that alternative, non-financial perfor-

mance metrics are (incrementally) value relevant. Particularly in opaque settings, contemporary research has expanded its attention to verbal and nonverbal management characteristics. Blankespoor, Hendricks, and Miller (2023) provide evidence on the informational role of management presentations during the IPO roadshows, while Blankespoor, Hendricks, and Miller (2017) establish a positive association between investors' cognitive perceptions of management from these presentations and firm valuations. In an entrepreneurial setting, Davila and Guasch (2022) relate entrepreneurs' nonverbal behavior to firm valuation and find that physical expansiveness correlates with higher proposed firm valuations. In contrast, our findings speak to the incremental value of accounting numbers for financing decisions in highly uncertain, highly innovative, high-intangible settings, in which investing based on "gut feeling" is the accepted norm.

The paper closest to ours is probably Baik, Berfeld, and Verdi (2023), which exploits exogenous changes in auditing and reporting requirements linked to firm size to examine how the availability of public and audited financial statements influences private firms' probability of receiving financing. The authors find that increased disclosure predicts firms' receiving private equity financing, but not venture financing, and argue that one reason they fail to find results for VC-financing is that the size thresholds for the accounting reporting requirements are too high for most early-stage firms in their sample. Our analysis is highly complementary as we have financial accounting information (abbreviated or full) for all firms: by leveraging an ex ante measure of high innovation potential that applies to firms of any size, our research design allows us to identify the effect of accounting information in the regions of the firm size distribution in which theirs has low power. Related papers, albeit in a different funding context, are Bogdani, Causholli, and Knechel (2022) and Gong, Krishnan, and Liang (2022), which find that a disclosure of a voluntary review or an audit of financial statements during equity crowdfunding campaigns increases the likelihood of raising target capital. These studies infer that such reviews (audits) serve as signals of high future prospects. Our paper contributes by analyzing whether the underlying financial statements are value relevant per se.

The remainder of the paper proceeds as follows. Section 2 provides the theoretical discussion. Section 3 describes the institutional background and data. Section 4 describes how we

construct our sample of potentially innovative firms. Section 5 analyzes the value relevance of the disaggregated book value of equity. Section 6 expands the analyses to the entire financing process, and Section 7 concludes.

II. THEORETICAL FRAMEWORK

Under the efficient markets hypothesis, the market value of equity should aggregate all available information about firms and should accurately represent the present value of future cash flows to shareholders. Even if market efficiency does not hold in its strongest form, price setting for publicly-listed firms occurs on liquid stock exchanges in which arm's-length investors frequently buy and sell shares based on their beliefs about the future cash flows of the firm. This high degree of liquidity makes equity market values for publicly listed firms easy to observe from the prices in reported secondary market transactions on these exchanges.

This same liquidity is generally unavailable for shares of private, unlisted firms. They are typically traded far less frequently than those of listed firms, and when a trade does occur, it is typically connected to equity fundraising events or secondary trades between existing and/or new investors. Moreover, the share prices are known only by the parties involved in the specific transactions. While secondary trades reflect market transactions between third parties and thus more closely resemble price setting in public markets, they can be determined by the liquidity constraints of exiting investors (Nadauld, Sensoy, Vorkink, and Weisbach 2019), so that the price set in such transactions might not depict the underlying fundamentals of the firm. Thus, we focus the bulk of our analysis on equity financing events in which the firm itself issues equity to outside shareholders in exchange for cash that it uses for investment and to finance its operations. Our goal is to examine the extent to which information contained in these financing round valuations is incorporated in the disaggregated book value of equity.

Any financing round represents a market valuation of a company, as agreed by the shareholders and those investing the new equity capital. More formally, our data allow us to observe a firm that raises K_t at time t by selling a proportion x_t of the firm to outside investors. This implies a post-money valuation at time t of $\text{Post}_t = \frac{K_t}{x_t}$ and a pre-money valuation of $\text{Pre} = \text{Post} - K_t$. For example, a company that raises a \$10 million investment by selling 25%

of its total shares to new investors has a post-money valuation of $40 after the funding has been raised and thus a pre-money valuation of $30 million.

To connect equity financing rounds to the disaggregated book value of equity, we rely on the value relevance model as originally outlined in Barth et al. (1998, 2001). The advantage of this model is that it does not rely on model assumptions of clean surplus and linear information, which are potentially problematic with respect to young, risky, loss-making firms. Because the equity ownership stake purchased in connection with the investment decision effectively sets the market value of the firm at the time of the financing round, we adjust the model by including the current round size. Furthermore, we disaggregate the book of value of equity into total equity capital paid-in and retained earnings and current net income to separate the effect of paid-in cash and accumulated earnings (Ball et al. 2020) and adjust for negative values of the latter following Core et al. (2003). We estimate the full-specification Equation 1 as follows:

$$\begin{aligned} \ln(MV_{i,t}) = \alpha &+ \beta_1 \ln(\textit{Round Size}_t) + \beta_2 \ln(\textit{Cumulative equity raised}_{t-1}) \\ &+ \beta_3 \ln(\textit{Retained} * pos_{i,t-2}) + \beta_4 \ln(\textit{Retained} * neg_{i,t-2}) \\ &+ \beta_5 \ln(NI * pos_{i,t-1}) + \beta_6 \ln(NI * neg_{i,t-1}) + \varepsilon_{i,t} \end{aligned} \tag{1}$$

We choose the log-linear specification because of the extreme skewness in early-stage firm performance (Cochrane 2005; Korteweg and Sorensen 2010). Hand (2005) discusses that the main advantage of this functional form is its flexibility in accommodating non-linear relationships, such as those arising from real options, which are prevalent in early-stage equity market valuations; however, Barth et al. (2023) show that imposing a functional form can understate the explanatory power of independent variables and, consequently, the value relevance of accounting information. Thus, we consider our results lower-bound estimates. $\textit{Round Size}_{i,t}$ is the amount of equity raised in the current financing round. $\textit{Cumulative equity raised}_{t-1}$ is the total equity paid-in from firm inception up to the year prior to the valuation in a financing round.[6] $\textit{Retained} * pos_{i,t-2}$ ($\textit{Retained} * neg_{i,t-2}$) is positive (negative) accumulated retained earnings from up to two years prior to the valuation in a financing round if retained earnings are posi-

6. Note that this includes any equity capital paid-in that is required as minimum equity for a firm's incorporation.

tive (negative) and is zero otherwise. $NI * pos_{i,t-1}$ ($NI * neg_{i,t-1}$) is the net income in the year prior to the financing round if net income is positive (negative) and is zero otherwise. We scale continuous variables by one-year lagged total assets; i.e., from one year prior to the valuation in an attempt to exclude a size effect on current valuations. Standard errors are clustered at the firm–year level to account for some rare cases when several financing rounds happen in the same year.

III. INSTITUTIONAL BACKGROUND AND DATA

Entrepreneurial Environment

Although Norway is a small country in population terms (with just over five million inhabitants), the relative importance of private capital markets in its economy is similar to that of other advanced Western economies. One illustration of this can be seen in Figure 1, which reports the average size of the venture capital sector from 2007 to 2018 scaled by population. Because the Oil and Gas sector is such a large fraction of overall Norwegian GDP, scaling its venture capital sector by population puts Norway on a more even footing with other European countries. In per-capita terms, it ranks third in Europe, behind only Sweden and Switzerland, and sixth globally, behind the United States, Israel and Canada.

Norwegian private markets are actively invested in by domestic and international venture and buyout investors. From 2004 to 2017, there were 180 distinct private-equity investors invested in Norwegian firms in our data, with approximately 130 being venture investors and 50 being buyout investors. More than half of the venture investors are foreign venture investors, including well-known U.S. and European firms such as Draper Fisher Jurvetson, Kleiner Perkins Caufield & Byers, Founders Fund, 500 Startups, EQT, Creandum, and large corporate VCs such as Saudi Aramco and Siemens, among others. In general, over the last 15 years, 24% of VC and seed investments in Norwegian firms came from foreign investors.[7]

In 2021, more than 80% of the 1.8 billion Norwegian kroner in VC and seed investments went into IT, life science and cleantech. The Norwegian government has a long tradition of sup-

7. Source: Menon Economics on behalf of the Norwegian Venture Capital Association.

porting early-stage and scale-up companies with nationally-allocated grants, equity and loans and of successfully channeling scale-up funding from the EU Commission[8]. In addition to providing funding instruments, the government supports accelerators, incubators, industry clusters and university tech transfer offices to create arenas that support entrepreneurship and the scaling of new enterprises.

Data Quality

Norwegian administrative data are recognized for their quality and detail and have been used prominently in research in labor economics, finance and innovation (for recent examples, see Hvide and Jones 2018; Fagereng, Mogstad, and Rønning 2021; Ring 2023). Because the associated business registration costs are low and registration requires little effort, most new Norwegian firms choose to establish as limited liability companies[9]; as such, regardless of firm age or size, they are required to submit standardized financial statements (in particular, a balance sheet and an income statement)[10] prepared in accordance with Norwegian GAAP (or IFRS) no later than eighteen months after their incorporation. This practice implies that the resulting accounting information for just-established firms conforms to a common set of standards (see Mjøs and Selle 2022).

The digitalized process of collecting and storing the administrative data improves its accuracy and high quality. As an indicator of accounting data quality, Leuz, Nanda, and Wysocki (2003) rank Norway among the countries with lowest aggregate earnings management score (and lower than, e.g., the U.K.'s). In addition, their analysis illustrates that Norway and the U.S. are similar (on a per-capita basis) in terms of their having large stock markets, low ownership concentration, extensive outsider rights, high disclosure, and strong legal enforcement. The comparison in Leuz et al. (2003) relies on reports of publicly-listed firms. Although the private companies in our sample produce less extensive financial reports than do public companies, we have no reasons to believe that their overall reporting quality is lower, which is supported by the discussion in Alon, Haaland, and Røsok (2022).

8. For example, the European Innovation Council https://eic.ec.europa.eu.

9. We provide an overview of the relevant legal details on Norwegian business incorporation and shareholder agreements in Appendix A.

10. See, e.g., Breuer (2021) for an overview of the full financial reporting requirement thresholds.

Data Sources

Our main data source for market equity values is the annual tax declarations of the population of Norwegian public and private limited liability companies and their shareholders. These declarations have been digitally collected and stored in a data warehouse since 2004, and we obtained all available data through the end of calendar year 2017. The transaction-level records include all share purchases, sales, and liquidations by all investors in all companies as reported to the tax authorities. The data include transaction (purchase or sale/liquidation) dates, transaction amounts, number of shares transacted and whether the transaction was a primary or secondary purchase. Primary transactions are purchases of newly issued shares in a firm's financing round, while secondary transactions are purchases of already-issued shares from existing shareholders.

The transaction records also include a unique national firm identification number (*organisasjonsnummer*); these are allocated to all firms registered in Norway and to foreign institutional shareholders of these firms. The firm identification number is consistently used in all firm registries and allows the data to be merged to other databases. Thus, we combine the tax data with financial statement and business registry data, which contain all accounting and corporate information, and with patent data obtained from the Norwegian Patent Office.

IV. IDENTIFYING INNOVATIVE FIRMS

Sample Selection

To construct our sample of interest, we begin by identifying all newly established limited liability companies (analogous to C-corporations in the U.S.) incorporated between 2004 and 2017. We remove financial services and real estate firms, newly formed subsidiaries of established companies, holding structures and firms operating in non-innovative industries, which are also heavily regulated, have high levels of public-sector involvement or ownership, are highly supported via taxes and/or subsidies, or are highly unlikely to engage in value-creating innovative growth projects. In such industries, we expect non-financial objectives such as government

policies to be especially important.[11]

Table 1 shows that, out of the population of 79,196 newly formed firms, a total of 902 firms receive at least one investment from an institutional VC investor. For our purposes, VC investors comprise venture capital (traditional, corporate or government-affiliated) funds, early-stage investment funds associated with traditional private equity groups, and incubators. Of course, it is unlikely that most of these 79,196 firms have growth aspirations or the intention to develop large-scale commercial innovation. Hurst and Pugsley (2011) show that most small business owners (in the U.S.) have no desire to grow, operating their own businesses primarily for lifestyle purposes. To identify firms with high potential for innovation, we draw on the entrepreneurial quality index elaborated by Guzman and Stern (2015) and develop a series of flags or indicators that signal the likely intention to grow.

Guzman and Stern (2015, 2020) start by recognizing that a practical first step for any growth-oriented entrepreneur in the U.S. is to register her business in the state in which she operates: this facilitates paying payroll taxes, unemployment insurance, etc. Incorporated businesses are significantly more likely to grow than non-incorporated businesses. To adapt these insights to the Norwegian business context, we develop three flags that we use to gauge a firm's likely innovation potential at the time that it first appears in the tax registry data. Population counts of the firms satisfying the criteria for these flags are reported in Table 1.

The first flag is whether the firm has an English-language firm name. A total of 26,452 firms, or approximately 33% of the sample, satisfy this criterion. The idea behind this flag is that because Norway is a country of only some five million people, an English-language firm name helps the firm be recognizable to a broader, international audience and therefore would be a natural choice for an entrepreneur intending to grow her firm. Giving the firm an English-language name would not necessarily confer a natural advantage if the firm's objective were to serve the local market, but if the firm developed a product or a service that appealed to customers in many national markets, an English-language firm name would be a logical choice,

11. We apply negative selection to rule out such industries. The excluded industries are the following: *agents/traders, agriculture, banks, brokers, cultural event producers, direct health services, education, fisheries, food production, gym/sports facilities, hotels, insurers, investment management, kindergartens, garages, mail-order, mining, museums, oil and gas production, physical shops, public services, publishing, real estate, restaurants, shipping companies, wholesale traders, and direct services (e.g., hairdressers, for tourists, car rental, lawyers, maintenance, accountants, auditors, builders, plumbers, electricians, undertakers, taxis).*

especially in northern Europe, where English is commonly spoken as a second language.

The second flag is whether the firm is located in a regional innovation hub in Norway. The four innovation hubs in our data are Oslo, Bergen, Stavanger and Trondheim. These are the four largest cities in the country, and each is home to a major research university with an associated technology cluster (Hvide and Jones 2018). The idea here is to construct a geographical flag that would correspond to a U.S. firm starting in Silicon Valley, Route 128, Austin (Texas), or the Research Triangle Park area in the U.S.. A total of 23,887 firms, or approximately 30% of the sample, were started in one of these innovation hubs during our sample period.

The final flag tracks whether one of the company's non-executive board members lives far from the city in which the company is based. For this, we use a zip code concordance and define "far" as a zip code difference of 1,500 zip code digits between the firm's and the board member's addresses. This implies an average beeline distance of more than 300 kilometers. Far fewer firms (14,148 firms, or approximately 18% of the sample) satisfy this criterion. The idea here is that the choice of a distantly located board member in the year of establishment is a potential indication that the founders (or an investor) have recruited a board member with specific technical or market expertise not readily found nearby.

In some cases, these flags may overlap, while in other cases, the presence of one flag could make the presence of another unlikely. For example, a firm founded in a technology hub may not need to recruit a geographically distant board member for technical expertise. To remain agnostic about which of these flags is more or less salient in a particular setting, we define the firm as a HIP firm if we apply at least one flag to it, which results in a HIP sample of 46,121 firms. This sample contains 90% of all firms that receive VC funding in our data. Within our HIP sample, 65% of the firms have only one ex ante innovation flag, 29% have two flags and only 5% of the firms match on all three selection flags. We label the remaining 33,075 firms, which operate in potentially innovative industries but are not designated with any of the ex ante innovation flags, as non-HIP firms in further analyses.

Validating the Sample Selection

To demonstrate the power of our flags to predict later-stage outcomes, Table 2 relates a series of firm outcomes to the presence of these flags, both individually and collectively. Panel A focuses on future financing events. In particular, this panel shows that each of these flags, either alone or in a group, is highly predictive of a firm's receiving VC investment or an innovation-related governmental grant.

Panel B focuses on future milestones related to growth and innovation. The first part of Panel B focuses on patents as an outcome.[12] In particular, firms with English names, but also firms with a geographically distant board member, are much more likely to apply for a patent at some point in time than firms not designated with any of these flags. All flags are highly predictive of the firm's achieving an exit through an IPO, merger or acquisition, as can be seen in the middle portion of Panel B. Last, the far-right portion of Panel B shows that these flags predict four-year revenue growth. The latter outcome also implicitly measures firm survival. Approximately one-third of our sample of newly established operating firms are still in operation after four years.[13]

Another way to gauge the salience of these innovation flags is to look at capital flows into and out of these HIP firms and compare them to those of the overall firm population, as defined in Table 1, Panel A. This angle is especially important if we want to derive market valuations of these firms. Table 3 shows the amounts of equity capital invested, either in financing rounds or secondary trades, in the shares of all sample firms before their exit events and the amounts paid out through share sales or share liquidations. This offers a market-wide, macro-level overview of the capital that innovative firms garner relative to that drawn by other firms. In addition, Table 3 presents the historical and, if available, current values of untraded shares. We calculate the current value of untraded shares based on the latest observable secondary purchase price in the particular firm.

Our HIP sample received over 90% of the total equity capital invested in all newly established businesses in Norway in our sample period. The 810 ex post selected VC-backed firms

12. We are grateful to Jorge Guzman for suggesting this outcome.
13. See the statistics on sample firm outcomes in the Appendix Table B1.

with at least one ex ante innovation flag comprise only 1.8% of all HIP firms but garner 22% of the equity capital raised. The latter firms represent an even larger share of the volume in secondary purchase transactions. The vast majority of the total capital paid out through share sales or share liquidations occurs in the firms in our HIP sample. These statistics provide further evidence that our selection on ex ante flags captures firms with high odds of raising significant funding to support their investment.

Sample Description

Table 4 describes equity transactions in the population of newly established firms as shown in Table 1 (A) and the accounting information one year prior to those transactions. We separate equity transactions into financing rounds and secondary trading of shares. The variation in performance, measured by financing activities and lagged accounting information among newly established firms, differs between firms with and without innovation potential. While the fraction of firms experiencing at least one financing round is approximately the same (39% of HIP firms vs. 36% of non-HIP firms), the marginal funding itself is significantly larger for HIP firms (mean 16.2 MNOK) than for non-HIP firms (mean 3.2 MNOK). The straightforward explanation for this is that when firms innovate to grow, they need to raise more equity to fund risky investments to facilitate this growth, e.g., for R&D, market positioning, long-term assets and human resources. The growth potential is also reflected in the assessment from capital markets. We observe the same pattern for post-money valuations, calculated as the average purchase share price in the respective financing round multiplied by the number of shares outstanding after each financing round. The implied valuations from secondary trades are very similar and support the findings from the financing rounds.

The intention to innovate and grow is also evident from the historical accounting information, as our HIP firms are substantially larger (mean total assets of 38.3 MNOK) than non-HIP firms (mean total assets of 11.9 MNOK). Consistent with the increasing scale of the financing rounds, the size of book equity, both absolute and relative to total assets, confirms this pattern. The higher equity-to-assets ratio also reflects the higher risk assumed by the growth-oriented firms.

Newly established firms have low and mostly non-positive earnings. The average net income of non-HIP firms is -0.3 MNOK, while it is lower in HIP firms (-2.6 MNOK). Lower and more negative earnings imply more costs and investments relative to revenues in the innovating and growing firms than in the non-HIP firms. These statistics confirm that investors put a higher forward-looking valuation on potentially innovative firms with an expected growth outlook despite such firms' lower current earnings.

VC-backed firms are the usual subjects of recent value relevance studies in the entrepreneurial setting (e.g., Hand 2005; Armstrong et al. 2006; Sievers et al. 2013). Almost all VC-backed firms have at least one financing round, and together with the VC investment comes a higher number of equity transactions, larger equity amounts and higher valuations than those of their counterparts in the full sample of ex ante selected HIP firms. These firms are also larger, have raised more equity and have more expenses (more or larger investments) before the equity transactions. These differences resulting from the ex post vs. ex ante selection emphasize the selection bias prevalent in the literature limited to samples of firms selected by VCs.

V. VALUE RELEVANCE OF ACCOUNTING INFORMATION

Value Relevance in Financing Rounds

We estimate Equation 1 in the sample of firms with at least one financing round from which we observe a post-money valuation. In addition, we require at least one year of accounting information before the financing round, a criterion that further narrows down our sample. Similarly to Ball et al. (2020), we disaggregate the book value of equity one year prior to the financing round into contributed capital and earnings. We scale all continuous valuation and accounting variables by the firm's total assets one year prior to valuation in attempt to account for the effect of firm size differences.

The baseline results for our three subsamples—HIP firms, VC-backed firms and non-HIP firms—are presented in Tables 5–7, respectively. In Column (1), we include only lagged retained and current earnings as covariates, while Column (2) introduces the cash-based component of the book value of equity, which is the cumulative equity raised one year prior to

the financing round. Column (3) combines both components and presents estimates of the (traditional) value relevance model of the disaggregated book value of equity. Columns (4)–(6) reflect the fact that, in financing rounds, the equity ownership stake received in exchange for the invested amount effectively determines the equity market value of the firm. Column (4) estimates the (mechanical) explanatory power of the equity raised in the current financing round, while Column (5) includes previously raised and current round raised equity. Column (6) represents the full adjusted value relevance model.

The disaggregated book value of equity captures 34.2% of the total variation in pre-money valuations in HIP firms (Table 5, Column (3)). While earnings alone can explain 17.8% of the variation (Column (1)), the incremental power of this measure is 4.5% (the difference between the adjusted R-squared between Columns (3) and (2)), implying that earnings partially carry the same information as the the cash component of equity. This is even more the case after we adjust the model for the current round size, as the incremental relevance of earnings drops dramatically to 0.6% (the difference between the adjusted R-squared in Columns (6) and (5)).

The explanatory power of the disaggregated book value of equity in ex post selected VC-backed firms is 7.1 percentage points lower than that in ex ante selected HIP firms (Table 6, Column (3) vs. Table 5, Column (3)), while the explanatory power of the disaggregated book value of equity is 11.6 percentage points higher in non-HIP firms than in HIP firms (Table 7, Column (3) vs. Table 5, Column (3)). This means that the valuations of firms with potential to innovate and grow are less predictable than those of firms without such potential and that growth ambitions are not captured by the lagged book value of equity.

However, retained and current earnings in VC-backed firms have a higher explanatory power of 22.9% and an incremental power of 16.5%, which is 12 percentage points (or 367%) higher than that of ex ante selected HIP firms. At the same time the incremental explanatory power of earnings in non-HIP firms is only 2.4%. The current earnings provide information about unrecognized net assets and future earnings growth opportunities. In contrast to the public market, where it is recognized that losses are temporary and not reflective of a firm's true economic performance (Hayn 1995; Joos and Plesko 2005), losses in early-stage firms may represent resources spent on investing in future value-creating growth. On the one hand, non-HIP

firms do not have such ambitions, which explains the decrease in the incremental explanatory power of earnings. On the other hand, firms selected into venture financing have the highest growth ambitions, reflected in the highest (incremental) relevance of earnings.

After we adjust the model for the current round size, the large incremental power of earnings in VC-backed firms drops from 16.5% to 3.0%, while non-HIP firms show the smallest relative drop in incremental explanatory power of earnings, from 2.4% to 1.0%. This speaks to the large overlap in the information contained both in the current round size and earnings in VC-backed firms and the smaller overlap in non-HIP firms. This might be due to the greater sophistication of venture investors than of investors providing equity to non-innovative firms.

Figure 2 shows the incremental explanatory power from adding in accounting information together with capital raising data by replicating Tables 5–7 by firm age group (firms two to three years old, four to five years old and six or more years old) and by firm category (non-HIP, HIP and VC-backed). An ex ante theoretical expectation is that the incremental R-squared should increase with firm age as earnings become more relevant because of greater stability in operations, better reporting processes, and the selection through firm survival itself. In particular, Hand (2005) shows that the value relevance of financial statements increases as the firm matures, consistent with the statements' capturing the increasing value of assets-in-place relative to future investment options in his sample of pre-IPO R&D-intensive biotech firms.

Our analyses show that earnings have incremental explanatory power for every age group, even though the magnitude varies across the firm categories. Over time (with higher firm age), we find that the incremental explanatory power is increasing for non-HIP firms, stable for the full pool of HIP firms and decreasing for VC-backed firms. The levels of power differ significantly across firm categories for firms aged two to five years but converge across the categories as firms mature (ages six years and above). Independent of firm age, earnings still have more explanatory power for VC-backed firms than for any others. A potential explanation for this outcome is that, when VC-backed firms mature, VC funds care more about the firms' exit events and adjust their valuations in financing rounds with respect to other market-related factors, which are reflected to a larger extent in the accounting numbers, in anticipation of these exit events. This echoes previous results in Hand (2005), Armstrong et al. (2006), and Sievers

et al. (2013).

Our sample also includes equity market values observed in secondary trades between existing and/or new investors, i.e. outside of financing rounds. The baseline results from estimating value relevance in secondary trades are reported in Appendix Table B2. Earnings alone explain more of the variation in valuations in secondary trades for HIP firms (19.7%, compared to 17.8% in financing rounds, Table 5), but far less for VC-backed firms (13.9% compared to 22.9% in financing rounds, Table 6). The incremental explanatory power of earnings added to the cash part of equity in secondary trades of HIP firms is 2.8% compared to 0.6% in their financing rounds (7.3% for secondary trades in VC-backed firms compared to 3.0% in their financing rounds). One explanation for this could be that the current financing round size captures a great deal of information that earnings also bear. Because the size of the to the firm provided equity is not obvious in secondary trades, the earnings is the only source for capturing such information. We investigate this further in Section 6.

Aggregation of Available Information vs. Incremental Information

One might argue that, despite being nonzero, the incremental explanatory power of earnings in our baseline results, as shown in Tables 5–7, is rather low. The richness of our data allows us to address this argument and test whether more granular accounting information can help explain the variation in early-stage valuations or whether non-financial publicly or privately observable firm characteristics simply do a better job in this setting. To do so, we gradually include various firm characteristics and granular accounting information in the estimation of Equation 1. The granular accounting information consists of 18 additional financial statement variables: revenues, non-operating income, personnel expenses, depreciation and write-offs, financial income, financial expenses, extraordinary income, extraordinary expenses, intangible assets, tangible assets, financial long-term assets, inventory, receivables, financial short-term assets, cash, provisions, long-term debt and short-term debt.

Table 8 shows the increment in explanatory power from expanding Equation 1 by adding disaggregated accounting information and non-financial firm characteristics. Panel A confirms that the disaggregated book value of equity already captures the majority of the publicly and

privately observable information across all firm categories. The inclusion of more granular financial statement items increases the adjusted R-squared for HIP firms by 1.8 percentage points, which is of the same magnitude as the total incremental explanatory power of publicly observable characteristics[14] (2.0 percentage points). The incremental explanatory power of privately observable characteristics[15] is even less at 1.0 percentage point. The results are similar for non-HIP firms and VC-backed firms.

Table 8 Panel B shows the incremental explanatory power from our adding the publicly observable firm characteristics first to the disaggregated book value of equity. The explanatory power increases by 3.1 percentage points for HIP firms and 2.8 percentage points for non-HIP firms but by only 1.3 percentage points for VC-backed firms. Subsequently adding granular accounting information effectively provides no additional power. This suggests that, conditional on investors' knowing publicly observable information, inclusion of more granular financial statement items after we have already disaggregated the book value of equity does not improve the explanatory power for valuations variation. This implies that the additional granular accounting data carry only information already contained in publicly observable firm characteristics. These results contrast with the discussions in Barth et al. (2023), Hand (2005) and Armstrong et al. (2006), who plead for the inclusion of more granular financial statement items and non-financial information related to both firm growth and firm intangibles in models estimating value relevance and support the need for pragmatic cost–benefit considerations in arguments over whether to require full financial statements from early-stage firms (Admati and Pfleiderer 2000; Berger 2011; Leuz and Wysocki 2016).

The low incremental explanatory power of non-financial (publicly and privately observable) firm characteristics in Table 8 leads us to the question of whether earnings' role here is to aggregate the information from those characteristics or whether earnings are incrementally informative for early-stage valuations. In other words, do earnings incorporate any other, unobserved, information not reflected in these non-financial characteristics? To answer this

14. Publicly observable characteristics include the financing round, firm age, industry and calendar year.

15. Privately observable characteristics include the pre-round number of investors, pre-round number of board members, number of patent applications and bank rating.

question, we estimate the following regression model:

$$\ln(NI * pos(neg))_{i,t}) = \alpha + \beta_1 \sum(Public\ Characteristics_{i,t}) + \\ + \beta_2 \sum(Private\ Characteristics_{i,t}) + \varepsilon_{i,t} \tag{2}$$

The outcome variable $(NI * pos_{i,t}$ $(NI * neg_{i,t})$ is firm i's positive (negative) net income in year t if net income is positive (negative) and is zero otherwise. It is scaled by total assets in the same year. $Public\ Characteristics_{i,t}$ and $Private\ Characteristics_{i,t}$ comprise the same non-financial firm characteristics as shown in Table 8. Table 9 shows that such firm characteristics explain in total only slightly more than 20% of the variation in positive and approximately 30% of the variation in negative earnings in all sub-samples. The main explanation for the difference between positive and negative earnings is *Bank rating*, a crude bankruptcy risk prediction variable, which is naturally more correlated with negative earnings. Venture investors in particular put more weight on possible positive outcomes than on downside risk, such that the explanatory power is slightly lower for VC-backed firms. Overall, our results indicate that, while earnings aggregate the underlying non-financial firm characteristics to some extent, both positive and negative earnings also bear incremental information relevant in valuations in financing rounds.

VI. ACCOUNTING INFORMATION IN THE FINANCING PROCESS

Tables 5–7 show that the cash-based portion of the book value of equity—paid-in equity—contributes most to explaining the variation in pre-money valuations. This is the straightforward implication of the post-money valuation calculation, as outlined in Section 2. Furthermore, Table B2 suggests that earnings capture information also contained in the amounts of equity provided in the first place. To explore this question, we replace the dependent variable in Equation 1 and estimate the following regression model at firm level:

$$\ln(Equity\ Amount_{i,t}) = \alpha + \beta_1 \ln(Retained * pos_{i,t-2}) + \beta_2 \ln(Retained * neg_{i,t-2}) \\ + \beta_3 \ln(NI * pos_{i,t-1}) + \beta_4 \ln(NI * neg_{i,t-1}) + \varepsilon_{i,t} \tag{3}$$

The outcome variable, $ln(Equity\ Amount_{i,t})$, is either the current round size in t or cumulative equity raised in $t-1$. $Retained * pos_{i,t-2}$ ($Retained * neg_{i,t-2}$) is positive (negative) accumulated retained earnings from up to two years prior to the valuation in a financing round if retained earnings are positive (negative) and zero otherwise. $NI * pos_{i,t-1}$ ($NI * neg_{i,t-1}$) is the net income in the year prior to the financing round if net income is positive (negative) and zero otherwise. We scale continuous variables by total assets one year prior to the valuation in an attempt to account for the effect of firm size on the provided equity amounts.

Table 10 presents the estimation results of Equation (3) for our firm sub-samples. A quarter of the variation in equity amounts, both the cumulative equity previously raised and the equity amount in the current round, is explained by earnings alone. This result is independent of firm category, implying that it is a direct implication of the financing decision itself.

The last piece of our analyses acknowledges that the traditional value relevance model reflects only one part of the early-stage financing process and that earnings also reflect information contained in the equity amounts raised, which, in turn, determine the valuation. To address the fundraising selection issue implicit in our value relevance estimations, we decompose the entire early-stage financing process into three, potentially simultaneous, investor decisions: whether to provide financing for the firm, how much capital to provide, and how much ownership to require for the amount of funding provided, which in turn determines the valuation of the firm. The analyses in Tables 5–9 cover only the third decision, i.e., the agreed implicit valuation. Table 10 suggests some evidence on the second decision, i.e., how much financing is provided. However, the latter two decisions are conditional on selection into financing in the first place. We run a Heckman selection model to account for the fact that some firms are selected to receive additional financing and some firms simply not (Heckman 1979). For the selection model estimation, we base the model on the validation of our sampling procedure of HIP firms in Tables 2–3 and rely on our three innovation flags to estimate firms' probability of receiving equity financing in each year. We apply three alternative specifications of our

first-stage selection model:

$$\begin{aligned} Financing_{i,t} = \alpha &+ \beta_1 English\,Name_{i,0} + \beta_2 Innovation\,Hub_{i,0} + \beta_3 Far\,Board\,Member_{i,0} \\ &+ \beta_4 \ln(Cumulative\,equity\,raised_{t-1}) + \gamma_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{4a}$$

which follows the common presumption that fundraising ability is not a function of earnings, and then we add publicly and privately observable firm information,

$$\begin{aligned} Financing_{i,t} = \alpha &+ \beta_1 English\,Name_{i,0} + \beta_2 Innovation\,Hub_{i,0} + \beta_3 Far\,Board\,Member_{i,0} \\ &+ \beta_4 \sum(Public\,Characteristics_{i,t}) + \beta_5 \sum(Private\,Characteristics_{i,t}) \\ &+ \beta_6 \ln(Cumulative\,equity\,raised_{t-1}) + \gamma_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{4b}$$

and finally add the disaggregated book value of equity:

$$\begin{aligned} Financing_{i,t} = \alpha &+ \beta_1 English\,Name_{i,0} + \beta_2 Innovation\,Hub_{i,0} + \beta_3 Far\,Board\,Member_{i,0} \\ &+ \beta_4 \sum(Public\,Characteristics_{i,t}) + \beta_5 \sum(Private\,Characteristics_{i,t}) \\ &+ \beta_4 \ln(Cumulative\,equity\,raised) + \beta_5 \ln(Retained * pos_{i,t-2}) \\ &+ \beta_6 \ln(Retained * neg_{i,t-2}) + \beta_7 ln(NI * pos_{i,t-1} + \beta_7 \ln(NI * neg_{i,t-1}) \\ &+ \gamma_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{4c}$$

Following the suggestive evidence in Table 10, the full specification in Equation 4c accounts for the fact that selection into a financing round might also be a function of the information contained in earnings. The dependent variable $Financing_{i,t}$ is a dummy variable taking a value of one if firm i experiences a financing round in year t. $\gamma_{i,t}$ includes firm age and calendar year fixed effects. We include the past cumulative equity raised in all three specifications. The first-stage model selects firms from the entire population of all newly established operating firms, defined as firm category (A) in Table 1.

Table 11 reports the first-stage—selection model—results in Columns (1)–(3) from our estimating Equations 4a–4c, respectively. The explanatory power of our three ex ante innovation flags in Column (1) is 2.7%. We obtain statistically significant coefficients on all innovation

flags. In Column (2), we additionally include all publicly and privately observable non-financial firm characteristics, as introduced in Table 8, which provide the largest bulk of the incremental explanatory power of 21.1%. The estimation in Column (3) shows that current and retained earnings have an incremental explanatory power of 1.8%, implying that earnings include some additional information relevant for the selection-into-financing decision conditional on the presence of the ex ante innovation flags and on the investor's knowing other publicly and privately observable non-financial firm characteristics.

Table 11 Columns (4)–(6) present the second-stage—outcome model—estimation results, addressing the current amount of capital raised, conditional on the firm's receiving financing at all. We include the inverse Mills ratios from Columns (1)–(3), respectively. The cumulative equity raised combined with the instrumented selection effect in Column (4) alone explains 20.3% of the current round size. The incremental explanatory power from our adding publicly and privately observable non-financial firm characteristics in Column (5) is an additional 14.8 percentage points. Subsequently adding current and retained earnings in Column (6) provides an incremental explanatory power of an additional 7.4 percentage points, or half as much as that from all non-financial firm characteristics, on the margin. This shows, in relative terms, a far larger incremental relevance of earnings compared to non-financial firm characteristics for the current round size than for the selection into financing.

Table 11 Columns (7)–(9) present the second-stage—outcome model—estimation results, addressing the actual pre-money valuation, conditional on the firm's receiving financing at all and on the provisioning of a certain financing amount. We include the inverse Mills ratios from Columns (1)–(3), respectively. The cumulative equity raised and current round size combined with the instrumented selection effect in Column (7) explain almost the half of the variation (49.1%) in pre-money valuations. The incremental power of non-financial firm characteristics in Column (8) is only 4.2%, indicating that such information is less relevant for the pre-money valuations per se than for the selection into financing and financing amount. In Column (9), we find the incremental explanatory power from our adding earnings to our pre-money valuation model, corrected for selection bias, in line with our baseline results in Tables 5–7. Overall, our two-stage model that accounts for the effect of selection into financing provides evidence that

earnings information is important for every step of the early-stage financing process.

Last, we examine whether the importance of accounting information in the early-stage financing process varies by investor category. We expect heterogeneity in this importance given expected differences in access to information and, thus, the magnitude of exposure to information asymmetries. We analyse the following investor categories: founders, directors, other individual investors, corporate investors, venture capitalists and foreign investors. The increments in explanatory power from the addition of publicly and privately observable non-financial firm characteristics and earnings information to the first-stage selection and second-stage outcome models for each investor category are summarized in Table 12. The valuations in Table 11 are based on all price observations, while Table 12 evaluates investor category–specific valuations, resulting in a larger variation in valuations in the first case. Subsequently, we expect the explanatory power of accounting information for investor category–specific valuations to be generally higher than in the pooled valuation calculations.

We find that the incremental explanatory power of earnings is significant at every step of the early-stage financing process for all investors. Here, earnings bear the largest incremental relevance, ranging from 9.0% to 18.3%, for pre-money valuations, followed by their relevance, ranging 5.6% to 16.0%, for the current round size. The incremental explanatory power of earnings in the first-stage selection model is of a smaller magnitude.

When we compare across investor categories, earnings have larger incremental explanatory power for corporate investors than for individual investors at every step of the financing and implicit valuation process. The incremental explanatory power is highest for foreign investors and lowest for founders. This is consistent with the value relevance of earnings increasing in the information asymmetry to which investors are exposed, but also with corporate investors applying more analytical rigor when assessing an investment proposal.

VII. CONCLUSION

This paper uses comprehensive Norwegian administrative records from 2004 to 2017 to evaluate the importance of accounting information for valuations in financing rounds of early-stage innovative firms. We develop a system of flags observable at the firm's founding that can pre-

dict whether a firm is likely to be innovative, to grow, to attract outside capital, and to achieve an attractive exit event for investors. This framework allows us to go beyond looking into associations based on ex post observables such as a firm's already having been selected for venture capital financing and instead study the importance of accounting information among all potentially innovative firms before their innovative success or failure is known.

In spite of the large body of anecdotal and survey evidence to suggest that investors primarily rely on difficult-to-grasp and difficult-to-assess soft, qualitative information when making early-stage investment decisions, we find that accounting numbers reflect information relevant for explaining *whether* a firm receives funding, the equity financing amount provided, and the valuation implied by the financing round. We show that the lagged book value of equity, disaggregated into earnings and contributed equity capital, captures between 27% and 34% of the total variation in valuations of innovative growth firms across financing rounds. Current earnings not only aggregate information from the underlying non-financial firm characteristics but also contain incremental information. Conditional on investors' knowing publicly observable characteristics, more granular accounting information does not better explain variation in pre-money valuations.

Our findings have potentially important implications for entrepreneurial finance and more generally for understanding liquidity in private capital markets. In our setting, firms are required to issue accounting information following standardized regulations regardless of how risky or early-stage their business ideas are. We find that accounting information has explanatory power for market valuations, which speaks to its importance in reducing information asymmetries even in highly uncertain settings in which investing based on "gut feeling" may be the norm. Because accounting information seems to enhance understanding of early-stage financing and valuations decisions, a possible implication is that its availability could stimulate liquidity in private capital markets, ultimately increasing the supply of capital to early-stage innovative firms.

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Figure 1: **Venture Capital Investments Across Countries**

Figure 1 shows the cross-country comparison of total venture capital (VC) investments in U.S.$ per capita between 2007 and 2018 (source: OECD Entrepreneurship Financing Database).

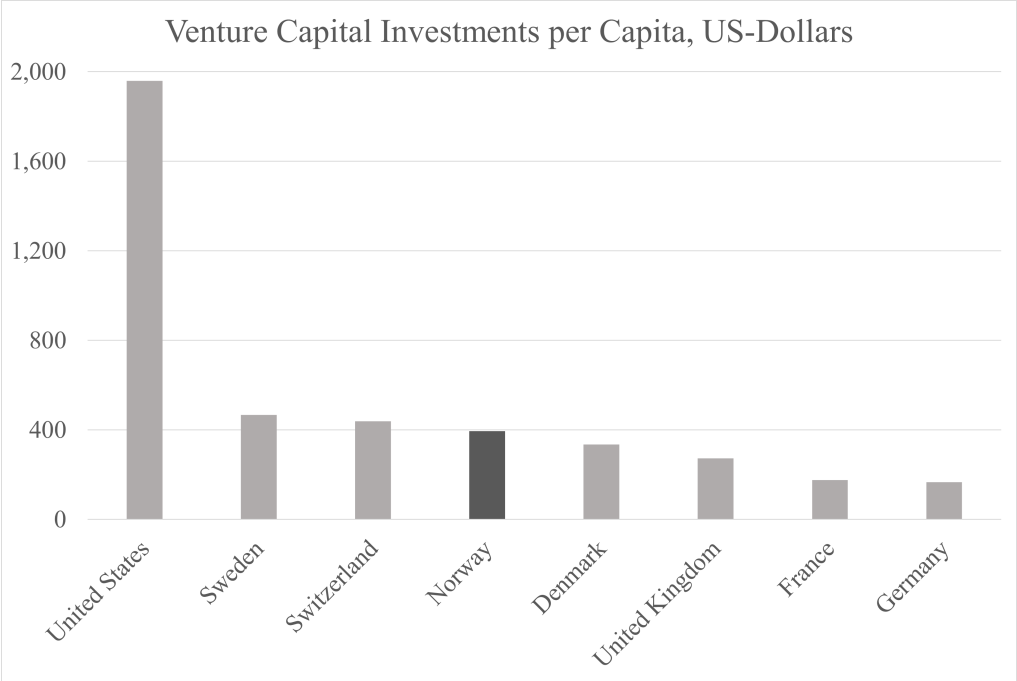

Figure 2: **Evolution of Incremental Explanatory Power**

Figure 2 shows the evolution of the incremental increase in the adjusted R-squared from our adding accounting information and running the log-linear regression model shown in Equation 1. We replicate Tables 5–7 for firms in three age categories (firm age two–three, firm age four–five, and firm age six and above) in the sub-sample of firms that have survived for at least six years.

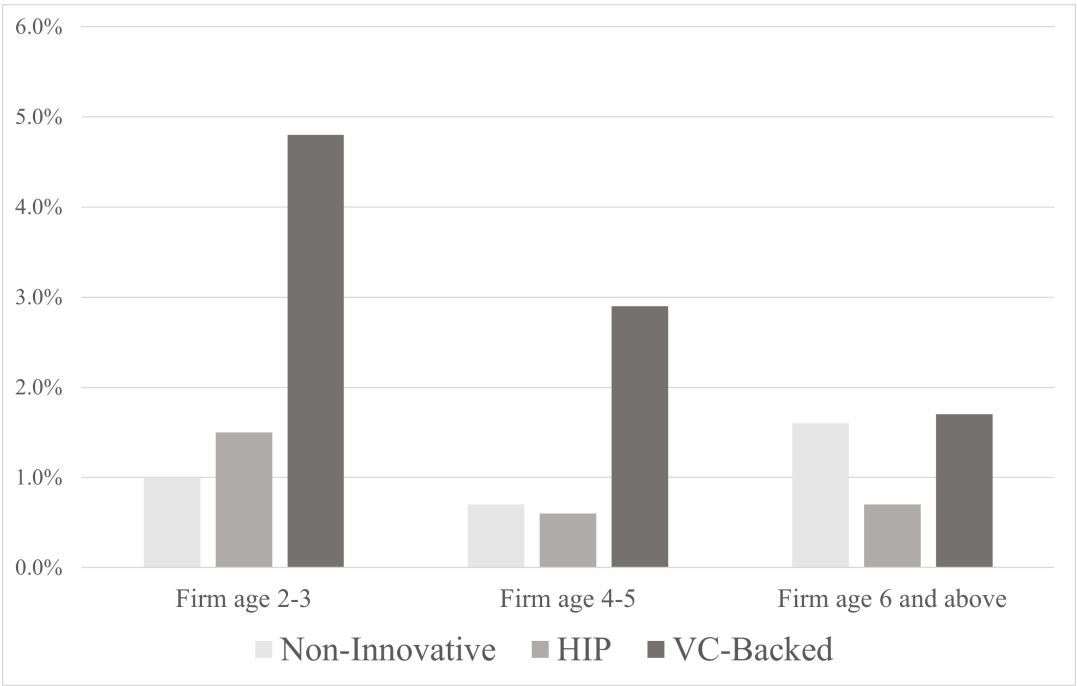

Table 1: Sample Construction

Table 1 describes our sample construction process. Panel A begins with all firms newly founded in Norway between 2004 and 2017, from which we remove financial services and real estate firms, newly formed subsidiaries of established companies, holding company structures, and firms in non-innovative industries. Panel B describes our process for identifying the sub-sample of firms with a high propensity to engage in innovation based on ex ante observable characteristics. Thus, we flag firms based on three alternative characteristics measured at year-end of their year of founding: founded with an English-language name, located in one of the country's four innovation hubs, and having at least one board member who lives far from the city in which the company is located.

Panel A: Full Sample	Firms	% of (A)
Firms (C-corps) founded in 2004–2017	321,548	
- Financial services and real estate firms	-143,496	
- Subsidiaries of established companies	-19,499	
- Holding structures	-6,275	
- Transaction data not matched	-27,930	
- Non-innovative industry	-45,152	
Newly established firms in potentially innovative industries: (A)	**79,196**	100.00%
***of which at least one VC investment:* (B)**	902	1.14%

Panel B: Ex Ante Innovation Flags	Firms	% of (A)
English name	26,452	33.40%
Located in an innovation hub (Oslo, Bergen, Stavanger, Trondheim)	23,887	30.16%
At least one board member who lives far from the firm	14,148	17.86%

Panel C: High Innovation Potential (HIP) Firms	Firms	% of Baseline
At least one ex ante innovation flag (C)	46,121	58.24% of (A)
. . . and received at least one VC investment	810	89.80% of (B)
of which one ex ante innovation flag	30,166	65.41% of (C)
of which two ex ante innovation flags	13,544	29.37% of (C)
of which three ex ante innovation flags	2,411	5.23% of (C)

Table 2: Predicting Later-Stage Firm Outcomes with Ex Ante Innovation Flags

Table 2 reports the results of a regression of later-stage firm outcomes on the three flags used to define our high innovation potential (HIP) sample. In Panel A, the dependent variables are indicator variables for receipt of any later VC financing or governmental innovation-related grant (logit estimations). In Panel B, in the first two sets of regressions, the dependent variables are indicator variables for the firm's having applied for a patent and having experienced a successful exit, defined as a merger, acquisition or IPO (logit estimations). In the final set of regressions, the dependent variable is the growth in revenues between the end of the first year and the end of the fourth year of the firm's life (OLS estimation). All regressions include a year-of-founding fixed effect. A constant term is estimated but suppressed for brevity. Robust standard errors are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Predicting Future Financing

	VC Investment (1/0)				Governmental Innovation Grant (1/0)			
English name (1/0)	1.154***			0.984***	1.192***			1.131***
	[0.069]			[0.070]	[0.067]			[0.069]
Innovation hub (1/0)		1.120***		0.916***		0.358***		0.167*
		[0.068]		[0.070]		[0.068]		[0.069]
Distant board member (1/0)			1.181***	0.997***			0.709***	0.589***
			[0.071]	[0.074]			[0.070]	[0.072]
Observations	79,196	79,196	79,196	79,196	79,196	79,196	79,196	79,196
(Pseudo) R-squared	4.4%	4.2%	4.1%	8.4%	7.1%	4.3%	4.9%	7.9%

Panel B: Predicting Future Firm Outcomes

	Patent Application (1/0)				Value-Creating Firm Exit (1/0)				4-Year Revenue Growth			
English name (1/0)	1.209***			1.188***	0.255***			0.191***	1.755***			1.544***
	[0.069]			[0.070]	[0.027]			[0.028]	[0.330]			[0.334]
Innovation hub (1/0)		0.039		-0.153*		0.259***		0.175***		1.264***		0.940**
		[0.073]		[0.074]		[0.028]		[0.028]		[0.329]		[0.331]
Distant board member (1/0)			0.647***	0.559***			0.686***	0.651***			1.977***	1.732***
			[0.074]	[0.075]			[0.029]	[0.029]			[0.394]	[0.396]
Observations	79,196	79,196	79,196	79,196	79,196	79,196	79,196	79,196	27,137	27,137	27,137	27,137
(Pseudo) R-squared	4.7%	1.5%	2.2%	5.2%	8.2%	8.2%	9.2%	9.4%	0.3%	0.2%	0.3%	0.4%

Table 3: Total Capital in Private Capital Market

Table 3 shows the aggregated distribution of total capital invested in and paid out from our sample of newly established operating companies, denoted category (A) in Table 1, and our sub-sample of HIP firms. Amounts are reported in millions U.S.$, where Norwegian kroner have been converted to dollars at the spot rate prevailing at the time of funding (approximately on average eight Norwegian kroner to the U.S. dollar). Percentages are expressed in terms of the population indicated in each specific row. We calculate the current value of untraded shares based on the latest observable purchase price (either in a financing round or in a secondary trade) in each particular firm.

	Overall Population	HIP Firms			
				and VC-Backed	
Number of firms	79,196	46,121		*810*	
		58.2% of Total		*1.8% of Sample*	
Total amount:					
Invested in financing rounds	129,542	120,785	*93.2%*	28,518	*22.0%*
Invested in secondary trades	21,871	19,707	*90.1%*	5,392	*24.7%*
Paid out through share sales	20,961	19,079	*91.0%*	4,759	*22.7%*
Paid out through liquidation of shares	3,544	3,405	*96.1%*	684	*19.3%*
Historical value of untraded shares	61,864	54,476	*88.1%*	11,659	*18.8%*
Current value of untraded shares	149,328	136,146	*91.2%*	8,516	*5.7%*

Table 4: Transaction-Level Summary Statistics

Table 4 provides summary statistics of the equity financing transactions in the population of all newly established operating firms (category (A) in Table 1 Panel A) for the sub-samples of HIP firms as defined in Table 1 Panel C, the residual category of non-HIP firms, and VC-backed firms, i.e., firms that ex post are selected into financing by venture capital investors. The table describes the equity amounts raised, round statistics and valuations for financing rounds and trades and valuations for secondary trades by each firm, as well as the accounting information in the year before the financing round or secondary trade, if available. The post-money valuation is calculated as the average purchase share price in each financing round multiplied by the number of shares outstanding after each financing round. All numbers are unscaled and are reported in million Norwegian kroner (approximately on average 8 kroner to the U.S. dollar).

	Non-HIP Firms			HIP Firms			VC-backed Firms		
	N	mean	p50	N	mean	p50	N	mean	p50
Transaction information									
N of firms with at least									
...one financing round	11,956			18,142			837		
...one secondary trade	5,554			10,998			579		
Firm age at first financing	15,720	1.2	1.0	28,679	1.3	1.0	3,395	1.4	1.0
Round size	15,720	3.17	0.16	28,679	16.21	0.25	3,395	26.47	2.50
VC round size							1,687	17.21	2.50
Post-money valuation	15,720	6.95	0.21	28,679	44.58	0.51	3,395	98.85	16.57
VC post-money valuation							1,687	84.32	19.50
Average secondary valuation	9,054	4.81	0.32	21,834	51.12	0.63	1,737	99.50	12.09
Accounting information at t-1									
Total assets	11,165	11.85	1.21	27,391	38.34	1.87	3,604	84.62	7.18
Book value of equity	11,165	3.85	0.19	27,391	11.75	0.33	3,604	30.74	3.00
Earnings (net income)	11,165	-0.26	-0.01	27,391	-2.64	-0.03	3,604	-7.93	-1.13
Retained earnings	11,165	0.04	0.00	27,391	-2.39	0.00	3,604	-2.86	0.00

Table 5: Value Relevance in Financing Rounds of HIP Firms

Table 5 reports the estimation results from the log-linear regression model presented in Equation 1 for our HIP sample. The dependent variable is the natural logarithm of the pre-money valuation in a financing round. The pre-money valuation is calculated as the post-money valuation (average purchase share price in each financing round multiplied by the number of shares outstanding after each financing round) less raised equity (=current round size). We disaggregate the (lagged) book value of equity into its cash component, cumulative equity raised, and (accrual) accounting-relevant components, i.e., retained earnings and current earnings. Cumulative equity raised is the total equity paid-in from firm inception up to the year prior to the valuation. Positive (negative) retained earnings is the natural logarithm (plus one) of the absolute value of accumulated retained earnings two years prior to the valuation if retained earnings are positive (negative) and is zero otherwise. Current profit (loss) is the natural logarithm (plus one) of the absolute value of net income in the year prior to the financing round if net income is positive (negative) and is zero otherwise. All variables are scaled by total assets one year prior to valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Positive retained earnings	0.013***		0.014***			0.022***
	(0.005)		(0.004)			(0.004)
Negative retained earnings	0.022***		-0.015***			-0.003
	(0.004)		(0.004)			(0.003)
Current profit	0.178***		0.123***			0.023***
	(0.012)		(0.008)			(0.006)
Current loss	0.231***		0.129***			0.029***
	(0.011)		(0.007)			(0.006)
Cumulative equity raised		0.758***	0.652***		0.477***	0.468***
		(0.020)	(0.018)		(0.014)	(0.015)
Current round size				0.678***	0.515***	0.491***
				(0.014)	(0.012)	(0.014)
Observations	11,023	11,023	11,023	11,023	11,023	11,023
Adjusted R-squared	17.8%	29.7%	34.2%	37.9%	47.5%	48.1%
Incremental R-squared						
Earnings			4.5%			0.6%

Table 6: Value Relevance in Financing Rounds of VC-Backed Firms

Table 6 reports the estimation results from the log-linear regression model presented in Equation 1 for a sub-sample of ex post selected VC-backed firms. The dependent variable is the natural logarithm of the pre-money valuation in a financing round. The pre-money valuation is calculated as the post-money valuation (average purchase share price in each financing round multiplied by the number of shares outstanding after each financing round) less raised equity (=current round size). We disaggregate the (lagged) book value of equity into its cash component, cumulative equity raised, and (accrual) accounting-relevant components, i.e., retained earnings and current earnings. Cumulative equity raised is the total equity paid-in from firm inception up to the year prior to the valuation. Positive (negative) retained earnings is the natural logarithm (plus one) of the absolute value of accumulated retained earnings two years prior to the valuation if retained earnings are positive (negative) and is zero otherwise. Current profit (loss) is the natural logarithm (plus one) of the absolute value of net income in the year prior to the financing round if net income is positive (negative) and is zero otherwise. All variables are scaled by total assets one year prior to valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Positive retained earnings	-0.005		0.000			0.015**
	(0.008)		(0.008)			(0.007)
Negative retained earnings	0.007		-0.013			0.002
	(0.008)		(0.008)			(0.007)
Current profit	0.237***		0.227***			0.100***
	(0.019)		(0.018)			(0.017)
Current loss	0.234***		0.205***			0.091***
	(0.017)		(0.017)			(0.016)
Cumulative equity raised		0.487***	0.354***		0.356***	0.318***
		(0.045)	(0.041)		(0.030)	(0.034)
Current round size				0.562***	0.525***	0.438***
				(0.030)	(0.029)	(0.036)
Observations	2,384	2,384	2,384	2,384	2,384	2,384
Adjusted R-squared	22.9%	10.6%	27.1%	33.9%	39.4%	42.4%
Incremental R-squared						
Earnings			16.5%			3.0%

Table 7: Value Relevance in Financing Rounds of Non-HIP Firms

Table 7 reports the estimation results from the log-linear regression model presented in Equation 1 for the residual sub-sample of non-HIP firms. The dependent variable is the natural logarithm of the pre-money valuation in a financing round. The pre-money valuation is calculated as the post-money valuation (average purchase share price in each financing round multiplied by the number of shares outstanding after each financing round) less raised equity (=current round size). We disaggregate the (lagged) book value of equity into its cash component, cumulative equity raised, and (accrual) accounting-relevant components, i.e., retained earnings and current earnings. Cumulative equity raised is the total equity paid-in from firm inception up to the year prior to the valuation. Positive (negative) retained earnings is the natural logarithm (plus one) of the absolute value of accumulated retained earnings two years prior to the valuation if retained earnings are positive (negative) and is zero otherwise. Current profit (loss) is the natural logarithm (plus one) of the absolute value of net income in the year prior to the financing round if net income is positive (negative) and is zero otherwise. All variables are scaled by total assets one year prior to valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Positive retained earnings	0.023***		0.022***			0.027***
	(0.007)		(0.006)			(0.005)
Negative retained earnings	0.017***		-0.013**			-0.010**
	(0.006)		(0.005)			(0.005)
Current profit	0.196***		0.085***			0.030***
	(0.017)		(0.011)			(0.010)
Current loss	0.228***		0.082***			0.026***
	(0.015)		(0.011)			(0.010)
Cumulative equity raised		0.865***	0.795***		0.672***	0.669***
		(0.028)	(0.029)		(0.027)	(0.028)
Current round size				0.623***	0.334***	0.316***
				(0.024)	(0.022)	(0.024)
Observations	4,232	4,232	4,232	4,232	4,232	4,232
Adjusted R-squared	18.5%	43.4%	45.8%	30.3%	49.9%	50.9%
Incremental R-squared						
Earnings			2.4%			1.0%

Table 8: Can More Data Better Explain Early-Stage Valuations?

Table 8 Panels A and B report the increase in adjusted R-squared, the incremental R-squared, after we run the log-linear regression model presented in Equation 1 and reported in Tables 5–7. We gradually include non-financial publicly or privately observable firm characteristics and more granular accounting information consisting of 18 additional financial statement variables: revenues, non-operating income, personnel expenses, depreciation and write-offs, financial income, financial expenses, extraordinary income, extraordinary expenses, intangible assets, tangible assets, financial long-term assets, inventory, receivables, financial short-term assets, cash, provisions, long-term debt and short-term debt. Panel A first includes additional financial statement information before including non-financial publicly and privately observable firm characteristics. Panel B conditions on investors' knowing publicly observable firm characteristics before granular accounting information is included.

	Adjusted R-Squared		
	HIP Firms	VC-Backed Firms	Non-HIP Firms
Panel A:			
Disaggregated book value of equity (Tables 5–7)	48.1%	42.4%	50.9%
+18 financial statement items	1.8%	0.5%	1.8%
Publicly observable characteristics			
+ Financing round	0.8%	-0.2%	1.0%
+ Firm age	0.0%	0.1%	-0.1%
+ Industry	0.3%	0.4%	0.5%
+ Calendar year	0.9%	0.7%	0.4%
$\sum$ *Additional explanatory power*	2.0%	1.0%	1.8%
Privately observable characteristics			
+ Pre-round N of investors	0.7%	0.8%	1.3%
+ Pre-round N of board members	0.0%	0.0%	0.0%
+ N of patent applications	0.1%	0.0%	0.0%
+ Bank rating	0.2%	0.6%	-0.1%
$\sum$ *Additional explanatory power*	1.0%	1.4%	1.2%
Panel B:			
Disaggregated book value of equity (Tables 5–7)	48.1%	42.4%	50.9%
Publicly observable characteristics			
+ Financing round	1.4%	-0.1%	1.4%
+ Firm age	0.0%	0.0%	-0.1%
+ Industry	0.7%	0.7%	1.0%
+ Calendar year	1.0%	0.7%	0.5%
$\sum$ *Additional explanatory power*	3.1%	1.3%	2.8%
+18 financial statement items	-0.2%	-0.5%	0.4%

Table 9: Do Earnings Aggregate Available Information or Provide Incremental Information?

Table 9 reports the increase in adjusted R-squared, the incremental R-squared, after we run the log-linear regression model presented in Equation 2. The dependent variable is positive (negative) net income in year t if net income is positive (negative) and is zero otherwise and is scaled by total assets in the same year. Similar to Table 8, non-financial publicly observable firm characteristics comprise financing round, firm age, industry classification and calendar year, while privately observable firm characteristics are number of investors, number of board members, patent applications and bank rating.

	Adjusted R-Squared					
	HIP Firms		VC-Backed Firms		Non-HIP Firms	
	NI*pos	NI*neg	NI*pos	NI*neg	NI*pos	NI*neg
Publicly observable characteristics						
Financing round	4.8%	1.5%	3.3%	4.3%	2.6%	0.5%
+ Firm age	0.6%	1.8%	0.6%	1.0%	0.4%	2.0%
+ Industry	1.4%	0.3%	1.8%	1.4%	1.4%	0.1%
+ Calendar year	0.1%	0.5%	0.8%	1.1%	0.1%	0.4%
Privately observable characteristics						
+ N of investors	0.8%	0.1%	2.2%	0.1%	0.4%	0.1%
+ N of board members	0.0%	0.2%	1.0%	0.1%	0.1%	0.0%
+ N of patent applications	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%
+ Bank rating	15.5%	27.0%	11.7%	18.0%	18.6%	27.7%
$\sum$ Total explanatory power	23.3%	31.4%	21.5%	26.1%	23.6%	30.8%

Table 10: Do Raised Equity Amounts Contain Accounting Information?

Table 10 reports the estimation results from the log-linear regression model in Equation 3. The dependent variable in Columns (1), (3) and (5) is the natural logarithm of the total equity paid-in from firm inception up to the year prior to the valuation, $t-1$ (the cash component of the book value of equity). The dependent variable in Columns (2), (4) and (6) is the natural logarithm of the equity raised (current round size) in year t. Positive (negative) retained earnings is the natural logarithm (plus one) of the absolute value of accumulated retained earnings two years prior to the valuation if retained earnings are positive (negative) and is zero otherwise. Current profit (loss) is the natural logarithm (plus one) of the absolute value of net income in the year prior to the financing round if net income is positive (negative) and is zero otherwise. All variables are scaled by total assets one year prior to the valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	HIP Firms		VC-Backed Firms		Non-HIP Firms	
Equity capital raised	Cumulative	Current	Cumulative	Current	Cumulative	Current
	(1)	(2)	(3)	(4)	(5)	(6)
Positive retained earnings	-0.001	-0.016***	-0.015**	-0.036***	0.000	-0.015**
	(0.004)	(0.004)	(0.007)	(0.009)	(0.005)	(0.006)
Negative retained earnings	0.058***	-0.003	0.057***	-0.030***	0.038***	0.006
	(0.004)	(0.004)	(0.006)	(0.009)	(0.005)	(0.005)
Current profit	0.086***	0.235***	0.027**	0.293***	0.140***	0.231***
	(0.010)	(0.012)	(0.014)	(0.022)	(0.014)	(0.016)
Current loss	0.155***	0.262***	0.081***	0.268***	0.185***	0.249***
	(0.009)	(0.011)	(0.013)	(0.021)	(0.012)	(0.015)
Observations	11,023	11,023	2,384	2,384	4,232	4,232
Adjusted R-squared	25.6%	23.8%	24.8%	25.2%	25.6%	25.5%

Table 11: Heckman Selection Model of Financing

Table 11 presents the first- and second-stage estimates of the Heckman selection model as specified in Equations 4a, 4b and 4c (first-stage) and Equations 2 and 1 (second-stage). Column (1) corresponds to Equation 4a and selects firms from the entire population of newly established firms (category (A) in Table 1) into a financing round by any investor using our ex ante innovation flags and cumulative equity raised. Column (2) estimates Equation 4b and includes non-financial publicly and privately observable firm characteristics, as defined before, into the selection model. Column (3) corresponds to the full specification of the selection model as shown in Equation 4c and selects firms into a financing round by any investor based additionally on information contained in earnings. Columns (4)–(9) present the second-stage estimations after we correct for the first-stage selection models in Columns (1)–(3), as specified. All accounting, financing and valuation variables in the outcome model are scaled by total assets one year prior to valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	First-Stage Selection Model			Second-Stage Outcome Model					
	Financing Event			Current Round Size			Pre-money Valuation		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inverse Mills Ratio				0.372***	-0.637***	-1.186***	-1.731***	-1.340***	-1.374***
				(0.124)	(0.220)	(0.215)	(0.096)	(0.200)	(0.209)
English name (1/0)	0.218***	0.118***	0.104***						
	(0.009)	(0.012)	(0.012)						
Innovation hub (1/0)	0.079***	0.089***	0.080***						
	(0.010)	(0.012)	(0.012)						
Distant board member (1/0)	0.248***	0.015	-0.002						
	(0.010)	(0.012)	(0.013)						
Cumulative equity raised	0.059***	-0.013***	-0.042***	0.578***	0.612***	0.438***	0.429***	0.425***	0.433***
	(0.002)	(0.003)	(0.004)	(0.022)	(0.017)	(0.017)	(0.014)	(0.013)	(0.015)
Positive retained earnings			-0.014***			0.063***			0.031***
			(0.001)			(0.005)			(0.004)
Negative retained earnings			-0.002			0.046***			-0.001
			(0.002)			(0.004)			(0.004)
Current profit			-0.020***			0.141***			0.070***
			(0.002)			(0.009)			(0.007)
Current loss			0.022***			0.116***			0.024***
			(0.002)			(0.008)			(0.007)
Current round size							0.484***	0.549***	0.512***
							(0.011)	(0.012)	(0.013)
Observations	343,591	136,206	136,206	15,255	14,772	14,772	15,255	14,772	14,772
Firm characteristics	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Selection model	1	2	3	1	2	3	1	2	3
(Pseudo) Adjusted R-squared	2.7%	23.8%	25.6%	20.3%	35.1%	42.5%	49.1%	53.3%	54.0%
Incremental R-squared									
Firm characteristics		21.1%			14.8%			4.2%	
Earnings			1.8%			7.4%			0.7%

Table 12: Importance of Accounting Information for Different Investors

Table 12 presents the incremental R-squared of non-financial firm characteristics and earnings from our replicating the Heckman selection model as presented in Table 11 for different types of investors providing equity to early-stage firms: individual investors (who include founders, directors and other individuals), corporate investors, venture capital investors and foreign investors. All accounting, financing and valuation variables in the outcome model are scaled by total assets one year prior to valuation before their natural logarithm is taken.

	First-Stage Selection Model		Second-Stage Outcome Model			
	Financing Event		Current Round Size		Pre-money Valuation	
Incremental R-squared of:	*Firm Characteristics*	*Earnings*	*Firm Characteristics*	*Earnings*	*Firm Characteristics*	*Earnings*
Founders	8.7%	0.7%	5.1%	5.6%	37.0%	10.7%
Directors	12.3%	0.7%	7.6%	6.7%	32.7%	12.8%
Other individual investors	16.6%	1.0%	5.3%	6.2%	22.4%	9.0%
Corporate investors	19.9%	1.9%	12.2%	11.5%	23.1%	13.1%
Venture capital investors	20.0%	2.3%	11.1%	10.8%	22.0%	13.6%
Foreign investors	11.5%	2.3%	20.9%	16.0%	27.8%	18.3%

APPENDIX

LEGAL OVERVIEW OF SHAREHOLDING IN NORWEGIAN STARTUP COMPANIES

Norwegian early-stage firms are commonly set up as privately held companies with limited liability ("AS") but may be converted into a publicly held corporation ("ASA") in anticipation of an IPO. The only exceptions to this rule, which arise from asset-related tax issues, are certain real estate or shipping startups, but these are excluded from our sample. In both AS and ASA companies, no shareholders are personally liable for the company's obligations unless they have separately agreed to specific guarantees. Both AS and ASA companies are taxed entities, and any shareholder distribution has to come from after-tax profits. New companies are registered online in the national companies registry.[16] The minimum share capital of an AS is 30,000 Norwegian kroner (approximately 4,700 U.S.$), while the minimum share capital of an ASA is 1,000,000 Norwegian kroner (approximately 156,000 U.S.$).

In firms seeking to attract venture capital investors, who are usually used to U.S.-type venture investor protection, shareholder agreements provide a method to benefit from familiar investment conditions even in this foreign legal setting. These agreements are in addition to the required articles of association. Norwegian corporate legislation, which is harmonized with EU law because of Norway's membership of the European Economic Area since 1994, sets out the fundamental principles of equal rights for all shareholders but allows founders some flexibility in allocating rights by defining different share classes in the firm's articles of association. In addition, commonly used shareholder agreements provide even more flexibility. These agreements cover, e.g., voting rights allocated to specific share classes or shareholders and dividend or liquidation preferences. Most firms issue only so-called ordinary shares or A-shares, and hence all holders of such shares have equal rights—i.e., they carry equal rights to dividends and in liquidations and have the same voting power. (Approximately 98% of the startups in our sample have only one class of shares, specifically ordinary shares.) However, a

16. See https://www.brreg.no/en/limited-company/.

shareholder agreement may still allocate these rights differently between shareholders within the same share class. Shareholder agreements used in VC-backed firms include mechanisms similar to standard U.S. venture capital contracts and typically include drag-along/tag-along clauses, preferential dividends, liquidation preferences, voting rules and specific allocations of governance rights. Shareholders in AS companies have, by law, a right of first refusal when any shares are put up for sale unless this right is waived in the articles of association. The articles of association are publicly available (while shareholder agreements are not). Thus, founders tend to keep the articles fairly compact. The enforceability of shareholder agreements toward both shareholders and third parties is unclear, owing to only few cases having been brought before the courts. Figure A1 provides a comparison of how enforceable shareholders' agreements are in different jurisdictions. The situation in Norway is similar to that in the U.S.

When issuing new shares, a general meeting may decide to allow certain investors to pay different purchase prices. In early-stage firms, variation in purchase prices likely reflects the relative bargaining position (under consideration of other contractual agreements) of different individual shareholders or shareholder categories. Investors will, in this case, end up owning the same type of shares but will have different cost prices for their shares, even if they all invest in the same round of capital raising for the firm.

General meetings are held at least annually to approve the annual accounts and dividends. This needs to happen no later than the end of June in the year following the accounting year. Extraordinary general meetings are held at the initiative of the board, shareholders with at least 10% ownership, or the company's auditor. General meetings, in addition to approving the accounts and electing the board, may revise the articles of association, decide upon equity issues (including convertibles and option/warrant schemes to employees), and provide general powers of attorney to the board to issue new equity in the future. The latter decisions require a 2/3 majority of votes and share capital represented in the meeting but are subject to the overall principle of fair and equal treatment of the rights of all shareholders. Any agreements between the company and its shareholders, board members or CEO with a value exceeding certain thresholds should also be approved by a general meeting. A shareholder owning at least 90% of a company can, by law, force remaining shareholders to sell, but the price may

be subject to a public arbitration in court at the majority shareholder's expense. The minority shareholders in such a company also have the right to request to be bought out, using the same procedure. (This regulation also follows from the EU directive 2004/25/EF, article 15, on takeovers.)

The firm must have a board of directors consisting of a minimum of one board member elected by the general meeting. In firms with more than 30 employees, the employees also have the right to elect board members. The number of employee-elected board members can increase in relation to the number of employees, up to a maximum of one-third of the board of directors and a minimum of three directors for the largest companies. The board is responsible for hiring and firing the CEO. In most startups, the CEO is both the founder and a board member, which makes this less straightforward. At least one-half of the members of the board of directors must be resident in Norway or be Norwegian citizens with their residential address in an EU/EEA country.

Firms are subject to national income tax; the tax rate was 28% during most of our sample period but has been gradually reduced and is currently set at 22%. A firm's net operating losses may be carried forward and used to reduce future taxable income without restrictions. Dividends and sold capital gains from shares are tax-free for incorporated shareholders to avoid double taxation in corporate structures. (This applies to any corporation's holding of any share in another corporation located in the European Economic Area.) Most investors with a portfolio size warranting the setup and maintenance costs, thus, hold shares via a holding firm and are taxed only on distributions to ultimate (individual) shareholders.[17] Norwegian *individual* shareholders are subject to a dividend tax of 31.7%, a tax on sold capital gains of 22%, and a wealth tax of 0.85% on their relative share of book equity values one year earlier.[18] Individual shareholders in a bankrupt firm obtain a tax-deductible loss equivalent to realizing their shares at zero value.

17. We exclude the transfers from an individual to a holding company as a separate transaction but account for the effective individual owner and original purchase date when considering holding companies.

18. The annual taxable dividend is reduced by an amount equal to a risk-free return on the invested amount. The interest rate used in 2017 was 0.7%. If such a tax credit remains unused, the shareholder may carry it forward.

Figure A1: **Comparison of Shareholder Agreements**

	Typical legal questions arising from shareholders' agreements	Likely outcome across jurisdictions: US	UK	GE	SE	NO	DK	Comments
Separation of voting rights from ownership to shares	Can shareholders separate their voting rights from the ownership to the shares?	✓	✓	×	×	×	×	▪ Voting trusts and irrevocable proxies are legal in US and UK ▪ German and Scandinavian law build on the indivisibility of shares principle, whereby shareholders' rights cannot be separated from the ownership to the share
Shareholders' agreements								
Enforceability between the parties	Are shareholder voting agreements binding between the parties?	✓	✓	✓	✓	✓	✓	▪ This was historically disputed in all countries researched, but is now accepted everywhere
	Can shareholder voting agreements be enforced by injunction (specific performance)?	(✓)	✓	✓	✓	(✓)	✓	▪ This has long been disputed across countries ▪ UK and Germany now have undisputable case law in favor of not only prohibitive, but also mandatory injunction
	Can members of the board of directors, acting as such, legally bind the exercise of their powers by agreement?	×	×	?	×	×	×	▪ Board members are typically seen as having a duty to act in the way they at any given point in time find is in the company's best interest
Enforceability toward third parties	Can shareholder voting agreements be enforced as directly dictating the legal effects of past decisions made by the general meeting?	?	(✓)	(✓)	×	?	×	▪ Agreements between shareholders have in the UK been accepted as a corporate act ▪ German case law indicates that a decision by the general meeting can be void if contrary to an agreement entered into by all shareholders
	Can shareholders' agreements be enforced toward a person who acquires shares from one of the parties to the agreement?	(✓)	×	×	(✓)	?	(✓)	▪ US state statutes typically require transfer restrictions to be conspicuously noted on the share certificate ▪ Scandinavian law probably at least requires that the transferee knows about the shareholders' agreement

Overview: Enforceability of shareholder agreements across jurisdictions. Source: J. Woxholth: *Aksjonæravtaler*.

ADDITIONAL TABLES

Table B1: Exit Outcomes

Table B1 shows the distribution of exit events for the entire population of newly established firms operating in potentially innovative industries defined as category (A) in Table 1 Panel A, broken down for the sub-samples of firms (HIP, non-HIP, VC-backed, non-VC-backed). Exit categories include independently operating (unliquidated), bankrupt, (partially) liquidated, merged, acquired and IPO'd. Venture backing includes traditional, corporate or government-affiliated VCs, early-stage investment funds associated with traditional private equity groups, and incubators. The exit events are not mutually exclusive.

	Population of Firms	HIP Firms	VC-Backed Firms	Non-VC-Backed Firms	Non-HIP Firms
Number of firms	79,196	46,121	810	45,311	33,075
Independently operating (unliquidated)	68.1%	67.4%	56.7%	67.6%	69.1%
Bankruptcy	11.5%	10.8%	5.9%	10.9%	12.5%
(Partial) Liquidation	11.9%	11.7%	10.4%	11.8%	12.2%
Merger	3.1%	3.6%	7.7%	3.5%	2.4%
Full acquisition (>90%)	5.3%	6.5%	16.9%	6.3%	3.7%
IPO	0.0%	0.1%	2.5%	0.0%	0.0%

Table B2: Value Relevance in Secondary Trades

Table B2 reports the estimation results from running the adjusted log-linear regression model presented in Equation 1 in our sample of newly established operating firms (category (A) in Table 1). The dependent variable is the natural logarithm of the market value of equity observed in a secondary trade, which we calculate as the average share price on the trade day multiplied by the number of shares outstanding. Cumulative equity raised is the total equity paid-in from firm inception up to the year prior to the valuation. Positive (negative) retained earnings is the natural logarithm (plus one) of the absolute value of accumulated retained earnings two years prior to the valuation in a secondary trade if retained earnings are positive (negative) and is zero otherwise. Current profit (loss) is the natural logarithm (plus one) of the absolute value of net income in the year prior to the secondary trade if net income is positive (negative) and is zero otherwise. All variables are scaled by total assets one year prior to valuation before their natural logarithm is taken. A constant term is estimated but suppressed for brevity. Standard errors are clustered at the firm–year level and are reported in parentheses. One, two and three asterisks denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	HIP firms			VC-Backed Firms			Non-HIP Firms		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Positive retained earnings	0.018***		0.020***	-0.003		-0.009	0.021***		0.023***
	(0.004)		(0.003)	(0.013)		(0.013)	(0.005)		(0.004)
Negative retained earnings	0.031***		0.002	-0.005		-0.033***	0.031***		0.007*
	(0.004)		(0.003)	(0.012)		(0.012)	(0.005)		(0.004)
Current profit	0.145***		0.086***	0.153***		0.151***	0.162***		0.082***
	(0.012)		(0.007)	(0.029)		(0.027)	(0.014)		(0.008)
Current loss	0.199***		0.080***	0.184***		0.145***	0.185***		0.062***
	(0.011)		(0.007)	(0.026)		(0.023)	(0.013)		(0.008)
Cumulative equity raised		0.625***	0.561***		0.487***	0.431***		0.580***	0.537***
		(0.017)	(0.015)		(0.061)	(0.056)		(0.023)	(0.021)
Observations	17,092	17,092	17,092	1,392	1,392	1,392	7,134	7,134	7,134
Adjusted R-squared	19.7%	34.7%	37.5%	13.9%	14.7%	22.0%	17.9%	33.3%	36.3%
Incremental R-squared									
Earnings			2.8%			7.3%			3.0%