On the Importance of Accounting Information in Early-Stage Financing *

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Abstract

This paper asks whether financial accounting numbers reflect information relevant in providing financing to growth-oriented early-stage firms. We use detailed administrative records from Norway to build a measure of a startup's ex ante innovation potential, before it receives financing. This allows us to look beyond the set of venture-backed startups to include firms that may never successfully raise outside capital. The lagged book value of equity, disaggregated into earnings and contributed capital, captures between 26%–46% of the total variation in valuations across financing rounds. Further publicly or privately observable firm characteristics and more granular accounting information do not provide meaningful additional explanatory power. The analyses suggest that earnings not only aggregate those characteristics but reflect unobservable information, which incrementally explains valuations and whether a firm raises outside equity. Overall, our findings speak to the importance of accounting information to reduce information asymmetries even in highly uncertain settings, in which investing based on "gut feeling" may be the norm.

Keywords: entrepreneurship, accounting information, venture capital, early-stage financing, earnings, value relevance.
JEL codes: G11, G23, G24, G32, M41.

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1 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 informationally opaque (Hellmann and Puri, 2002). Potential investors must overcome enormous information asymmetries to provide financing for such firms. According to the prevailing school of thought, venture capitalists (VC) and other early-stage equity investors rely primarily on "gut feeling" and a variety of nonfinancial characteristics to assess the current performance and future prospects of potential investments (Huang and Pearce, 2015). If investors rely primarily on qualitative, difficult to grasp and assess, attributes such as *team* and *fit* to make investment decisions (Gompers, Gornall, Kaplan, and Strebulaev, 2020), it is unclear whether available accounting information, which primary role is to reduce information asymmetries, at the time of the investment decision is able to aggregate these attributes at all, and, beyond that, is incrementally informative for predicting market valuations and 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. In case accounting information absorbs information which serves the investment selection process, if we condition the sample on firms' receipt of venture backing, we could remove precisely the variation required to identify the importance of accounting information. To address this concern, we must also observe firms that were ex ante similar to venture-backed firms but did not receive funding. In addition, VCs themselves face strong reporting requirements from their investors, typically limited partners (LPs), which in turn results in endogenous demand for accounting information from their portfolio

firms. This leads us to the second, closely related, challenge of 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 information is publicly and exogenously available for use by all potential investors, not merely available endogenously as a result of investor demand. Otherwise, we would be unable to distinguish the lack of availability of accounting data from its lack of relevance.

These challenges preclude us from using e.g. U.S. data 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 data set from Norway. Most new Norwegian firms choose to establish as limited liability companies; as such, they are required to submit standardized financial statements (abbreviated or full)[1] prepared in accordance with Norwegian GAAP (or IFRS), independent of firm age or size, no later than eighteen months after their incorporation.[2] This practice implies that the resulting accounting information, also in abbreviated financial statements, for even very small and very young firms conform to a common set of standards (see Mjøs and Selle, 2022).

Finally, 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, with Norway being one of only five countries implementing wealth tax on individuals. This information allows us to calculate firm valua-

[1] See e.g. Breuer (2021) for an overview of the full financial reporting requirement thresholds.

[2] The financial reporting requirement is based on the calendar year, so that **all** limited liability firms established before June 30^{th} of the respective year need to submit a full annual report including a balance sheet, a profit&loss statement and notes by the end of this first year of operation. Firms established after June 30^{th} provide the full annual report for the entire period since incorporation in the following year.

tions based on real share purchases in every firm in Norway. This gives us a detailed panel data set including both accounting information and valuations for the entire population of new firms started in Norway between 2004 and 2017.

With these data, we begin by building ex ante empirical measures of future innovation potential. These allow us to identify a set of firms that are observably similar to those that will later receive early-stage equity investment. To build the sample of firms "at risk" of innovating, 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 with indicators for high innovation propensity based on company characteristics observable at founding. The indicators are based on industry classification, having an English-language company name, being located near the largest university cities, and having at least one geographically distant board member. These flags are discussed in detail in Section 4. Our indicators are highly predictive of future growth and later access to venture financing. In total, less than 1% of the new firms in our sample receive venture capital funding (including funding from traditional, corporate or government-affiliated VC funds, early-stage investment funds associated with traditional private equity groups, and incubators); this figure closely aligns with the findings in Puri and Zarutskie (2012). Fewer than one in six firms in the overall population satisfy any two indicators, but these firms include 87% of all firms that receive any venture funding. Our flags are also strong predictors of firm-level 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, Gornall, Kaplan, and Strebulaev, 2020).

We next examine how well book value of equity incorporates information contained in financing rounds (Holthausen and Watts, 2001; Barth, Beaver, and Landsman, 2001).

To do so, we need to adjust the traditional value relevance model from Barth, Beaver, and Landsman (1998) for the fact that we observe primary financing rounds, where 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. In public markets, differences of opinion by 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 early-stage financing rounds, there is minimal secondary trade; instead the information flow is not between arms-length outsiders but between the firm and the investors themselves.[3]

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 26%–46% of the total variation in pre-money valuations. The incremental explanatory power of retained and current earnings on pre-money valuations in the sample of high innovation potential (HIP) firms is 4.3 percentage points, and 15.8 percentage points for the subsample of VC-backed firms.[4] This illustrates the selection bias that arises from ex post selection on VC financing (as in Hand, 2005; Armstrong, Davila, and Foster, 2006; Sievers, Mokwa, and Keienburg, 2013). Because the magnitude of the incremental explanatory power of earnings is relatively small, we add further publicly and privately observable firm characteristics to our model to evaluate whether additional information helps to better reflect early-stage valuations. Except for the financ-

[3]This difference in liquidity conditions in public and private markets, as well as the difference in the price-setting dynamics in primary (financing round) and secondary transactions challenge the direct comparison of our results with those from the established literature on value relevance in well-established firms (e.g., Collins, Maydew, and Weiss, 1997; Barth, Beaver, and Landsman, 1998; Core, Guay, and Van Buskirk, 2003; Barth, Li, and McClure, 2023). In addition, there are sample composition differences with regard to loss-making firms or firms with negative book value of equity, given the early-stage nature of our firms, as opposite to established public firms.

[4]The incremental explanatory power of earnings in the subsample of non-innovative firms is 1.7 percentage points.

ing round sequence itself, which has slightly higher incremental explanatory power than earnings, neither publicly observable characteristics including firm age, industry and calendar year nor privately observable variables including the pre-round number of investors, pre-round number of board members, number of patent applications and bank rating can significantly outperform information that is already included in earnings.[5] Further disaggregation of accounting information (we include 18 additional financial statement items) does not improve the explanatory power in valuations in HIP firms (and does so only slightly in non-innovative firms).

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The total outside equity raised in the funding round explains more variation in pre-money valuations than do earnings, suggesting that raised equity subsumes information otherwise contained in earnings. Indeed, we show that approximately one-quarter of the variation in contributed capital is explained by current and retained earnings alone. This finding is independent of the type of the firm, implying that it is an artifact of the financing process itself. This, in turn, implies that the traditional value relevance model using secondary trades 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 capital to provide, and how much ownership to require for the amount of funding provided, which in turn determines the valuation of the firm. In the spirit of Heckman (1979), we use our four innovation flags 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

[5]We rely on the R-squared instead of the adjusted R-squared, as the latter adjusts for the number of terms in the model. Our main goal here is, however, to test exactly for that increase in the number of terms. As we do not observe an increase in R-squared with additional variables, there is no increase in adjusted R-squared expected either.

financing. Using the Mills ratio from this first stage to instrument for the selection effects, we observe that a higher value relevance of earnings in the endogenous baseline results are the combined effect of the first and the second stages. The incremental power of earnings is larger in the selection model and larger still in outcome models predicting current round size. This implies that earnings are relevant in each step of the financing process, but that the information that they contain relates more to the financing decision than to the implied valuations per se.

The literature on entrepreneurial accounting remains scarce. Beuselinck, Elfers, Gassen, and Pierk (2023) provides an overview. This includes work on the adoption of management accounting systems (e.g., Davila and Foster, 2007), on the 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 work 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), Hurst and Pugsley (2011)). The inclusion of all 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, Davila, and Foster, 2006; Sievers, Mokwa, and Keienburg, 2013). Such firms have successfully attracted venture investors: prior work shows that earnings quality in the IPO year is better 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).

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 it to the increasing role of intangible assets and growth opportunities in the economy. To fill in this information gap, a large strand of literature has emerged to suggest that alternative, non-financial performance metrics are (incrementally) value relevant. Particularly in informationally opaque settings, contemporary research expands 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 the cognitive investor perceptions of management from these presentations and firm valuations. In an entrepreneurial setting, Davila and Guasch (2022) relate nonverbal behavior of entrepreneurs to firm valuation and find that physical expansiveness correlates with higher proposed firm valuations. In contrast, our findings speak to the value of accounting numbers even in highly uncertain, highly innovative, high-intangible settings, in which investing based on "gut feeling" is the accepted norm.

The closest paper 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 the probability of private firms receiving financing. They find that increased disclosure predicts 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 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), who find that a disclosure of a voluntary review or an audit of financial statements during equity crowdfunding campaigns increase the likelihood of raising target capital. These studies infer that such reviews (audits) serve as signals of high future prospects. Our paper fills in by analyzing whether the underlying financial statements are value relevant per se.

Because accounting information provides better understanding of financing and valuations decisions, our results suggest that the availability of standards-based accounting information could stimulate liquidity in private capital markets, ultimately increasing the supply of capital to early-stage innovative firms. In this sense, our paper is also broadly related to the literature on the economic consequences of adoption of common accounting standards (Daske, Hail, Leuz, and Verdi, 2013; Gao, Jiang, and Zhang, 2019; Breuer, 2021; Ortiz, Peter, Urza I, and Volpin, 2023). Even in the absence of corresponding policy changes, our findings help in navigating early-stage firms in their voluntary disclosures decisions, which connects our work to Dambra, Schonberger, and Wasley (2023); Bourveau and Schoenfeld (2017); Chen (2019); Jansen (2020), among others.

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 the sample construction of potentially innovative firms. Section 5 presents our empirical findings, while Section 6 concludes.

2 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 the strictest sense, price setting for publicly listed firms occurs on liquid stock exchanges in which arms-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 the trade does occur, it is typically connected to equity fundraising events or in 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 driven 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 x_t percentage points of the firm to

outside investors. This implies a post-money valuation at time t of $Post - MV_t = \frac{K_t}{x_t}$ and a pre-money valuation of $Pre - MV = K_t \times (\frac{1}{x_t} - 1)$.

To connect equity financing rounds to disaggregated book value of equity, we rely on the value relevance model as outlined originally in Barth, Beaver, and Landsman (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 for 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, Gerakos, Linnainmaa, and Nikolaev, 2020) and adjust for negative values of the latter following Core, Guay, and Van Buskirk (2003). We estimate the full-specification Equation 1 as follows:

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

We choose the log-linear specification because of extreme skewness in early-stage performance (Cochrane, 2005; Korteweg and Sorensen, 2010). Hand (2005) discusses that the main advantage of this functional form is the flexibility of accommodating nonlinear relationships, such as those arising from real options that are prevalent in early-stage equity market valuations; however, Barth, Li, and McClure (2023) shows that imposing a functional form can understate the explanatory power of independent variables and, consequently, the value relevance of accounting information. Thus, we should consider our results lower bound estimates. $Round\ Size_{i,t}$ is the amount of equity raised in the current financing round.

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] $Retained * pos_{i,t-2}$ ($Retained * neg_{i,t-2}$) 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 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 total assets 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.

3 Institutional Background and Data

3.1 Entrepreneurial Environment

Although Norway is a small country in terms of population (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 2007–2018 scaled by population. Because the oil and gas sector is such a large fraction of overall Norwegian GDP, scaling the 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 as well.

Insert Figure 1 here.

[6]Note that this includes any equity capital paid-in, including the required equity minimum at firm incorporation.

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, of which around 130 are venture investors and 50 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 supporting early-stage and scale-up companies with nationally allocated grants, equity and loans and of successfully channeling scale-up funding from the EU Commission. In addition to 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 enterprise.

3.2 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 require little effort, most new Norwegian firms choose to establish as limited liability companies;[8] as such, they are required to submit

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

[8]We provide an overview of the relevant legal details of Norwegian business incorporation and shareholder agreements in Appendix A.

standardized financial statements (abbreviated or full)[9] prepared in accordance with Norwegian GAAP (or IFRS), independent of firm age or size, no later than eighteen months after their incorporation.[10] This practice implies that the resulting accounting information for even very small and very young firms conform to a common set of standards (see Mjøs and Selle, 2022). In addition, Norway, as one of the fewest countries (see the cross-country comparison in Breuer, 2021), imposed mandatory audits on all limited liability firms up until 2011 regardless of size or age, after which small limited liability firms could opt out from the audit if they stayed under a certain size threshold. The requirement of the production of GAAP financial statements has remained unchanged.

The digitalized process of collecting and storing the administrative data ensures its accuracy, resulting in 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.). 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, Nanda, and Wysocki (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 the overall reporting quality is lower, which is supported by the discussion in Alon, Haaland, and Røsok (2022).

[9] See e.g. Breuer (2021) for an overview of the full financial reporting requirement thresholds.

[10] The financial reporting requirement is based on the calendar year, so that **all** limited liability firms established before June 30^{th} of the respective year need to submit a full annual report including a balance sheet, a profit&loss statement and notes by the end of this first year of operation. Firms established after June 30^{th} provide the full annual report for the entire period since incorporation in the following year.

3.3 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*), which is allocated to all firms registered in Norway and to foreign institutional shareholders of these firms. This 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 statements data and business registry data, which contain all accounting and corporate information as well as with the patent data obtained from the Norwegian Patent Office.

4 Identifying Innovative Firms

4.1 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.) that have been incorporated

between 2004 and 2017. We remove financial services and real estate firms, newly formed subsidiaries of established companies, and holding structures. Table 1 shows that of the remaining 124,348 newly formed firms, a total of 975 received at least one investment from a professional venture investor and a partially overlapping set of 1,010 firms received a grant through Innovation Norway, described above. For our purposes, a professional venture investor includes 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 124,348 firms have growth aspirations or the intention to develop large-scale commercial innovation. As Hurst and Pugsley (2011) shows, most small business owners (in the U.S.) have no desire to grow, operating their businesses primarily for lifestyle purposes. In our sample, this is illustrated by the facts that 61,369 (49%) newly formed firms conduct no capital market transactions, either debt or equity, after incorporation and that the shares of only 26,561 (21%) firms are traded at least once in the secondary market during our sample period. 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. This procedure also helps with observability and measurement issues due to firms' ability to raise outside equity; these firms have become a subject of evaluation in value relevance studies in the recent years (see, e.g., specifically in this context, Hand, 2005; Armstrong, Davila, and Foster, 2006; Sievers, Mokwa, and Keienburg, 2013).

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-incorporatedd businesses. To adapt these insights to the Norwegian business context, we develop a series of flags that we use to

gauge a firm's likely innovation potential at the time that it first appears in the tax registry data. Although any one flag may have false negatives and false positives associated with it, by developing a series of flags to be applied together, our goal is to produce a robust measure of high innovation potential based on ex ante observable characteristics. Population counts associated with satisfying these flags are reported in Table 1.

Insert Table 1 here.

The first flag is whether the firm has an English-language firm name. A total of 35,200 firms, or approximately 28% 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 who intended 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 natural choice, 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 host 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 34,217 firms are started in one of these innovation hubs during our sample period.

The third flag tracks whether a firm operates in an innovative industry. We obtain 5-digit industry codes from Statistics Norway for the entire population of firms and then

apply negative selection to rule out industries with low innovation potential. We also exclude selected industries that are heavily regulated, that have high levels of public-sector involvement or ownership, or that are highly supported via taxes and/or subsidies. In such industries, we expect nonfinancial objectives and government policy to be especially important.[11] A share of 64% of the sample (over 79,000 firms) is included based on this industry flag.

The final flag tracks whether one of the company's nonexecutive board members lives far from the city in which the company resides. For this, we use a zipcode concordance and define "far" as a zipcode difference of 1,500 zipcode digits between the firm's address and the board member's address. This implies an average beeline distance of more than 300 kilometers. Far fewer firms (20,011, slightly above 16% of all firms) 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 potentially innovative firm if it satisfies any two flags, resulting in a HIP sample of 51,243 firms. This sample contains 87% of all firms that receive any VC funding in our data, and over 79% of the firms that receive some innovation-related governmental

[11] Excluded activities include: *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, direct services (e.g., hairdressers, for tourists, car rental, lawyers, maintenance, accountants, auditors, builders, plumbers, electricians, undertakers, taxis).*

grant funding.

4.2 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.

Insert Table 2 here.

Panel A focuses on future financing events. In particular, this panel show that each of these flags, either alone or taken as a group, is highly predictive of a firm's receiving VC investment or a innovation-related governmental grant. The set of four flags explains more than 10% of the variation in VC and government funding outcomes.

Panel B focuses on future milestones related to growth and innovation. The first part of Panel B focuses on patents as an outcome.[12] Firms with English names, firms in innovative industries, and firms with a geographically distant board member are much more likely to obtain a patent at some point in the sample period than firms without these flags. Being located in an innovation hub is less predictive: on its own, the indicator is significant only at the 10% level, while it becomes insignificant altogether when the other flags are included. These flags are also highly predictive of 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 firms versus those of the overall firm population. This angle is especially

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

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 paid out amounts through share sales or liquidation of shares. 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.

Insert Table 3 here.

Our HIP sample—that is, firms with any two flags—receive over 90% of the total equity capital invested in all businesses in Norway in our sample period. The 850 VC-backed firms with two flags comprise only 1.7% of all two-flag firms but garner over 23% 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 for supporting their investment.

4.3 Sample Description

Table 4 describes the equity transactions in our sample and 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 across our firm categories sorted by innovation potential. The sample firms selected into VC financing,

which represent a subsample of all HIP firms, have on average done four financing rounds, compared to 1.3 for non-innovative and 1.6 for all HIP firms. The average equity ratio (book value of equity divided by total assets a year before the equity transaction) of all categories of firms is approximately 30%. However, the marginal funding through equity capital raising is significantly larger for HIP firms at mean 15.6 MNOK (median 0.24 MNOK) and for firms selected into VC financing at mean 27.6 MNOK (median 2.5 MNOK) than for non-innovative firms, for which the mean is 2.2 MNOK (median 0.16 MNOK).

The valuations implied in these equity transactions show the same pattern: the mean market equity value of non-innovative firms following financing rounds is 4.9 MNOK (median 0.21 MNOK), and HIP firms are approximately four times more valuable, at 42.8 MNOK (median 0.5 MNOK), while the VC-backed firms are most valuable at an average of 99.8 MNOK (median 16.9 MNOK). The post-money valuation is 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. When firms innovate to grow, they need to raise more equity to fund investments to facilitate this growth, e.g., for R&D, market positioning, long-term assets and human resources.

Insert Table 4 here.

This is also evident from the historical accounting information, as HIP firms and firms selected into VC financing are larger. On average, non-innovative firms' total assets are 9.4 MNOK (median 1.3 MNOK) and those of HIP firms 38.7 MNOK (median 1.85 MNOK). Firms selected into VC financing are also the largest by historical accounting measures, with total assets of 93.0 MNOK (median 7.3 MNOK). As expected, all early-stage firms have low earnings, with the average earnings even for the non-innovative firms being only -0.1

MNOK (median 0.0 MNOK). The HIP firms have earnings of -2.5 MNOK (median -0.0 MNOK), while the firms selected into VC financing have significantly lowest earnings at -7.6 MNOK (median -1.1 MNOK). More specifically, these lower earnings imply more costs and investments relative to revenues in the innovative firm categories than in non-innovative firms. These statistics confirm that investors put a higher forward-looking valuation on innovative firms with expected profitable growth outlooks in spite of the firms' lower current earnings. Most firms' negative earnings also preclude using conventional price–earnings multiples in the valuation of the most innovative early-stage firms.

Column (3) should be considered a subsample of the firms in Column (2), as shown in Table 1. These firms were selected into VC financing and are the usual subjects of recent value relevance studies in this context (e.g., Hand, 2005; Armstrong, Davila, and Foster, 2006; Sievers, Mokwa, and Keienburg, 2013). However they are ex post selected firms, and together with the VC investment comes a higher number of equity transactions, larger equity amounts and higher valuations than their counterparts in the full sample of HIP firms. These firms are also larger, have raised more equity and had more expenses (more or larger investments) before the equity transactions. This emphasizes the selection bias prevalent in the literature based on samples of firms selected by VCs.

5 Empirical Results

5.1 Value Relevance of Accounting Information

5.1.1 Baseline Results

We estimate Equation 1 on the sample of firms with at least one financing round from which to observe a post-money valuation—there are 66,938 financing rounds in all newly

established operating firms, as described in Table 4. In addition, we require at least one year of accounting information before the financing round, a criterion that narrows our sample to 23,393 financing rounds. We scale all continuous valuation and accounting variables by the natural logarithm of the firm's total assets one year prior to valuation in attempt to account for the effect of firms' size differences.

The baseline results for three subsamples—non-innovative firms, HIP firms, and (ex post selected) VC-backed firms—are presented in Table 5. The dependent variable is the natural logarithm of the firm's pre-money valuation as discussed in Section 2. In Column (1), we include lagged retained and current earnings as covariates. While Column (2) introduces the cash-based component of the book value of equity cumulatively raised one year prior to the financing round, Column (3) combines both components and presents estimates of the value relevance of the disaggregated book value of equity. Column (4) evaluates the (mechanical) explanatory power of the current equity raised in the financing round, given its direct determination of the pre-money valuation. Column (5) combines all equity components.

The explanatory power of the disaggregated book value of equity is lower in innovative than in non-innovative firms; this means that the valuations of innovative firms are less predictable than those of non-innovative firms. This is consistent with innovative firms having high growth ambitions not captured by the lagged book value of equity. Retained and current earnings have an explanatory power of 17.2% for non-innovative firms, 18.0% for innovative firms, and 22.1% for VC-backed firms (Column (1)). Cumulative equity raised prior to the financing rounds explains 44.6% of the variation in valuations for non-innovative firms and 31.1% for innovative firms, but its explanatory power decreases to 10.6% for VC-backed firms (Column (2)). These results indicate that earnings reflect relatively more information than past fundraising for the most innovative firms. When we combine both components of the book value of equity in Column (3), the value relevance increases by

1.7 percentage points for non-innovative firms, 4.3 percentage points for HIP firms and 15.8 percentage points for the VC-backed firms. This indicates that the information in cumulative equity raised is captured by earnings to a large degree in non-innovative firms but to a lower degree in HIP firms and to a very small degree in the VC-backed firms.

Perhaps for mechanical reasons, the current round size shows high and relatively stable value relevance of 32%–38% among all firms in Column (4). However, its additional incremental power in Column (5) is 5.7 percentage points for non-innovative firms, 13.1 percentage points for HIP firms and 16.3 percentage points for VC-backed firms. This implies that information flowing with the currently raised equity is already partially contained in the lagged book value of equity—more so in non-innovative firms and to a smaller degree in innovative firms.

Current earnings provide information about unrecognized net assets and future earnings growth opportunities. Consistent with this, we observe that both current profits and losses carry larger, positive and significant coefficients for HIP firms than for the non-innovative firms. In contrast to the public market environment, where it is recognized that losses are temporary and not reflective of a firm's true economic performance (Hayn, 1995; Joos and Plesko, 2005), positive loadings on current losses represent a positive signal of a firm's future growth (consistent with findings in Armstrong, Davila, and Foster, 2006), and this signal is stronger than the profit signal in innovative firms, while the opposite is the case in non-innovative ones. This is consistent with losses representing resources spent on investing in future growth, which is more relevant for innovative firms—and even more so for firms selected into VC financing—than for non-innovative firms. Our results echo the findings in Gu, Lev, and Zhu (2023) that the earnings of firms reporting intangibles-driven losses are as relevant as the earnings of profitable firms.

Insert Table 5 here.

Given the null hypothesis that accounting information in early-stage entrepreneurial firms is irrelevant, an explanatory power of the lagged book value of equity disaggregated into earnings and contributed capital ranging from 26% (in VC-backed firms) to 46% (non-innovative firms) of the total variation in pre-money valuations is quite high. According to Collins, Maydew, and Weiss (1997), in public firms (with their longer history and less uncertainty), accounting information has explanatory power of 53.6%. The most recent paper, Barth, Li, and McClure (2023), with its more extensive sample, shows an ordinary least squares (OLS) in-sample R-squared only 7 percentage points higher (albeit with no separation between profits and losses) than ours. Core, Guay, and Van Buskirk (2003), who add disaggregated earnings information, have an average R-squared of 35% in high-tech (public) firms and 42% in young public firms. The elevated role of book value of equity (BVE) aligns—as extensively discussed in the literature in the public market setting—with the primary role of the balance sheet in providing information on the firm's liquidation values, which, together with the probability of default, affect equity values (see among others Collins, Maydew, and Weiss, 1997; Barth, Beaver, and Landsman, 1998). Our results depict the importance of liquidation preferences, which play a crucial role in venture contracting (Gornall and Strebulaev, 2020).

Figure 2 shows the incremental explanatory power from adding in accounting information together with capital raising data by replicating Table 5 by firm age group for firms two to three years old, four to five years old and six or more years old and by firm category (non-innovative, HIP and selected into VC-financing). An ex ante theoretical expectation is that the incremental R-squared should increase with firm age as earnings become more relevant because of more stable operations and better reporting processes, as well as selection through firm survival in 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 intensity of assets-in-place relative to future investment options in his sample of pre-IPO R&D-intensive biotech firms.

Our analyses by firm age and category show that earnings have incremental explanatory power for every age group, even if the magnitude varies across the subsamples. Over time (with higher firm age), we find that the incremental explanatory power is increasing for non-innovative 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 groups with age (ages six years and above). Independent of age, earnings have more explanatory power for VC-backed firms than for any other firms. A potential explanation for this outcome is that, when VC-backed firms mature, VC funds care more about firms' exit events and adjust 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, Davila, and Foster (2006), and Sievers, Mokwa, and Keienburg (2013).

Insert Figure 2 here.

5.1.2 Can Other Information Better Explain Early-Stage Valuations?

One might argue that, despite being nonzero, the incremental power of earnings in our baseline results, as shown in Table 5, is rather low. Thus, we follow this line of argument and investigate whether additional information helps to better explain early-stage valuations. The richness of our data allows us to address this question. We gradually include in the estimation of Equation 1 publicly observable (in Norway) and granular accounting information consisting of 18 additional financial statement variables[14], financing round, firm age,

[14]Revenues, non-operating income, personnel expenses, depreciation and write-offs, financial income, financial expenses, extraordinary income, extraordinary expenses, intangible assets, tangible assets, financial

industry classification and calendar year, as well as the privately observable lagged number of investors, lagged number of board members, patent applications and bank rating. Privately observable information will be available for investors who decide to participate in firms' financing rounds and are thus likely to impact the valuations in these transactions.

Table 6 shows the increment in explanatory power from our expanding Equation 1 by adding combinations of additional disaggregated accounting information and other firm characteristics. The results confirm that the disaggregated book value of equity with its explanatory power of 43%–52% already captures a great deal of the publicly and privately observable information. The combined explanatory power after we include all the additional (18 accounting and 8 non-accounting-related) variables increases by only 4.6 percentage points for non-innovative firms, 5.3 percentage points for HIP firms and 4.2 percentage points for VC-backed firms.

Insert Table 6 here.

Table 6 Panel A includes additional financial statement items before we add other firm characteristics. When we add only separate financial statement items, the explanatory power for non-innovative firms increases by 1.2 percentage points—approximately twice the increment from our adding earnings in Table 5. The level of power increases even more for HIP firms, by 1.8 percentage points compared to the initial 0.6 percentage points For VC-backed firms, the increase is more moderate at 0.9 percentage points from the already large increase of 2.9 percentage points shown for earnings.

In the next step, we add the publicly observable characteristics one by one and find that these, taken together, still incrementally increase the explanatory power: namely, by 2.3 percentage points for all firms except the VC-backed firms, for which the increment is

long-term assets, inventory, receivables, financial short-term assets, cash, provisions, long-term debt and short-term debt.

1.8 percentage points. This implies that publicly observable firm characteristics additionally capture part of the information that is incorporated in pre-money valuations but has not been incorporated in detailed accounting information. In the last part of Panel A, we also add the private observable characteristics assumed to be available to investors considering investing in the firm. These add slightly less power of 1.1 percentage points for non-innovative firms, 1.2 percentage points for HIP firms and 1.5 percentage points for VC-backed firms. This is information captured neither by accounting information nor by publicly available firm characteristics.

Table 6 Panel B takes the intuitive assumption that all potential investors have access to publicly observable firm characteristics. The explanatory power increases by 2.8 percentage points for non-innovative firms and by 3.3 percentage points for HIP firms but by only 2.1 percentage points for VC-backed firms. Our adding granular accounting information afterward effectively provides no additional power, except a marginal boost (0.3 percentage points) for non-innovative firms. Overall, these results suggest that inclusion of separate financial statement items, in addition to the disaggregated book value of equity, does not improve the explanatory power in valuations conditional on investors knowing publicly observable information and equity capital contributed to the firm in HIP firms. This implies that the additional granular accounting data carry information that is already contained in publicly observable firm characteristics. Our results contrast with the discussions in Barth, Li, and McClure (2023), Hand (2005) and Armstrong, Davila, and Foster (2006), who plead for the inclusion of more granular financial statement items and nonfinancial information related to both firm growth or firm intangibles in models estimating value relevance. Our results on the value relevance of aggregated accounting information 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)).

5.2 Accounting Information in the Financing Process

Table 5 shows 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 calculation, as outlined in Section 2. Subsequently, the question arises whether earnings capture any information that is also contained in the provided equity amounts in the first place. To explore this question, we replace the dependent variable in Equation 1 and estimate the following model:

$$\begin{aligned}\ln(\textit{Equity Amount}_{i,t}) = \alpha + \beta_1 \ln(\textit{Retained} * \textit{pos}_{i,t-2}) + \beta_2 \ln(\textit{Retained} * \textit{neg}_{i,t-2}) \\ + \beta_3 \ln(NI * \textit{pos}_{i,t-1}) + \beta_4 \ln(NI * \textit{neg}_{i,t-1}) + \epsilon_{i,t}.\end{aligned} \tag{2}$$

The outcome variable, $ln(\textit{Equity Amount}_{i,t})$, is the natural logarithm of either the current round size in t or cumulative equity raised in $t-1$. $\textit{Retained} * \textit{pos}_{i,t-2}$ ($\textit{Retained} * \textit{neg}_{i,t-2}$) 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 is zero otherwise. $NI * \textit{pos}_{i,t-1}$ ($NI * \textit{neg}_{i,t-1}$) 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 total assets one year prior to the valuation in attempt to account for the size effect on the provided equity amounts.

Table 7 presents the estimation results of Equation (2) for our firm subsamples. 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 the type of firm, implying that it is a direct implication of the decision to

provide financing itself. This, in turn, implies that a conventional value relevance model only partially reflects the importance of the book value of equity since information contained in the equity amounts raised, which are then translated into valuations, seems to determine earnings as well.

Insert Table 7 here.

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 5–6 cover only the third decision, i.e., the valuation. Table 7 suggests some evidence on the second decision. However, the two last decisions are conditional on the selection into financing made in the first place. We run a Heckman selection model to account for the fact that some firms receive additional financing and some firms simply do not (Heckman, 1979). For the selection model estimation, we base the model on the validation of our sampling procedure of HIP firms in Table 2 and rely on our four innovation flags to estimate firms' probability of receiving equity financing in each year. We apply two alternative specifications of our first-stage selection model:

$$\begin{aligned} Financing_{i,t} = \alpha + \beta_1 English_{i,0} + \beta_2 Innovative\ Industry_{i,0} + \beta_3 Innovation\ Hub_{i,0} \\ + \beta_4 Far\ Board\ Member_{i,0} + \beta_4 \ln(Cumulative\ equity\ raised_{t-1}) + \gamma_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{3a}$$

which follows the common presumption that fundraising ability is not a function of earnings,

or alternatively,

$$\begin{aligned} Financing_{i,t} = \alpha &+ \beta_1 English_{i,0} + \beta_2 Innovative\ Industry_{i,0} + \beta_3 Innovation\ Hub_{i,0} \\ &+ \beta_4 Far\ Board\ Member_{i,0} + \beta_5 \ln(Cumulative\ equity\ raised) \\ &+ \beta_6 \ln(Retained * pos_{i,t-2}) + \beta_7 \ln(Retained * neg_{i,t-2}) \\ &+ \beta_8 \ln(NI * pos_{i,t-1}) + \beta_9 \ln(NI * neg_{i,t-1}) + \gamma_{i,t} + \epsilon_{i,t}. \end{aligned} \tag{3b}$$

Following the suggestive evidence in Table 7, the alternative specification in Equation 3b accounts for the fact that selection into a financing round might also be a function of 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 both 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 8 reports the first-stage selection model estimation results in Columns (1)–(2), which represent Equations 3a and 3b, respectively. The explanatory power of our four flags, cumulative equity raised, firm age and calendar year in Column (1) is 22.5%. We obtain statistically significant coefficients on three of our innovation flags. The positive association of the indicator "innovation hub" with the decision to provide financing as shown in Table 2 is now absorbed by the calendar year, firm age and cumulative equity raised. The estimation in Column (2) shows that current and retained earnings have an incremental explanatory power of 2.1 percentage points, implying that earnings bear information relevant for the selection-into-financing decision.

Insert Table 8 here.

Table 8 Columns (3)–(6) present the second-stage outcome model estimation results,

addressing the amount of capital raised and the pre-money valuation in the fundraising transaction. The dependent variable in the second-stage outcome model in Columns (3)–(4) is the natural logarithm of the current round size following Equation 2. The dependent variable in Columns (5) and (6) is the natural logarithm of the pre-money valuation following Equation 1. We use the inverse Mills ratios from the two alternative first-stage models to instrument for the selection effects. The coefficients of the Mills ratios are large in magnitude and statistically significant in all second-stage estimations, confirming that selection is an issue in the value relevance estimations. The decision to select into financing matters for amount of equity capital raised, with second-stage explanatory power of 35.2% without including earnings information. When we add the latter in Column (4), the power increases by 2.9 percentage points to 38.1%, compared to approximately 25% in Table 7. In addition, we observe a higher value relevance of earnings information in the second stage than in the endogenous baseline results. Particularly, the increment in explanatory power is 1.1 percentage points from including earnings information in the estimation in Column (6). Our results imply that information contained in earnings is relevant for every step of the financing process and reflects relatively more the financing decisions themselves than the valuations.

In additional analyses, we analyse whether the relevance of earnings information in the early-stage financing process varies with investor type given expected differences in access to information and, thus, the magnitude of exposure to information asymmetries. We run the estimations presented in Table 8 for the following investor categories: founders, directors, other individual investors, corporate investors, venture capitalists and foreign investors. The increments in power from the addition of earnings information to the first-stage selection and second-stage outcome models are summarized in Appendix Table B3. We find that for the selection into financing the information contained in earnings is more relevant for the corporate investor categories than for the individual investors. With regard to the invested

equity amounts, earnings information reflects most for those investors expected to be most exposed to information asymmetry, i.e., other individuals (8.1 percentage points) and foreign investors (17.2 percentage points). We find the same pattern when estimating the value relevance of earnings information.

6 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 indicators observable at the firm's founding that can predict 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 being 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 assess soft, qualitative information when making early-stage investment decisions, we find that accounting numbers reflect information which is relevant both for explaining *whether* a firm receives funding and the provided equity financing amount, and for understanding the valuation implied by the funding round. We show that the lagged book value of equity, disaggregated into earnings and contributed capital captures, explains approximately 26%–46% of the total variation in valuations in financing rounds. Further publicly or privately observable firm characteristics do not provide additional significant explanatory power. 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 their business ideas are. We find that accounting information has explanatory power for market valuations even in highly uncertain, highly innovative settings, in which investing based on "gut feeling" may be the norm. Because accounting information provides better understanding of early-stage financing and valuations decisions, its availability would 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 over the time period between 2007 and 2018.

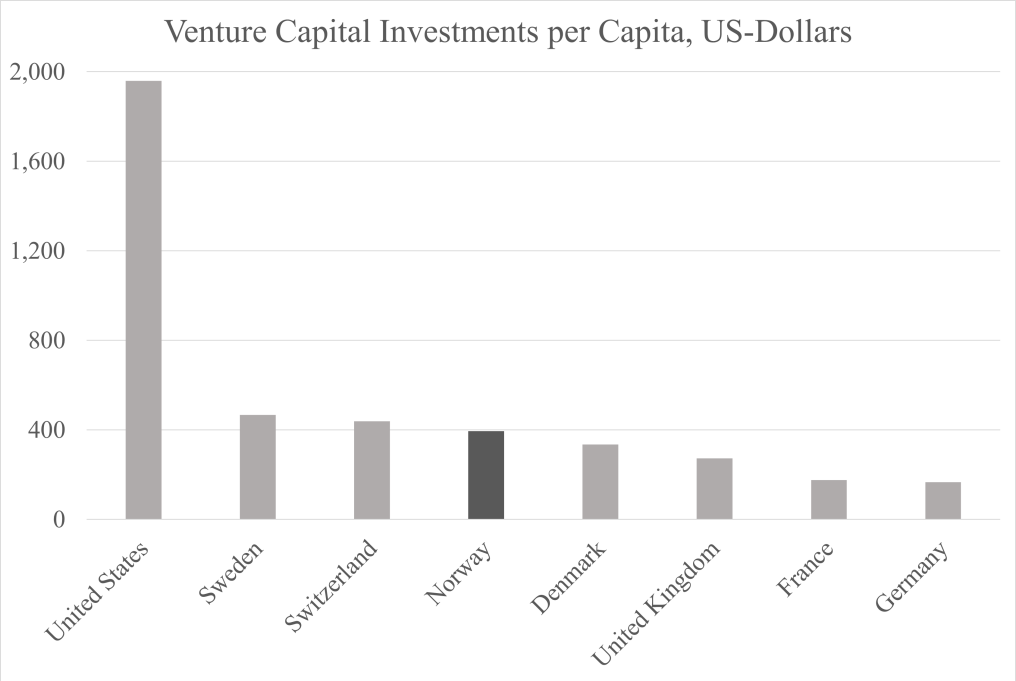

Figure 2: **Evolution of Incremental Explanatory Power**

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

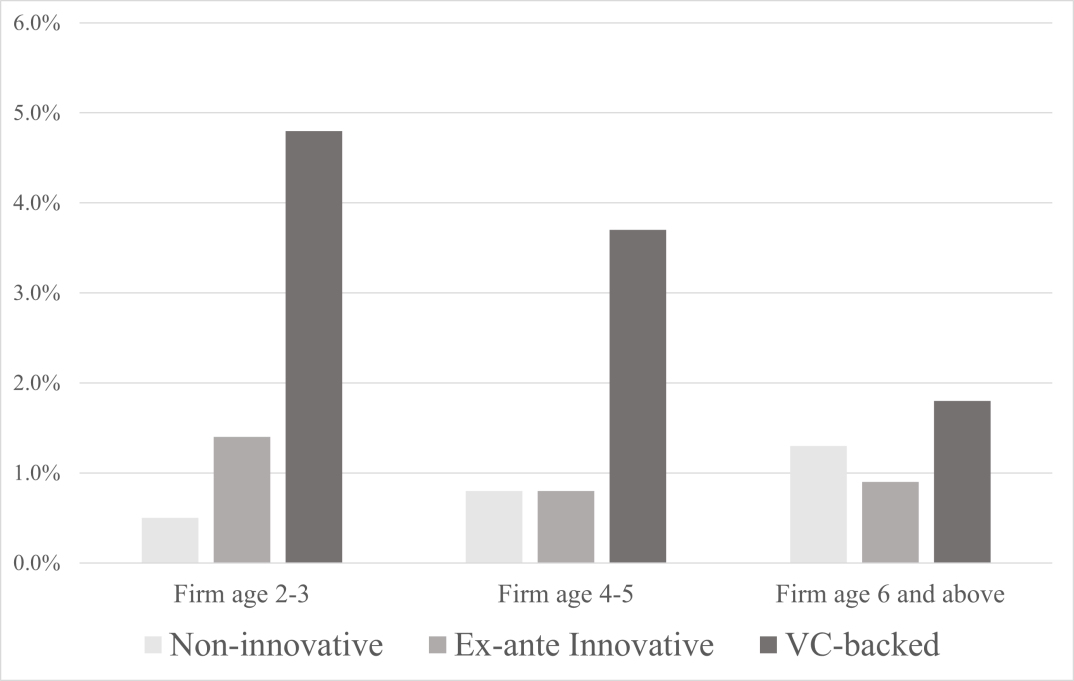

Table 1: Sample Construction

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, and holding company structures. Panel B describes our process for identifying the subsample of firms that have a high propensity to engage in innovation based on ex ante observable characteristics. Thus, we flag firms based on four 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, operating in a potentially innovative industry, 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	
Population of newly established operating firms: (A)	**124,348**	100.00%
of which receiving a bank loan:	39,041	31.40%
of which at least one equity financing round:	29,104	23.41%
of which at least one secondary trade:	26,561	21.36%
of which no capital market transactions:	61,369	49.35%
***of which at least one VC investment:* (B)**	975	0.78%
***of which at least one governmental innovation grant:* (C)**	1,010	0.81%

Panel B: Ex Ante Innovation Flags	Firms	% of (A)
English name	35,200	28.31%
Located in an innovation hub (Oslo, Bergen, Stavanger, Trondheim)	34,217	27.52%
Operating in a potentially innovative industry	79,196	63.69%
At least one board member who lives far from the firm	20,011	16.09%

Panel C: High Innovation Potential (HIP) Firms	Firms	% of Baseline
Any two ex ante innovation flags	51,243	41.21% of (A)
. . . and received at least one VC investment	850	87.18% of (B)
. . . and received at least one governmental innovation grant	802	79.41% 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 four flags used to define our high innovation potential sample. In Panel A, the dependent variables are indicator variables for receiving 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)	1.381***				1.013***	1.412***				1.149***
	[0.066]				[0.068]	[0.065]				[0.067]
Innovation hub (1/0)		1.256***			0.943***		0.464***			0.157*
		[0.065]			[0.067]		[0.066]			[0.067]
Innovative industry (1/0)			1.997***		1.679***			2.227***		1.980***
			[0.122]		[0.124]			[0.130]		[0.131]
Distant board member (1/0)				1.348***	1.037***				0.838***	0.584***
				[0.068]	[0.071]				[0.068]	[0.070]
Observations	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348
Pseudo R-squared	5.2%	4.5%	5.3%	4.4%	12.2%	7.5%	3.8%	8.1%	4.6%	11.8%

Panel B: Predicting Future Firm Outcomes

	Patent Application (1/0)						Value-Creating Firm Exit (1/0)				4-Year Revenue Growth				
English name (1/0)	1.434***				1.226***	0.281***				0.191***	1.970***				1.612***
	[0.067]				[0.068]	[0.023]				[0.024]	[0.256]				[0.261]
Innovation hub (1/0)		0.169*			-0.132		0.242***			0.143***		1.379***			0.971***
		[0.070]			[0.071]		[0.023]			[0.024]		[0.243]			[0.245]
Innovative industry (1/0)			2.029***		1.798***			0.191***		0.103***			0.944***		0.531**
			[0.124]		[0.126]			[0.022]		[0.023]			[0.196]		[0.199]
Distant board member (1/0)				0.747***	0.527***				0.682***	0.635***				1.971***	1.626***
				[0.072]	[0.073]				[0.024]	[0.024]				[0.290]	[0.292]
Observations	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348	124,348	47,846	47,846	47,846	47,846	47,846
(Pseudo) R-squared	5.4%	1.3%	5.3%	2.1%	9.0%	8.4%	8.3%	8.3%	9.3%	9.5%	0.3%	0.2%	0.1%	0.2%	0.4%

Table 3: Total Capital in Private Capital Market

Table 3 shows the distribution of total capital invested in and paid out from our sample of newly established operating companies, denoted category (A) in Table 1. Amounts are reported in thousands 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 amount 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	124,348	51,243		*850*	
		41.2% of Total		*1.7% of Sample*	
Total amount:					
Invested in financing rounds	139,938	126,195	*90.2 %*	29,526	*23.4 %*
Invested in secondary trades	25,030	21,022	*84.0 %*	5,496	*26.1 %*
Paid out through share sales	24,872	20,604	*82.8 %*	5,149	*25.0 %*
Paid out through liquidation of shares	3,810	3,492	*91.7 %*	685	*19.6 %*
Historical value of untraded shares	70,683	58,928	*83.4 %*	12,200	*20.7 %*
Current value of untraded shares	160,421	143,005	*89.1 %*	9,111	*6.4 %*

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) by the subsamples of HIP firms as defined in Table 1 Panel C, the residual category of potentially non-innovative firms, and VC-backed firms, i.e., firms that ex post are selected into financing by venture capital investors. The table describes raised equity amounts, round statistics and valuations in financing rounds and trades and valuations in 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-innovative Firms (1)	HIP Firms (2)	VC-Backed Firms (3)
Transaction information			
N of firms with at least one financing round	27,618	20,311	902
N of financing rounds	35,164	31,774	3,618
Average number of financing rounds	1.3	1.6	4.0
Average firm age at first financing	1.2	1.3	1.5
Average round size	2.19	15.62	27.55
Median round size	0.16	0.24	2.54
Average post-money valuation	4.94	42.84	99.80
Median post-money valuation	0.21	0.50	16.87
N of firms with at least one secondary trade	14,080	12,481	625
N of secondary trades	22,977	24,547	1,858
Average number of secondary trades	1.6	2.0	3.0
Average secondary valuation	3.86	47.06	101.10
Median secondary valuation	0.33	0.60	12.91
Accounting information at t-1			
N of observations	26,844	30,476	3,843
Average total assets	9.35	38.71	93.02
Median total assets	1.30	1.85	7.30
Average book value of equity	2.82	11.36	33.28
Median book value of equity	0.17	0.32	3.11
Average earnings	-0.09	-2.53	-7.57
Median earnings	0.00	-0.03	-1.11

Table 5: Value Relevance of Accounting Information in Financing Rounds

Table 5 reports the estimation results from the log-linear regression model presented in Equation 1. 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.

	Non-innovative Firms					HIP firms					VC-Backed Firms				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Positive retained earnings	0.020***		0.017***		0.022***	0.015***		0.015***		0.022***	-0.006		-0.001		0.015**
	(0.005)		(0.004)		(0.004)	(0.004)		(0.004)		(0.003)	(0.008)		(0.008)		(0.007)
Negative retained earnings	0.019***		-0.012***		-0.009***	0.024***		-0.016***		-0.004	0.007		-0.014*		0.003
	(0.004)		(0.003)		(0.003)	(0.004)		(0.004)		(0.003)	(0.008)		(0.008)		(0.007)
Current profit	0.190***		0.076***		0.019***	0.178***		0.119***		0.022***	0.232***		0.222***		0.095***
	(0.012)		(0.008)		(0.007)	(0.011)		(0.007)		(0.006)	(0.018)		(0.017)		(0.016)
Current loss	0.220***		0.072***		0.013*	0.230***		0.123***		0.026***	0.227***		0.198***		0.085***
	(0.011)		(0.008)		(0.007)	(0.010)		(0.007)		(0.006)	(0.016)		(0.016)		(0.016)
Cumulative equity raised		0.864***	0.806***		0.667***		0.771***	0.671***		0.485***		0.490***	0.360***		0.316***
		(0.017)	(0.018)		(0.018)		(0.018)	(0.017)		(0.015)		(0.043)	(0.040)		(0.033)
Current round size				0.636***	0.333***				0.674***	0.479***				0.561***	0.444***
				(0.016)	(0.017)				(0.013)	(0.013)				(0.029)	(0.034)
Observations	8,830	8,830	8,830	8,830	8,830	12,028	12,028	12,028	12,028	12,028	2,535	2,535	2,535	2,535	2,535
R-squared	17.2%	44.6%	46.3%	32.2%	52.0%	18.0%	31.1%	35.4%	37.8%	48.5%	22.1%	10.6%	26.4%	34.4%	42.7%
Incremental R-squared															
Earnings			1.7%					4.3%					15.8%		
Current round size					5.7%					13.1%					16.3%

Table 6: Can More Data Better Explain Early-Stage Valuations?

Table 6 Panels A and B report the incremental R-squared after we run the log-linear regression model presented in Equation 1 and reported in Table 5 but gradually also include 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 other publicly and privately observable firm characteristics. Panel B conditions on investors' knowing publicly observable firm characteristics before granular accounting information is included.

	R-squared		
	Non-innovative Firms	HIP Firms	VC-Backed Firms
Panel A:			
Disaggregated book value of equity (Table 5)	52.0%	48.5%	42.7%
+18 Financial statement items	1.2%	1.8%	0.9%
Publicly observable characteristics			
+ Financing round	1.4%	1.0%	0.1%
+ Firm age	0.0%	0.0%	0.4%
+ Industry	0.5%	0.5%	0.5%
+ Calendar year	0.4%	0.8%	0.8%
$\sum$ *Additional explanatory power*	2.3%	2.3%	1.8%
Privately observable characteristics			
+ Pre-round number of investors	0.9%	0.8%	0.8%
+ Pre-round number of board members	0.0%	0.0%	0.0%
+ Number of patent applications	0.0%	0.1%	0.1%
+ Bank rating	0.2%	0.3%	0.6%
$\sum$ *Additional explanatory power*	1.1%	1.2%	1.5%
Panel B:			
Disaggregated book value of equity (Table 5)	52.0%	48.5%	42.7%
Publicly observable characteristics			
+ Financing round	1.7%	1.5%	0.1%
+ Firm age	0.0%	0.0%	0.4%
+ Industry	0.7%	0.8%	0.7%
+ Calendar year	0.4%	1.0%	0.9%
$\sum$ *Additional explanatory power*	2.8%	3.3%	2.1%
+18 Financial statement items	0.3%	0.0%	-0.2%

Table 7: Do Raised Equity Amounts Contain Accounting Information?

Table 7 reports the estimation results from the log-linear regression model in Equation 2. 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.

	Non-innovative		HIP		VC-Backed	
Equity capital raised	Cumulative	Current	Cumulative	Current	Cumulative	Current
	(1)	(2)	(3)	(4)	(5)	(6)
Positive retained earnings	0.003	-0.014***	0.000	-0.015***	-0.013**	-0.038***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.009)
Negative retained earnings	0.039***	0.006	0.059***	-0.002	0.057***	-0.033***
	(0.003)	(0.004)	(0.003)	(0.004)	(0.006)	(0.008)
Current profit	0.142***	0.229***	0.089***	0.236***	0.029**	0.289***
	(0.011)	(0.012)	(0.010)	(0.011)	(0.013)	(0.021)
Current loss	0.183***	0.256***	0.158***	0.264***	0.081***	0.262***
	(0.010)	(0.011)	(0.009)	(0.010)	(0.012)	(0.019)
Observations	8,830	8,830	12,028	12,028	2,535	2,535
R-squared	24.7%	26.0%	26.2%	24.2%	24.7%	24.3%

Table 8: Heckman Selection Model of Financing

Table 8 presents the first- and second-stage estimates of the Heckman selection model as specified in Equations 3a and 3b (first-stage selection models 1 and 2) and Equations 2 and 1 (second-stage outcome models). Column (1) corresponds to Equation 3a 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) corresponds to the full specification of the selection model as shown in Equation 3b and selects firms into a financing round by any investor based additionally on the information contained in earnings. Columns (3)–(6) present the second-stage estimations after we correct for the first-stage selection models in Columns (1) and (2), 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. The selection estimations in Columns (1) and (2) include firm age and calendar year fixed effects. 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			
Outcome Variable:	Financing Event		Current Round Size		Pre-money Valuation	
	(1)	(2)	(3)	(4)	(5)	(6)
Inverse Mills ratio			2.675***	1.686***	-1.206***	-1.794***
			(0.069)	(0.096)	(0.059)	(0.077)
English name (1/0)	0.144***	0.126***				
	(0.006)	(0.006)				
Innovative industry (1/0)	0.105***	0.102***				
	(0.006)	(0.006)				
Innovation hub (1/0)	0.001	0.000				
	(0.006)	(0.006)				
Distant board member (1/0)	0.221***	0.195***				
	(0.007)	(0.007)				
Cumulative equity raised	0.084***	0.061***	0.702***	0.505***	0.495***	0.475***
	(0.003)	(0.003)	(0.014)	(0.015)	(0.012)	(0.013)
Positive retained earnings		0.003***		-0.002		0.037***
		(0.001)		(0.003)		(0.003)
Negative retained earnings		0.021***		0.014***		-0.020***
		(0.001)		(0.003)		(0.003)
Current profit		-0.023***		0.078***		0.091***
		(0.001)		(0.009)		(0.006)
Current loss		0.027***		0.166***		0.007
		(0.001)		(0.006)		(0.005)
Current round size					0.493***	0.463***
					(0.010)	(0.011)
Observations	701,974	701,974	20,858	20,858	20,858	20,858
Selection model	1	2	1	2	1	2
(Pseudo) R-squared	22.5%	24.6%	35.2%	38.1%	51.5%	52.6%
Incremental R-squared		2.1%		2.9%		1.1%

A Legal Overview for Shareholders 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 are certain real estate or shipping startups for asset-related tax reasons, but these are excluded from our sample. In both cases, 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.[15] The minimum share capital of an AS is 30,000 Norwegian kroner (approximately 4,700 U.S.$), while the minimum share capital of an ASA is 1,000,000 Norwegian kroner (app. 156,000 U.S.$).

In firms attracting 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 due to 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 through 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 shares have equal rights—i.e., they carry equal rights

[15] See https://www.brreg.no/en/limited-company/.

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 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, a variation in purchase prices may likely reflect 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 end-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.[16] 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.[17] Individual shareholders in a bankrupt firm obtain a tax-deductible loss equivalent to realizing their shares at zero value.

[16]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.

[17]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 Shareholders' 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 shareholders' agreements across jurisdictions. Source: J. Woxholth: *Aksjonæravtaler*.

B Additional Tables

Table B1: Exit Outcomes for HIP firms

Table B1 shows the distribution of exit events of all HIP firms as shown in Table 1 Panel C, broken down by the source of financing that they received. Exit categories include independently operating (unliquidated), bankrupt, (partially) liquidated, merged, acquired and IPO'd. The source of financing is either governmental innovation-related grant funding, VC funding, both, or other financing sources. 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.

	All HIP	*Financing source:*			
	Firms	Gov't Grant	VC-Backed	Both	Other
Number of firms	51,243	597	645	205	49,796
Independently operating (unliquidated)	67.2%	64.7%	53.0%	67.3%	67.4%
Bankruptcy	11.1%	6.4%	6.0%	5.4%	11.2%
(Partial) Liquidation	11.5%	3.5%	12.2%	4.9%	11.6%
Merger	3.5%	5.2%	9.1%	3.9%	3.4%
Full acquisition ($> 90\%$)	6.6%	19.9%	17.4%	15.1%	6.3%
IPO	0.1%	0.3%	2.2%	3.4%	0.0%

Table B2: Value Relevance of Accounting Information in Secondary Trades

Table B2 reports the estimation results from running the adjusted log-linear regression model presented in Equation 1 on 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.

	Non-innovative Firms			HIP firms			VC-Backed Firms		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Positive retained earnings	0.027***		0.027***	0.019***		0.020***	-0.009		-0.014
	(0.003)		(0.002)	(0.004)		(0.003)	(0.013)		(0.013)
Negative retained earnings	0.028***		0.005**	0.031***		0.002	-0.013		-0.040***
	(0.003)		(0.002)	(0.004)		(0.003)	(0.012)		(0.012)
Current profit	0.145***		0.075***	0.147***		0.086***	0.170***		0.166***
	(0.009)		(0.006)	(0.011)		(0.007)	(0.028)		(0.026)
Current loss	0.157***		0.051***	0.197***		0.077***	0.198***		0.157***
	(0.008)		(0.007)	(0.010)		(0.006)	(0.025)		(0.022)
Cumulative equity raised		0.562***	0.544***		0.630***	0.571***		0.507***	0.447***
		(0.014)	(0.013)		(0.016)	(0.014)		(0.058)	(0.054)
Observations	18,483	18,483	18,483	19,242	19,242	19,242	1,490	1,490	1,490
R-squared	13.2%	29.6%	33.0%	19.3%	35.0%	37.7%	14.8%	14.5%	22.9%
Incremental R-squared			3.4%			2.7%			8.4%

Table B3: Importance of Accounting Information for Different Investors

Table B3 presents the incremental R-squared from our replicating the Heckman selection model as presented in Table 8 by different investor types providing equity to early-stage firms: individual investors (which include founders, directors and other individuals), corporate investors, venture capitalists 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. All specifications include firm age and calendar year fixed effects. 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.

	Individual Investors			Corporate	Venture	Foreign
	Founders	Directors	Other	Investors	Capitalists	Investors
	(1)	(2)	(3)	(4)	(5)	(6)
Selection model						
Outcome variable: Financing event	1.8%	1.1%	1.8%	2.4%	3.2%	2.3%
Outcome model						
Outcome variable: Current round size	5.8%	6.6%	8.1%	4.4%	8.2%	17.2%
Outcome variable: Pre-money valuation	5.8%	3.5%	11.0%	0.0%	0.9%	2.5%