The Decisions to not Apply for Finance – who and why?

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1. Introduction

Through their decisions about the allocation of capital financial institutions such as banks, venture capital firms, and stock markets represent a major external ex-ante selection device that every firm and project must face. Even if a range of new funding sources emerged recently (Mac an Bhaird et al., 2019) imperfections at the financial markets may still cause financial gaps. For example, Martinez-Cillero et al. (2020) find that financial constraints cause Irish SMEs to have an investment level 55% lower than suggested by economic fundamentals alone, indicating substantial market failures. Causes for market failures have often been ascribed to information asymmetries, most studies pointing to the difficulties for financiers to reveal the true nature of firms' financing applications. However, information deficiencies also exist on the demand side, leading to self-selection from the market for finance. Hence, the fear of rejection may discourage firms or, more specifically, their leaders (entrepreneurs, managers), from entering the credit application process in the first place, despite an unfulfilled desire for additional finance (Tang et al., 2017; Xiang et al., 2014; Freel et al., 2012; Kon and Storey, 2003). In the literature, these entrepreneurs and firms are termed "discouraged borrowers."¹

This fear of rejection may or may not be justified. In a case where the credit application would have been turned down anyway, discouragement represents an effective self-constraining mechanism, and these firms are characterized as "appropriate discouraged borrowers" (Freel et al., 2012). In the case of firms that would have been accepted in the loan market² but did not enter due to discouragement, an "inappropriate discouraged borrower" situation occurs. Reasons for decisions to apply or not are subjective in nature and are rooted in the entrepreneurs' or firms' perceptions of their performance, application costs, and their perceptions of banks' evaluation criteria (Kon and Storey, 2003). This subjective evaluation thus relates not only to how firm managers end entrepreneurs perceive the future economic performance of their firm but also to how convincingly they think they can convey this information to bank managers and how it is aligned with (perceived) lending criteria.

In this article, we test to what extent the self-perception of entrepreneurs regarding their firms' past and future development influences the likelihood of them being discouraged from entering the capital markets. Further, we relate discouragement to the extent and type of the firms' innovation activities. In doing so, we follow Freel et al. (2007, 2012) in attempting to identify discouraged borrowers, but contribute to existing knowledge in this field by including other variables than those traditionally used to characterize discouraged firms. We include variables such as age, size, and industry, but also types of innovation and entrepreneurs' perception of prospects of the firm and the purpose of the finance they need (investments or working capital). We therefore shed new light on the strategic decision-making of entrepreneurs regarding financing their ventures. The bulk of the literature on discouraged borrowers focuses on either identifying the characteristics of firms that are more likely to be discouraged or on the extent of discouraged borrowers, while there is much less understanding of the reasons for discouragement.

By contributing the first Danish study on discouraged borrowers, our research responds to calls for further empirical work on the extent and scale of the phenomenon made by Kon and Storey (2003) and Chakraverty and Xiang (2013). Chakraverty and Xiang in particular call for additional studies to be conducted in Western European countries after the onset of the financial crisis, echoing quests for more research on the role of context (Wright et al., 2016, Bertoni et al., 2019, Mol-Gómez-Vazquez et al., 2022, Anastasiou et al., 2022, Khan et al., 2021). In addition to new empirical insights, and relating these to context, we provide new elements and directions toward a more developed theory of discouraged borrowers that acknowledge that the decision to apply for credit or not is essentially a strategic, individual-/team-level issue.

We use data from two waves of a survey on discouraged borrowers in Denmark, in which we asked firms specifically about the discouraged borrower phenomenon and their financial needs. This represents an unbalanced panel, including 702 observations of 497 unique firms. We deploy a probit model with endogenous selection to identify in two stages respectively demand for external finance and discouragement to apply for finance.

We find firm characteristics to have little predictive power in explaining the phenomenon of discouraged borrowers. In contrast, self-perceived pessimism regarding the firm's financial performance, as well as high levels of radical innovation activity are both significant predictors of discouragement. We furthermore find that the firms that believe in their long-term prospects and therefore invest in capacity-building are less discouraged to apply for finance. However, this effect from innovation is moderated by the firm's optimism regarding its current and future

performance. We find that the share of discouraged borrowers in Denmark is roughly on par with those found in other European countries.

The remainder of the paper is structured as follows. In section 2, we survey selected parts of the existing literature on discouraged borrowers to identify the gaps in the literature that guide our empirical investigation. In section 3, we develop our hypotheses. The data and variables are elaborated on in section 4. The empirical strategy and results are unfolded in section 5. In section 6 we discuss the results against knowledge on entrepreneurial decision making before concluding and pointing to implications for entrepreneurs, financial institutions, policy, and research.

2. Theoretical Background

Asymmetric information and adverse selection problems have repeatedly been acknowledged by scholars as a foundation for explaining obstacles for smoothly operating financial markets. This discussion has mainly concerned firms that are directly rationed by financial institutions, which either reject their loan applications or increase their risk premiums, especially for certain types of firms. The demand is taken as given in these discussions. That is, firms will demand credit, and articulate this demand, although access to it may be restricted. When assuming all credit demand is articulated in the market, the screening procedures can be optimized over time. The literature on discouraged borrowers challenges this common assumption, as it recognizes that not only financiers may restrict the demand, but also firms themselves.

A discouraged borrower is defined by Kon and Storey (2003) as "*a good firm, requiring finance that chooses not to apply to the bank because it feels its application will be rejected*" (p. 47). In their model, discouragement is influenced by (i) screening errors made by the bank, (ii) scale of application costs, and (iii) an interest rate differential between the loan and alternative sources of finance. Among their propositions is the idea that the level of discouraged borrowers is likely to vary between different countries, as subsequently studied by, for example, Popov (2013) and Chakraverty and Xiang (2013).

The literature on discouraged borrowers is quite young and has therefore only recently started to receive attention from academics. Discouraged borrowers may potentially be a significant problem if they make up a non-negligible share of the firms. Ferrando and Mulier (2022) find that 40% of firms in their sample of representative firms in need of external credit in 9 euro area countries would have been granted a loan had they applied. Using data from the United States national survey of small businesses, Levenson and Willard (2000) found that there were twice as many businesses with an unfulfilled desire for credit compared to those that applied for a loan and were rejected (see comparable estimates in e.g. Freel et al., 2012). Nearly half of all the small firms in the sample in a study by Cavalluzzo et al. (2002) claim they needed finance but did not apply for fear of rejection. Financial characteristics and credit history were found to affect the level of discouragement (also Drakos and Giannakopoulos, 2018). The choice to not apply for finance on the formal credit market may cause firms to seek to fulfill their demand at the informal market (Nguyen et al., 2022).

The extent of discouraged borrowers in different economies has been investigated through independent surveys, rendering difficulties comparing results, but in recent years the EU SAFE-data has provided harmonized survey results. Using the SAFE-data Drakos and Giannakopoulos (2018) an average of 17% discouraged firms, and Mol-Gómez-Vazquez et al., (2022) find 18%.

There is evidence (ibid., Anastasiou et al., 2022) that variance across countries in EU is substantial. According to Mollik et al. (2022) World Bank data indicate that 12% of firms are discouraged borrowers across the 139 countries in the data base. Also, different studies operationalize 'discouraged borrowers' differently, as overviewed in Brown et al., (2022). Generally, across all studies, the level of discouragement is likely underestimated because most empirical studies are done on established firms and therefore fail to encompass the share of nascent start-ups that never become established due to being discouraged from applying for start-up finance.

Going beyond Europe, Chakraverty and Xiang (2013) studied discouraged borrowers in 10 developing countries. Using World Bank survey data, they found that characteristics of firms matter as larger, older firms are less likely to be discouraged. This is influenced by the level of competition in the economy and by the strength of relationships between firms and financial institutions (also Gama et al., 2017 on 29 Eastern European and Central Asian countries, Mallik et al., 2022). The reason why a stronger relationship to banks decreases discouragement is that they increase not only goodwill between firms and banks but also firms' knowledge of lending criteria and their sense of realistic proposals and requirements for applications. This in turn affects the extent to which firms are more likely to misjudge the capital markets' valuation of their applications. Therefore, some of the reasons for variations between countries in the level of discouraged borrowers may be explained by differences in capital market traditions (Berger et al., 2001; Brancati, 2015; Tang et al., 2017, Bertoni et al. 2019).

Fastenbauer and Robson (2014) found in one of the few qualitative studies on discouraged borrowers that strong relationships with banks increases "appropriate discouragement," since firms in these cases are already aware of if they qualify for credit in advance of a formal application (see also Rostamkalaei et al., 2020).

Generally, earlier studies report that discouragement is more likely in firms that are (i) young, (ii) small, (iii) knowledge-based, (iv) operating in competitive markets, and (v) maintaining fewer and weaker relationships with banks. However, there is both some disagreement on these features and indications of differences according to the institutional context. The empirical evidence on the impact of age of the firms is, for example, relatively more mixed than that of firm size. Examples can be found in studies showing positive, negative, no effect from age on the likelihood of discouragement (Ferrando and Mulier, 2015a; Rostamkalaei et al., 2020), and age of firms has also been found to have a non-linear correlation with discouragement (Kallandranis and Drakos, 2021) as has the relationship with size (Mallik et al., 2022). The literature has been very sparse on linking borrower discouragement and innovation, which is therefore incorporated in our study.

3. Hypotheses Development

Based upon the above account of earlier literature and gaps therein, we develop four hypotheses for our own analyses. Prior literature points out that both young and small firms are likely to show a higher tendency to be discouraged (Chakraverty & Xiang, 2013; Freel et al., 2012; Cavalluzzo et al., 2002; Han et al., 2009; Drakos and Giannakopoulos, 2018). There are at least three possible reasons for such firms to show a higher propensity to not enter the credit application process. First, small, young firms recognize that their relatively high asymmetric

information hampers the ability of financiers to assess their creditworthiness correctly (Berger et al., 2001). Second, small, young firms are most often relatively inexperienced with the process of sourcing external capital and have limited track records, collateral, and reputational capital. Therefore, they face relatively higher application costs. Third, small, young firms experience a lack of confidence due to a large power differential between firm and financier. We consequently pose Hypothesis 1 below. This hypothesis is not at all new in the literature, but as mentioned above there are mixed results from different studies. Moreover, we include it because we are interested in the interaction with, and relative importance of the characteristics revealed through the analysis of hypothesis 1 and the behavioural variables included in subsequent analyses.

Hypothesis 1:

Young and/or small firms will show a higher likelihood of being discouraged from applying for external finance.

Financial discouragements may stem from the entrepreneur's subjective perception that credit would not be granted and that even if it was available, the firm would then be unable to cover the costs and terms. In turn, these beliefs, originate from the firm's knowledge of bank lending criteria and practices (Kon and Storey, 2003; Freel et al., 2012) as well as from the level of confidence in the ability of the management team to convey the information and expectations regarding the prospects of the firm in a convincing manner. Therefore, discouragement is related to the projected and past economic development of the firm. Firms presume that banks prefer to finance firms in good economic standing (Ferrando and Mulier, 2015a; Tang et al., 2017, Drakos and Giannakopoulos, 2018). Earlier literature has established that entrepreneurs are generally (over-) optimistic about their prospects (Baron, 1998, Zhang and Cueto, 2017), which is, in turn, known to banks. Even so, the opinions regarding future development are likely to impact decisions to apply or not.

Hypothesis 2:

A firm's likelihood of being discouraged from applying for finance decreases in the case of a positive self-assessed perception of its current and expected future economic performance and increases in the case of a negative perception and expectations.

Presumably, discouragement only occurs in the absence of documentation and accounting transparency that allows firms to convincingly prove the economic performance and projections to external financiers (Kon and Storey, 2003).³ Such transparency is influenced by characteristics of the firms as small and/or young firms display higher asymmetric information and have more difficulties demonstrating their likelihood of success. The fact that they are more often dependent upon a single or a few products adds to the uncertainty, in turn, the anticipated reluctance among financiers to finance their business. Thus, even well-performing small, young firms might realize that the asymmetric information problem caused by their high financial opacity (Berger et al., 2001) will prevent them from gaining access to external finance. We therefore expect the efficiency of financial discouragement as a self-constraining mechanism to be weaker for small and young firms and posit that:

HYPOTHESIS 3A:

The relationship between a firms' self-assessed performance and the likelihood of being discouraged is moderated by its size and age, such that the relationship is weaker for small and young firms.

Somewhat similar arguments may be put forward regarding whether firms are innovative. It could be questioned whether or not financiers view firms' innovation activities positively or not, but surely the uncertainty related to innovation adds to the difficulties in correctly assessing the risk profile of firms (Brancati, 2015). High innovation intensity is an additional difficulty for financiers and is therefore likely to spur discouragement (Brown et al., 2022).

Hypothesis 3b:

The relationship between a firms' self-assessed performance and the likelihood of being discouraged is moderated by its innovativeness, such that the relationship is weaker for more innovative firms.

Finally, we incorporate the purpose of credit needs by differentiating between credit for investment and credit for working capital. To the best of our knowledge, no other studies incorporate the purpose of credit.⁴ We argue for the existence of a relationship between realized economic development, planned investments, and financial discouragement as follows:

Positive short-term changes in economic profitability have positive effects on increasing confidence and credibility among firms. These will likely impact long-term prospects and expectations indicated by firms seeking to apply not only for working capital but also the capital for investments (fixed capital). Thus, if an increase of short-term profitability and other economic variables leads to expectations of long-term increases in the need for investments, then the need for external capital is likely to increase. We expect that this increased confidence positively affects a firm's belief in successfully convincing financiers to meet the demand for credit. In other words, we see the need for investment capital as an indicator of positive long-term prospects.

Hypothesis 4:

Firms are less likely to be discouraged from borrowing if they have needs for financing investment purposes rather than a need for working capital.

4. Analyses of Credit Demand and Discouragement

4.1.Data sources

The data are based on surveys given to the management teams in a representative panel of private firms that consist of at least five employees (FTEs) located in North Jutland, Denmark. Although the small geographical area limits how far the results can be generalized it on the other hand reduces possible effects from differences in banking systems, information transparency, economic sentiment, norms, and culture.

Firms were selected randomly among all registered firms. We confront the characteristics of firms in the realized sample with the population and find only marginal differences in the distribution on firm size, age, and industry. This specific collection of data on financial constraints and discouragement is an ad hoc addition to a regular, regional business cycle monitoring, where respondents are asked quarterly about their views of the past and future development of firm-level variables such as production, employment, profits, exports, investments, prices, and orders. The data represents an unbalanced panel, consisting of 702

observations from 497 unique firms for two years. We also deploy variables on innovation activities from additional annual surveys on a subset of the firms and add financial characteristics from a business register.

4.2.Variable description

Dependent variable and definitions of discouraged borrowers

A dichotomous dependent variable represents the firms' self-reported discouragement to seek (or not) external finance despite unfulfilled financial needs. Questions on financial needs were made about both working capital and investment capital. The questions of our primary interest were:

1. During the past year, did your firm experience problems in obtaining external finance for development activities? *Yes/No/Did not apply/DKNA*

2. During the past year, did your firm experience problems in obtaining external finance for working capital? *Yes/No/Did not apply/DKNA*

3. Did expectations of rejection make you abstain from applying for external finance for either development activities or working capital during the past year? (the question posed for each type of finance) *Yes/No/DKNA*

These questions also give us indicators of the firms' demand for external finance.⁵ When cross-tabulating the firms' possibilities to answer the questions we obtained the following combinations of possible responses.

Insert Table 1 about here

Although several studies have appeared over the last decade, how to delimit the relevant proportion of discouraged borrowers remains an open question. Definitions such as those used by Kon and Storey (2003) and in several subsequent studies suggest that the discouraged borrower should have a credit need to be within the relevant definition (Table 1, box 1:2). However, if we exclusively differentiate firms based on their need for internal finance simply excluding firms without credit need risks leading to selection bias and consequently to biased results. Later we explain how to deal with potential endogeneity problems that arise from this.

As for the remaining combination of answers to the survey questions regarding financial constraint and discouragement, the classification is not always obvious. To start with, it could be questioned if firms that claimed they had no problems obtaining finance but that also claimed they were discouraged from applying (Table 1, box 2:2) should be excluded from the relevant sample because they had no financing problems, which could indicate no unfulfilled demand. On the other hand, they could have listed "no problems" precisely because they did not enter the application process due to fear of rejection (and thus mistakenly did not mark "did not apply"), or they could be discouraged by specific information on their possible application hence being informally turned down (Rostamkalaei et al., 2020). What is even more plausible would be that they are in a weaker category of discouraged borrowers. For example, they were discouraged from applying for the full amount needed due to expectations that it would be unrealistic or

costly, and they then had no problems obtaining the amount demanded. Furthermore, firms who reported experiencing financial constraints could, according to our interpretation, be discouraged from applying for additional credits, and thus could not use the whole set of options to obtain external finance. In sum, among the firms expressing a general need for external finance, we categorize firms in boxes 2.1 and 3.1 of Table 1 as not discouraged, and in boxes 1.2, 2.2, and 3.2 as discouraged.

Independent variables

Perceptions, actual development, and expectations

Firms were further asked about their *realized profit* development in the last period, and their *expected profit* development in the period following. An increase in these variables represents a positive signal for financiers but also strengthens the firms' confidence that it is worthwhile to apply. Since real changes and expected changes in profit are self-reported, they stand as the entrepreneurs' self-perception, and not as external metrics; however, in this context, this is no disadvantage. If the firm reported increased profits in the current quarter and projected further increases in the future, we assumed a persistent positive trend and healthy economic circumstances, and classified them as well-performing, *optimistic firms*, (just denoted 'optimistic' here) whereas those with decreasing current and expected profits are classified as badly performing *pessimistic firms* ('pessimistic'). Mixed cases are more difficult to classify. We furthermore included information about the firms' investment activity, realized in the current period (realized investment) and expected in the following period (expected investment), where we expect firms with positive investment activities to be less discouraged, cf. hypothesis 4.

Innovation and knowledge intensity

For a subset of firms in our sample, we add firm-level data on innovation activities and knowledge intensity of the firms' operations. Firms were asked to state how many products/services/processes they introduced in the current year: those new to the firm (which we label as *incremental innovation*) and those new to the market (*radical innovation*). The more innovative the firms' activity, the more effort will be needed to properly communicate this activity to banks and other financiers. Because *incremental innovations* are, in contrast to *radical innovations*, already to some extent known by the market, we associate them with less uncertainty and with a better likelihood of the financer understanding them. Thus, firms that are frequently engaged in incremental innovation should be less discouraged than radically innovating firms. We also expect this effect to decrease with increasing innovation intensity. Firms engaging in a high number of innovation projects are likely to develop routines to manage this process in a more structured way; this can be associated with increasing documentation and therefore higher transparency, but also a higher level of confidence when dealing with external financiers. Therefore, both innovation measures – incremental and radical innovation intensity – enter our regressions in their logarithmic transformation.

Furthermore, we posed additional questions about the type of technologies of the firm. *Imp. tech* represents a dummy variable taking the value of one if the firm believes that technological knowledge is of high or very high importance to their innovations.

Origin of constraints

Firms that already experience financial constraints are likely to be more discouraged from applying for further finance, despite existing needs. Therefore, we also included two variables, indicating whether the firm has experienced constraints in access to working capital (*constraints daily*), as well as constraints in capital needed to finance their innovation activities (*constraints inno*).

Other characteristics

From the Danish business register "Navne & Numre Erhverv," we obtained information on the *age* and *size* (in terms of employees) of the firms. We expect both variables to be negatively correlated with the likelihood of being discouraged to apply for finance.

Control variables

The firm's environment influences its access to external finance, which led us to control for its location (*region*). Several earlier studies have indicated that an urban core provides a facilitating environment regarding attracting financial capital and that innovative firms in peripheral areas are more likely to be discouraged (Lee and Brown, 2017). Since the assessment of small, young, and innovative firms can be facilitated by tacit knowledge exchange and social proximity, we expect firms in regions outside the Aalborg region, North Jutland's urban core, to be more likely to face financial constraints. In turn, this affects who will enter the loan markets and who will self-ration their demand.

Firms in manufacturing usually embody a higher share of tangible assets suitable to serve as collateral and thus are favored by asset-based creditability evaluation techniques. Furthermore, production processes and their output might be better understood and valued than the somewhat intangible work of *service* firms. Therefore, we suggest firms in the *manufacturing* industry are less discouraged from seeking external finance.

We also expect the firms' ownership structures to matter. If a firm is a *subsidiary*, it might be nurtured by its parent company, and thus less in need of external finance. Besides, it might draw from the reputation and creditability of its parent company, which would make it more confident when applying for external finance.

5. Analytical Approach and Results

Table 2 provides descriptive statistics on a firm level. Around 10% of firms within the sample are discouraged from applying for external finance, which remains broadly in line with results of former studies (e.g., Freel et al., 2012; Chakraverty and Xiang, 2013; Han et al., 2009; ECB, 2013; Mac an Bhaird, 2016; Mol-Gómez-Vazquez et al., 2022, Mallik et al., 2022). Only 24% of all firms require external finance, illustrating the extent of firms financed by internal sources of capital, and supports our choice to deploy a 2-stage selection model (described below).

Table 3 provides frequency analysis of discouraged borrowers. In addition to the overall share of discouraged firms, we list the shares of firms in demand of credit and the shares of constrained firms. The share of discouraged firms is listed in groups according to the two survey rounds and firm characteristics: region, sector, and size. We find only small differences within these groups. Large firms are, however, clearly less discouraged and less constrained. We further distinguish between firms that are constrained in financing their daily business (mainly wages and production inputs) and their innovation projects. Generally, the responses correspond to each other; if a firm experiences financial constraints, it is then likely to manifest both in daily business and in innovation finance.

Insert Table 3 about here

Table 4 provides a correlation matrix of all the dependent and independent variables. At first glance, it reveals a strong and significant correlation between the need for external finance and to experience financial constraints, and/or to be discouraged from applying for finance, which is not surprising, since the former represents the prerequisite for the latter two. Firms that already experience financial constraints also show a strong tendency to be discouraged, in line with hypothesis 4. However, high correlations above 0.5 also indicate possible multi-collinearity, calling for caution when integrating variables in regression models and interpreting the results.⁶ The remaining independent variables all show only very weak correlation with financial discouragement. Self-assessed performance (optimistic, pessimistic) appears to be largely uncorrelated to most other variables, with few exceptions. The small, insignificant correlations include links with structural characteristics, size, age, innovativeness. This is important in our context as we strive for identifying the relative importance of these two types of variables for discouragement. Optimism somewhat surprisingly correlates with constraints in financing daily business. More intuitively, firms that carried out investment activities or are planning to do so, are more optimistic. Here, the causality could go both ways, that optimism encourages investment, or the ability to carry out investments leads to optimism. Pessimism on the other hand does not show a significant correlation with any other variable.⁷

Insert Table 4 about here

Model setup and empirical strategy

The dichotomous scale of our dependent variable and the nature of our survey data suggest the use of a probit model. As discussed earlier, we only consider firms expressing a need for external finance as potentially discouraged. To address a potential endogenous selection, we apply a technique equivalent to the well-established, two-stage Heckman correction in linear models (Heckman, 1979), which is applied for bivariate probit models (van de Ven and van Praag, 1981) and estimates a firm's likelihood to report discouragement by full maximum likelihood, conditional to the demand for external finance in general. In the first stage, we deploy an over-identification strategy and control over a large battery of available variables.⁸

Our dataset represents an unbalanced panel since not all firms participated in both waves of surveys. Because of the very limited number of methods available for unbalanced panel data regressions with selection and dichotomous dependent variables, we instead choose to use pooled data and include year dummies to capture time effects. To nevertheless address the issue of serial correlation between two observations of the same firm, we relax the assumption that standard errors are independently and identically distributed by clustering them on a firm level, which allows for within-firm correlation. This leaves the variables' coefficients unchanged but leads to more conservative standard errors. Because the innovation activity variables introduced in models four and five are not available for all firms, the number of observations drops. To ensure that the results are not driven only by the new sampling, we reran all models with bootstrapped standard errors, which led to unchanged significance levels of all-important coefficients.

We constructed a part of our hypotheses with non-linear interaction terms. This is likely to minimize common method variance because such a complex relationship is not part of the respondents' theory-in-use (Chang et al., 2010). Finally, we conducted a post-hoc Harman one-factor analysis to check whether variance in the data can be largely attributed to a single factor, which we found does not appear to be the case.

Results

In Table 5, we report the results of a probit model with endogenous selection, where in the first stage the selection criterion is the demand for external finance, but the dependent variable in the second stage is the discouragement to apply for finance.⁹

Insert Table 5 about here

Against initial expectations, most firm-level characteristics prominent in the literature show no effect on financial discouragement. We do not see any statistically significant impact of a firm's age, and its size only shows weak significance by a level of 10% in model 1 and model 2. As expected, while radical innovation shows no significant effect, incremental innovation intensity appears to reduce the probability of being discouraged. This may reflect that it is potentially easier to explain the incremental innovations to financiers, as opposed to radical innovation, which often produces skeptical attitudes among financiers (Freel, 2007). Consequently, we are not able to provide a solid support for hypothesis one. We find, as posited in hypothesis 2, that pessimistic firms in most models tend to have a moderately significant higher likelihood of being discouraged. Optimistic firms, however, do not seem to be less discouraged than the mediocre control group. This finding indicates, in line with Han et al. (2009), that discouragement is a partially efficient self-constraining mechanism. Furthermore, the investment variable (realized and future investments) has a strong negative effect on discouragement. However, this only holds for investments made during the observation period, while we cannot observe a significant influence from planned future investments. The explanation may be that investments have considerable time lags before being realized hence resulting in production and economic results with a (unknown and varying across industries) time lag.

In model 3, we introduced variables indicating whether the firm experienced constraints in financing their daily business (*constraints daily*) or innovation activities (*constraints inno*), where

both turn out to be of high explanatory power in explaining an increase in the likelihood of being discouraged. In line with hypothesis 4, the effect is stronger for constraints in working capital compared with innovation finance, indicating the importance of the purpose of external finance. Even though the experience of financial constraints seems to have a high effect on discouraging firms from trying to utilize further possibilities to access external finance, firms aiming to carry out innovation projects appear to be more persistent.

In models 3 and 4, we introduced interaction terms between the classical firm characteristics *size* and *age* with the optimistic or pessimistic perception of firms, and we obtained mixed results. Whereas the interaction with *size* in model 4 shows no effect at all, the firm's *age* in model 3 appears to be a (modestly) moderating mechanism between a firm's perceived performance and financial discouragement, such that only relatively old firms' positive performance projection encourages them to try to fulfill their financial needs (Ferrando and Mulier, 2015a). The results indicate that the entrepreneurs' self-perception of the firms' development is a stronger predictor of discouragement than firm characteristics and provides only weak and partial support to hypothesis 3a.

In models 5 and 6, we introduced measures for the firms' innovation activities, and interact them with the firm's self-perceived performance. In general, we find evidence (although weak¹⁰) that firms exercising incremental innovation tend to be less discouraged, and firms exercising radical innovation activities tend to be more discouraged. This suggests that firms consider (modest) innovation activity to be a positive signal to investors that will increase the likelihood of and/or conditions necessary for external finance. However, overly radical innovation activity might be hard to explain to potential financiers, thus requiring an extra communication effort and the disclosure of private information on innovation projects. This effect appears to be moderated by the firms' perceptions. Optimistic firms with high radical innovation activity seem to be willing to go the extra mile to secure the funding of their innovation projects and are less discouraged than their optimistic, but not radically innovative, counterparts. This result is also reproduced in model 6, using an alternative approximation for more radical, high-tech, and complex innovation activities, measured by the firms' perception that technical knowledge is of the highest importance for its survival (imp. tech.). These findings add to the results of model 2, where firms in need of innovation finance are less discouraged than firms struggling to finance their daily business. In general, the analyses reveal an interesting interaction between optimism and radical innovation activities. While such activities, associated with uncertainty, asymmetric innovation, and complexity of communication, appear to discourage firms from applying for external finance, this effect is reversed for optimistic firms. Keeping in mind that optimism per se has no significant effect on discouragement in our results, optimistic innovators appear to "go the extra mile" despite the obstacles ahead.

In sum, we found no – or only very weak – support for hypotheses 1 and 3a, weak to moderate support for hypothesis 2, and strong support for hypotheses 3b and 4.

6. Discussion

Our results indicate that self-confident and discouraged managers are distributed randomly (or at least not in a strongly systemic fashion) among firms with the characteristics investigated.¹¹ This

finding calls for further research to advance a theory of individual decision-making amongst discouraged borrowers and to identify the characteristics of individual managers (and not just firms) (Mol-Gómez-Vázquez et al., 2019; Ferrando & Mulier, 2015a; Hutchinson, 1995). In note 1 in this article, it was pointed out that the discouraged borrower literature lends inspiration from individual decision-making by consumers and jobseekers. On this background, it is somewhat surprising that the focus in earlier literature has been on the firm level at the expense of the individual level of aggregation. Rather than covering only the characteristics of firms, future empirical research should include variables that capture the backgrounds of those within the firm who make the actual decision of whether to apply for external finance (Fraser, 2014; Tang et al., 2017). A few attempts have been made in this direction (Han et al., 2009, Fraser, 2014, Cowling, 2016, Cole and Sokolyk, 2016, Naegels et al., 2022, Nguyen et al., 2021, Caglayan et al., 2022), but previous examples of this are sparse.

The strategic decision to apply for credit or not rests on the individuals' and management teams' assessment of a situation with incomplete information. From studies on entrepreneurial behavior and –motivation (e.g. Baron, 1998, 2007) we know that this situation causes entrepreneurs to use heuristics such as relying excessively on information that is readily available and appears early in the information gathering process, past information relevant to the current situation, and information which is perceived to be aligned with the information basket and –codes of the receiver. Moreover, even if we know that entrepreneurs as a group are perhaps over-optimistic (Baron, 1998, Hmieleski and Baron, 2009, Zhang and Cueto, 2017) then in as much as the discouraged borrowers are 'inappropriately' discouraged borrowers that case illustrates the opposite; that parts of the non-applicant entrepreneurs/firms are too pessimistic about their prospects of obtaining the external finance (Cole and Sokolyk, 2016). Entrepreneurship research has extensively investigated over-confidence and over-optimism but has paid less attention to the opposite; how to model pessimistic perceptions. The application of the case of discouraged borrowers provides a promising way to study this general problem area.

The natural follow-up question is to ask what is the context that contributes to forming entrepreneurs' and managers' self-perceptions? We pointed above to some firm-level and individual management-level explanations but, we also believe that the discouragement of borrowers has a higher-level dimension. The financing literature, especially the venture capital literature, has long discussed whether venture capital firms exhibit "herding behavior," that is when firms replicate the behavior of their peers in the same industry (Sahlman and Stevenson, 1985; Terjesen et al., 2013). To some extent, the degree of credit rationing is hidden information, but certainly, some of the knowledge about behavioral standards and changes herein is publicly available. Herding behavior likely applies to borrowers. Through industry associations, training programs, networks, and more, entrepreneurs and firms share experiences and information on what is feasible to fund. Such a shared belief may become even more established by direct interaction with and signals from banks, by the general discourse including articles in the business press, and official statistics on rejection rates. Discouragement is therefore likely to be affected by the 'hard factors' such as interest rates, competition on the banking market, standardized credit assessment procedures, but also the above-mentioned shared belief and other 'soft', intangible factors affecting the attitudes of bankers and firms. Up to now, very few studies have incorporated these macro- and micro-behavioral aspects in discussions of discouraged borrowers, and we advocate for further development of the research in this direction.

7. Conclusion and implications

We investigated whether the self-perception of entrepreneurs regarding their firms' past and future development and innovativeness are stronger indicators for discouragement than firm characteristics such as age, size, and industry. Our results do not show a strong influence from firm characteristics and demonstrate that the self-perception of entrepreneurs is a stronger indicator for discouragement. Instead of firm characteristics, we find that firms with radical innovation activity are more likely to be discouraged; however, this is not the case if firms are also optimistic regarding their performance. Moreover, firms that have positive expectations, and therefore invest in capacity-building, are less discouraged to apply for finance.

We claim that even if only a small share of firms are discouraged from attempting to apply for finance, this is potentially an important problem (Ferrando and Mulier, 2022) that has implications in different dimensions, including policy, banking, management, and research. Because the discouraged borrower phenomenon exists intrinsically at the level of the individual firm (management) decisions and is difficult to document with accuracy in traditional statistics, it is not only to a large extent outside the domain of direct policy initiatives but also a difficult area in which to design initiatives that incentivize "inappropriate discouraged borrowers" to change their decisions and enter the loan market, while maintaining the "appropriately" discouraged borrowers out of the market.

One measure to enhance the efficiency of the market is to stimulate more transparency in the capital market, for example through mandatory bank disclosures (Balakrishnan and Ertan, 2017) or information sharing through extended use of credit registers and credit rating bureaus. An efficient regulatory environment and strong creditor rights have also been argued to enhance banks' participation in the loan market, in turn reducing borrower discouragement (Khan et al., 2021). There is, however, a limit to this type of market efficiency enhancement. For example, to the extent that banks use general lending criteria based upon generic credit scoring tools, such procedures could be made more transparent. However, earlier literature points out that the effects from increased information affect application costs and screening errors of banks differently and that the combined effect is non-linear (inverted u-shape curve) where low levels of information increase discouragement and high levels decreases discouragement (Kon and Storey, 2003). Moreover, besides credit-scoring instruments, there is a limit to providing more clear and accessible lending criteria. Often entrepreneurs think that applications are processed purely by computers (Rastamkalaei, 2017). However, a large part of the assessments are undertaken on an individual firm level and are based upon firm-specific "soft" factors. Therefore, more publicly available lending criteria cannot perfectly inform firms about how human factors such as capabilities of the management team or trust (Tang et al., 2017) are weighted in the lending decisions. This type of information is difficult to explain in documents. It would, however, most likely decrease inappropriate discouragement (and increase appropriate discouragement, which also represents an increased capital market efficiency) if more information on bank lending decisions were more transparent.

Related, financial institutions will miss out on business opportunities, the share of inappropriately discouraged borrowers, when capital markets are non-transparent. An increased flow of information from banks on possibilities for obtaining funding would increase the efficiency of the capital markets in terms of discouraging the "right" borrowers, i.e., those that would have been rejected anyway. Cole and Sokolyk (2016) found that around one-third of discouraged firms would have been granted credit had they applied. Moreover, it means that they will have

difficulties fine-tuning their credit assessment tools and criteria over time when all the demand is not surfaced (Silver and Vegholm, 2009). Thus, this will benefit banks and "good" entrepreneurs alike. Costs associated with application and rejection could be avoided through increased formal or informal information flows (Moro et al., 2014, Rostamkalaei et al., 2020).

Finally, we have already pointed to some implications for research in the discussion section above. We highlighted the importance of understanding individual behavior, institutionalized common knowledge, and capital market information channels. Moreover, most earlier studies take a snapshot in time when studying discouraged borrowers. In line with Fastenbauer and Robson (2014), future research should investigate whether there are learning effects involved in the propensity to be discouraged from entering credit markets.

We believe to provide new empirical and theoretical insights into the discouraged borrower phenomenon, but our study also has limitations. Even if representative for Denmark, we studied a limited geographical area. Identifying the extent of discouragement is, however, not our main contribution, consequently, the geographical scale has limited importance. Like other studies, we are also limited by the fact that we studied firms, not projects. In practice, firms seek funding when they plan to undertake specific projects, whereas banks tend to assess the creditworthiness of the total firm. An important limitation is also that we were unable to separate 'appropriately' from 'inappropriately' discouraged borrowers. This is also the case in by far the majority of studies in the field, exceptions including Cowling et al., (2016), Cole and Sokolyk (2016), and Ferrando and Mulier, (2015a). Finally, by far most studies of discouraged borrowers do not distinguish between debt and equity-seeking firms. Most studies deal with bank loan financing only, as already indicated in footnote 2. Even if our study covers both types of finance, hence advances the current literature, the data does not allow a fine-grained analysis of potential differences between being discouraged equity seekers and discouraged debt seekers. Our data do, however, not indicate that this difference impacts substantially on results.

These limitations point to further studies in wider geographical areas and larger sample size, and with more fine-grained dependent variable.

Disclosure statement

No potential conflict of interest is reported by the authors.

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Tables

Notes

¹ The term "discouraged borrowers" is a phrase borrowed from private consumer credit literature (e.g., Jappelli, 1990), but the general idea was used even earlier, in labor market studies, to characterize those individuals who do not apply for jobs due to expectations of being rejected (e.g., Finegan, 1981).

² The majority of studies refer to "borrowers," "credit," and "loan markets," indicating that the phenomenon is confined to firms in need of debt. However, firms can also be discouraged from seeking equity finance (Xiang et al., 2014). In the present study, we ask firms about external finance broadly, not just debt. Although there are differences in the information asymmetries and application costs between these two situations, we do not assess that these differences have a large impact on our results. Despite the differences, we most often refer to "borrowers" to comply with the terminology in the literature.

³ Similarly, Chakraverty and Xiang (2013) incorporate an "AUDIT" variable measuring whether firms had their financial statements verified by an external auditor. In the majority of the countries studied, they find significant differences between discouraged and non-discouraged borrowers on this variable, indicating that external audit reduces discouragement. A similar variable is incorporated in the study by Popov (2013).

⁴ Xiang et al. (2014) emphasize the importance of including both debt and equity but have little on the purpose of finance.

⁵ We do not specify the type of capital in terms of debt or equity. As Denmark is a typical bankbased financial system (Christensen, 1992), it is highly likely that by far the majority of answers apply to bank finance. ⁶ This is for instance the case for the correlation between incremental and radical innovation. Consequently, we re-ran all models including only one of the corresponding variables separately. This leads to slightly changed coefficients, but overall comparable results.

⁷ The only exception is a moderately negative correlation with optimism, which is expected since both variables are mutually exclusive.

⁸ The purpose here is not to provide insight into the determinants of the demand for external finance per se, but rather to provide a model with a high explanatory power that facilitates the fitting of the second stage model.

⁹ Since our primary interest lies in the determinants of financial discouragement, we do not report the results of the first stage here, but they are available on request. Due to the often observed instability of the maximum likelihood estimator, we also tried different specifications of the selection model, for instance applying an exclusion restriction (where we choose the control variable indicating the firm to be a subsidiary). We find that effects on the size and significance coefficients for the variables remain rather stable across different specifications of the selection stage.

¹⁰ Note that the number of observations drops when we introduce innovation variables, which affects statistical significance levels negatively when compared to results obtained from models 1-3.

¹¹ It should be noted that in the region and country we studied, North Jutland in Denmark, the majority of firms by far are relatively small. Moreover, it is an open question, but a plausible hypothesis, that it is not the size *per se* that leads to discouragement, but rather whether the firm is functionally divided (which is of course related to size). If so, a specialized finance division likely has more knowledge of lending criteria used in the financial sector and more resources and experience with the application process, which in turn decreases 'inappropriate' discouragement.

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