



Only the brave: improving self-rationing efficiency among discouraged Swiss SMEs

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Abstract We conduct a survey among 1922 Swiss SMEs to analyze their access to bank loans. Credit-constrained SMEs are six times more likely to be discouraged than rejected. The most dominant reasons for being discouraged are too high collateral requirements, cumbersome application procedure, and the expectation of being turned down. Through a unique feature in the Swiss banking market, we also find new evidence for the importance of a strong firm–bank relationship. We challenge the assumption that discouraged borrowers are very similar to rejected borrowers. Our results indicate that the group of discouraged borrowers is more similar to the denied borrowers than to the group of approved borrowers, but only with respect to firm characteristics. For variables describing business development and firm–bank relationship, discouraged SMEs have less in common with credit-constrained firms than with their unconstrained counterparts. Even with a conservative prediction, about 60% of the discouraged firms would have obtained a bank loan if they had applied for one. The self-rationing mechanism observed is thus rather inefficient, and banks and policy makers should think about how to foster SMEs’ courage to apply for the bank loans they need.

Plain English Summary For each SME that applied for credit and was rejected, six other firms had a financing need but did not apply. Some 60% of these discouraged firms would have obtained a loan if they had applied for one, even by a conservative prediction. A survey among 1922 Swiss SMEs on their access to bank loans shows that they are more often credit constrained than might be expected. The dominant reasons for being discouraged are too high collateral requirements, cumbersome application procedures, and the expectation of being turned down. We also find new evidence for the beneficial effect of a good firm–bank relationship. Banks and policy makers should consider how to foster SMEs’ courage to apply for the bank loans they need in order to sustain or increase both their investments and their workforce.

Keywords Credit rationing · Discouraged borrowers · SME · Relationship lending · Sample selection model · Self-rationing

JEL Classifications G21 · G32 · J71 · L11 · L26 · M13

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1 Introduction

We conduct a representative (with respect to the distribution across industry, firm size, and region) survey among 1922 Swiss small and medium enterprises (SMEs) to capture their financial and business situation. Access to external financing is seen as a relevant factor for economic growth by many policy makers and

academics. After the financial crisis, the issue of credit constraints—particularly problematic for SMEs—has been a growing concern. SMEs account for over two-thirds of employment in Switzerland, which means that we analyze the group of firms that employs the majority of the workforce in the Swiss economy (Swiss Federal Statistical Office, 2017).¹

Our focus is on the “discouraged” borrowers among the SMEs: firms with a need for external financing that did not apply for any form of financing.² Older literature on credit-constrained firms and credit rationing has ignored discouraged borrowers (Stiglitz & Weiss, 1981; De Meza & Webb, 1987; Cox & Jappelli, 1993; Duca & Rosenthal, 1993). But more recently, this group of firms has gained considerable attention, because it was often found to be larger than the firms that were denied credit (Levenson & Willard, 2000; Brown et al., 2011; Popov & Udell, 2012; Beck et al., 2018). Kon and Storey (2003) developed a theoretical framework for identifying discouraged borrowers. Han et al. (2009) use this concept and find evidence that self-rationing by firms is on average efficient: riskier borrowers have a higher probability of being discouraged than low risk borrowers. Their evidence is based on data from the USA in 1998. Nonetheless, they find some good borrowers that are discouraged and expect different results in less sophisticated markets. Furthermore, this finding is sensitive to the definition of a “risky borrower.”

Good borrowers not applying for loans they need can be a symptom of credit market imperfections. In this article, we compare discouraged SMEs to approved and denied borrowers and identify common factors of discouragement. Then, we analyze the efficiency of self-rationing in Switzerland, which is an interesting case for at least three reasons. First, it allows for a natural experiment with its uniquely structured banking market, in which state-owned banks have a considerable market share. There are 24 mainly state-owned cantonal banks. Second, there is another fully state-owned bank, PostFinance, which is not allowed to extend loans to customers in its own name. This allows for an interesting perspective on relationship lending. Third, Swiss firms had to deal with a major economic shock in 2015 after the Swiss National Bank (SNB) lifted the

minimum exchange rate of CHF 1.20 per euro, introduced in September 2011. The decision caught markets, and especially the export-oriented economy, by surprise and led to a jump of the Swiss Franc of roughly 20%. The shock became persistent, with the exchange rate averaging around CHF 1.08 per euro during the following two years. This allows us to test whether export-oriented firms suffered more than others from financial constraints due to their disadvantage from the currency appreciation.

The assumption that discouraged borrowers are very similar to rejected borrowers is challenged. We estimate the share of SMEs that felt financially constrained but would have been likely to receive external financing if they had applied for it. This is of significant relevance from a policy perspective, because financial intermediaries seem to exert a large and positive impact on the growth of GDP, with a disproportionately large effect through the growth of small firms (Beck et al., 2000; Beck, Demirguc-Kunt, et al., 2008a).

A common conclusion in the literature is that smaller, younger, and privately owned businesses are more likely to be discouraged. This is partially supported by our survey results. But our findings show a comparatively high level of discouragement, especially compared to the number of rejections. The number of SMEs reporting discouragement is six times larger than the number reporting rejection. The smaller the firm, the more accentuated is this difference. Through a unique anomaly in the Swiss banking market, we also find new evidence for the importance of a strong firm–bank relationship.

We contribute to the literature in four ways. First, we design and conduct a unique and, in terms of size, industry, and region, representative survey among 1922 SMEs. They represent 1.21% of the SME population in Switzerland. The survey served the prime purpose of analyzing the Swiss SMEs’ financing situation. Switzerland offers an interesting case because it is a small open economy that had to deal with a major currency appreciation prior to our survey, which put export-oriented firms’ competitiveness under pressure.

Second, we challenge the treatment of all discouraged firms as uncreditworthy and obtain an estimate of the efficiency of the self-rationing mechanism. In Europe, discouraged firms outnumber those who are actually denied credit by a factor of two (Ferrando et al., 2019) and in our sample for Switzerland by a factor of six. We estimated that more than half of the discouraged

¹ In the EU-28, they account for 66.4% of non-financial business sector employment and for 47.5% in the USA (European Commission, 2018; SBA Office of Advocacy, 2018).

² Kon and Storey (2003) have a narrower definition of “discouraged” borrowers. They only consider “good” borrowers as discouraged.

firms were more likely to receive a bank loan than to be rejected.

Third, we find new evidence for the importance of a strong relationship between a firm and its main bank. This is owing to the unique situation with one bank that is fully state owned, has a considerable market share, but is not allowed to extend loans to customers in its own name. And fourth, identifying the factors that make a potential borrower discouraged, we formulate policy recommendations to mitigate discouragement.

In Sect. 2, we review the literature on the availability of credit and form our hypotheses, followed by a description of the survey and the survey design in Sect. 3. A description of our data and methodology is presented in Sect. 4. Our results are presented in Sect. 5, where we first look at common attributes of discouraged firms and then analyzed the efficiency of self-rationing. In Sect. 6, we discuss the implications and limitations of our research, followed by conclusions.

2 Related literature and hypothesis development

During the early 1950s, the focus was on the availability doctrine, which explained the relationship between monetary policy and the real economy through effects on spending (Baltensperger, 1978). According to the mechanism of market equilibrium, a change in the price of credit would lead to a new state in which borrowers' supply matches lenders' demand. However, empirical evidence has shown clear signs of the prevalence of credit rationing. The dominant explanation for this phenomenon is the existence of asymmetric information. Some firms do not receive a loan even though they may have an investment project with a positive net present value. This occurs because the lender cannot distinguish between good and bad borrowers (Stiglitz & Weiss, 1981). One way to mitigate equilibrium credit rationing is by means of signaling when a borrower can provide collateral (Bester, 1985; Wette, 1983).

Comparing SMEs which receive access to credit with those that do not seems the most intuitive approach to examining credit availability. But a sole focus on these two groups neglects firms that needed external financing but for some reason refrained from applying. Early works to acknowledge this and deliberately identify discouraged borrowers found empirical evidence for the relevance of this group (Levenson & Willard, 2000; Raturi & Swamy, 1999).

Kon and Storey (2003) defined discouraged firms as creditworthy borrowers who hesitate to apply due to the expectation of being denied. According to them, both information asymmetries and application costs are responsible for this phenomenon. Mac an Bhaird et al. (2016) use this definition and calculate the rates of discouragement using Survey on Access to Finance (SAFE) data from 2009 to 2011 for nine European countries. Examining the firms with a need for financing, they found the highest rate of discouragement in Ireland (44%) and Germany (24%). Lower rates were observed in Spain, Austria, Belgium, and Greece (17–19%).

Brown et al. (2011) estimate that in Western Europe roughly twice as many businesses were discouraged from applying for a bank loan than had their loan request denied. Their data for Eastern Europe showed around four times more firms were discouraged than rejected. Furthermore, Beck et al. (2018) reveal that credit constraints vary widely—between 17 and 78%—across the 21 countries analyzed.

Comparatively low rates of discouragement were estimated for Canada at 0.51% (Chandler, 2011). Those for the UK range from 2.65% (Cowling et al., 2016) to 8.1% (Freel et al., 2012). Higher shares are estimated in the USA with 8.75–14.04% (Cole & Sokolyk, 2016; Han et al., 2009) and France with 22.3% (Cieply & Dejardin, 2009). Data across 29 countries included in the BEEPS from 2007 to 2009 showed that 20.9% of all firms were discouraged (Gama et al., 2017).

Han et al. (2009), using data from the 1998 SSBF, argue that discouragement can be viewed as a self-rationing mechanism. By including not only “good” borrowers but also “bad” borrowers in their pool of discouraged firms, they distinguish between efficient and inefficient discouragement. They find that in the USA, bad borrowers are more likely to be discouraged than good borrowers, and thus conclude that discouragement is indeed an efficient self-rationing mechanism. A more recent study using the UK Survey data from between 2011 and 2015 identified another form of efficient self-rationing (Rostamkalaei et al., 2020). They distinguished informal turndowns from other reasons for not applying for a loan when one would be needed. Out of the SMEs not applying for a loan, around one in eight refrained from an application because they were verbally informed by a commercial lender that a formal loan application would likely be denied.

We argue that the empirical findings of efficient self-rationing cannot be generalized, for at least three reasons. First, good borrowers are still discouraged, and bad borrowers still apply. Second, the USA has a relatively sophisticated small business financing marketplace. Also using SSBF data, but from 2003, Cole and Sokolyk (2016) estimate that about one in three discouraged borrowers would have received credit if they had applied. Third, the amount of discouragement among good borrowers has shown to be positively correlated with the degree of asymmetric information and credit application costs—financial or non-financial. The latter can be due to the lack of financial literacy, a general fear of being rejected, or a dislike for sharing information with outsiders (Kon & Storey, 2003). SMEs' are more opaque than larger listed companies, so we expect more information asymmetry (Berger & Udell, 2006; Fee et al., 2009; Rauh, 2006). Furthermore, we see financial and cultural aspects that increase the application costs of Swiss SMEs. For example, we would expect that a good borrower with some financial slack values his application costs higher than a bad borrower, who sees no other option than to immediately obtain external financing. This leads us to our first hypothesis:

H1 The probability of being a discouraged borrower is positively associated with a firm's quality (i.e., its potential access to finance).

SMEs are viewed as more financially and thus informationally opaque than large firms. This informational issue about a firm's financial and business development characteristics can be seen as a main reason for credit rationing. The younger a firm, the relatively shorter is the track record and the less information is thus available to evaluate the performance and to form expectations for the future. This leads us to our second hypothesis:

H2 Younger SMEs are more likely to be discouraged than their older peers.

In the academic discussion, the provision of credit is often associated with the lending technology; a basic view distinguishes between transaction and relationship lending, with the latter being focused on soft facts and the former on hard facts. Favorable soft information has been found to increase borrowing bargaining power (Grunert & Norden, 2012). Within this context, we give

special attention to at least five areas: bank market power, number of bank or other credit relationships and their duration, distance from the borrower to the lender, and the ideal structure of a lending bank. We assume that this affects the gathering of information. These areas are not mutually exclusive, but the distinction will later facilitate the discussion of the results.

For larger firms, there are generally more sources that indicate the capacity and willingness to pay back a loan than for smaller firms. Therefore, it has been argued that transaction lending based on hard information is less suitable for smaller firms. Therefore, a wide range of literature points towards the firm–bank relationship, which might help to mitigate informational asymmetries and the corresponding rationing of credit (Boot & Thakor, 2000). Through its specialization in screening and monitoring borrowers, a bank is able to reduce the informational asymmetries by acquiring private information (Tirole, 2010, pp. 333–354). The longer such a relationship continues, the more information can be accumulated. Using this as a proxy for information quality, Han et al. (2009) find that riskier borrowers are more likely to be discouraged than low risk borrowers. An enduring relationship can thus lower interest rates due to its efficiency and also lower financial constraints through the detection of good-quality borrowers, as modeled by Boot and Thakor (1994). Several empirical studies for the USA find a negative connection between relationship duration and the cost of credit (Agarwal & Hauswald, 2010; Berger & Udell, 1995, 2002; Petersen & Rajan, 1994).

But the effects of the length of a relationship can also point in the other direction. This can be because a new lender might not obtain certain relevant information or due to the lock-in effect. These contrasting findings include evidence from Spain, Belgium, and Italy. Several studies find that longer relationships lead to significantly higher credit costs for borrowers (Hernández-Cánovas & Martínez-Solano, 2010; D'Auria et al., 1999; Degryse & Ongena, 2005; Angelini et al., 1998). A recent study using data from Italy finds evidence that a long-lasting relationship significantly improves access to credit for small and large firms, but medium-sized firms experience the opposite (Angori et al., 2019). One reason for the prevalence of contrasting evidence could be an oversimplification of the distinction in lending technologies (Berger & Udell, 2006).

When looking at loan rates or degree of discouragement among firms, one could argue that the duration of a

firm–bank relationship is much less relevant than the lending technology applied. This might especially be the case when there is collateral, which primarily serves to compensate for the information imperfections of the lender (Kon & Storey, 2003). In Switzerland at the end of 2016, around 76% of the bank loan volume issued to SMEs was in the form of mortgage loans, and a further 10% had some other form of collateral (Swiss National Bank, 2017). We expect that a firm with an existing mortgage has an advantage in obtaining a bank loan for at least two reasons: Firstly, it has an existing and usually longer credit relationship with the bank, because Swiss companies rarely repay their mortgage. Secondly, an existing collateral reduces the problems associated with informational asymmetries. We test this through our third hypothesis:

H3 Borrowers who already have a mortgage have a lower risk of discouragement.

The literature also reveals various conclusions concerning the number of banks with which a firm has a relationship. It has been shown that more relationships can be beneficial by mitigating a firm's hold-up risk. This is connected to the competitive advantage of a main bank over an outside bank due to its information monopoly. It has been shown empirically that borrowing from a single bank lender seems to limit the use of bank debt due to information monopolies (Rajan, 1992; Sharpe, 1990; Von Thadden, 2004). Similarly, considering the adverse selection problem, Detragiache et al. (2000) argue in favor of more than one bank relationship due to the risk that a single bank may be unable to fund future profitable projects.

By contrast, Bolton and Scharfstein (1996) find that borrowing from more than one entity might reduce a firm's liquidation value. Dewatripont and Maskin (1995) argue that the presence of several creditors makes lending less profitable by complicating the refinancing process. This is supported by Gobbi and Sette (2014) with data from Italy and by Petersen and Rajan (1994) using data from the USA.

Our dataset does not specify the number of sources of financing a firm has but the number of bank relationships. We assume the latter to be an approximation of possible alternative sources of funding, which is negatively related to the number of discouraged borrowers (Kon & Storey, 2003). Thus, we formulate our fourth hypothesis as follows:

H4 The number of bank relationships correlates negatively with the probability of discouragement.

In addition to the number of bank relationships and their duration, other measures have been used as a proxy for the depth of the relationship. Agarwal and Hauswald (2010) focus on the physical distance and find that borrower proximity has a positive effect on the collection of soft information. They also argue that technological progress cannot fully bridge the limits to local information gathering over greater distances. Another measure they have used for the firm–bank relationship is "Scope." Indicating whether a firm has a current-account balance exceeding US\$5000, this variable only weakly hinted at a reduction in the loan rate offered by the bank. But more importantly, it was associated with a decreased likelihood of credit delinquency.

The ideal size and structure of a lending institution is another ongoing discussion. Several authors have pointed out the advantage of small and domestic banks, as they are more able to capture the soft information needed for relationship lending (Berger et al., 1995, 2001; Keeton, 1995; Mian, 2006; Sengupta, 2007; Weston & Strahan, 1996). However, recent studies have argued that large and foreign banks could be more efficient through their more advanced lending technologies (Berger et al., 2007; Berger & Udell, 2006; de la Torre et al., 2010). In Switzerland, there are regional and Raiffeisen banks, which are smaller than the average cantonal bank and much smaller than large banks such as Credit Suisse and UBS. Furthermore, the smaller banks cannot operate with the same economies of scale as their larger peers, which make them more reliant on making use of their strengths: geographical proximity to the customer and a more personal touch. We can therefore test our fifth hypothesis:

H5 SMEs that have a regional or Raiffeisen bank as their main bank are less likely to be discouraged.

With the argument of a lack of market discipline, Berger and Udell (2006) argue that a larger presence of state-owned institutions might have an adverse effect on the provision of loans to SMEs. The rationale behind this argument is a lack of market discipline and relatively weak monitoring strategies, which can increase informational asymmetries and lead to reduction in lending. This argument has been supported, mostly for developing countries, by empirical evidence using cross-country

differences in market shares of state-owned banks (Beck et al., 2004; Berger et al., 2004). Similarly, supporting evidence is also found by looking at the effects of bank privatizations (Clarke et al., 2005; Megginson, 2005).

The case of Switzerland offers an interesting natural experiment, where 24 cantonal banks, which play a crucial role in the Swiss banking system, are mainly state owned, and one bank, PostFinance, is fully state owned but not allowed to extend loans to customers.³ Firms that have their main bank relationship with PostFinance may thus be at a disadvantage when it comes to applying for a credit because their main bank is not allowed to grant loans. These firms therefore have to go to a different bank with which they do not have such a strong relationship and where the information asymmetries are thus higher. In our sample, 40% of the SMEs call one of the state-owned banks their main bank.⁴ We can compare SMEs who use these two groups as their main banks to each other as well as to all other banks.

H6 Customers of cantonal banks and PostFinance are more often discouraged than all other firms.

3 Survey on access to finance in Switzerland

We conduct a specifically designed survey among 1922 SMEs to gather information about their access to credit, their financial and economic situation, and their existing credit lines. The survey was conducted in the final quarter of 2016.

3.1 Sample selection

In order to best represent the firm population, we collaborated with the Federal Statistical Office to obtain a balanced sample of SMEs across firm size, industry, and language region. We excluded firms from the public, primary, and financial sector; private households; extra-territorial organizations; and firms with two or fewer employees.⁵ The final sample includes 1922 SMEs and

³ Cantons hold the majority of the capital in 23 of the 24 cantonal banks (Lengwiler, 2016).

⁴ See Table 2 for details.

⁵ With employees, we refer to the number of full-time equivalents (FTE). As we aim to focus only on firms with a weekly economic activity of at least 20 h, we excluded firms with two or fewer FTE. According to the Federal Statistical Office, two or more employees is the best proxy for minimum 20 hours activity.

thus represents 1.21% of the total population of 159,000 firms in the selected segment (Federal Statistical Office, 2017).

Compared to other datasets, our survey data also includes key information typically required by banks when a company applies for a loan such as the debt–equity ratio, number of bank relationships, export rate, revenue growth rates, and growth expectations.

In order to best represent the true population of the Swiss SMEs, we arranged them into 54 categories based on three dimensions: firm size category, industry, and region (Appendix 1). Industry was divided into manufacturing, construction, trade, restaurants and hotels, services I, and services II.⁶ Firm size categories distinguish between micro- (2 to 9 employees), small- (10 to 49 employees), and medium-sized firms (50 to 249 employees). Regions were divided according to the three main languages spoken in Switzerland.⁷ North corresponds to the German-speaking part, west to the French-speaking part, and south to the Italian-speaking part.

Two phases were necessary to obtain the best possible match for the true population. First, we selected the firms to take part in the survey according to their population weights. For small subgroups, the subsample size was raised to obtain enough responses. Second, after the firms participated in the survey, we weighted each of the firms according to their corresponding population weight. The weights were specifically provided by the Federal Statistical Office as of end of year 2015.

3.2 Survey design

The first goal of this survey is to classify the firms into four mutually exclusive groups, borrowed from previous empirical and theoretical work: (1) “no-need” firms are those who had no additional financing needs over the previous 12 months; (2) “discouraged” firms stated a need for external financing, but did not apply for a loan; (3) “approved” firms received credit in the previous 12 months; and (4) “denied” firms applied for external financing but were rejected in this period (Cole & Sokolyk, 2016; Han et al., 2009; Kon & Storey, 2003).

⁶ Services I includes transportation and logistics, information and communication, real estate, academic and technical services. Services II includes education, health care, social affairs, art, and entertainment and leisure.

⁷ Reference is the firm’s headquarters. Firms from the fourth official language region, Romansh, were omitted due to the small sample size.

Following the purpose of the survey, the questionnaire was structured in three parts. In the first part, the SMEs were asked about their past and current access to credit. This allowed us to categorize each firm into one of the four aforementioned groups. We focused on bank credit and distinguished between existing credit lines, the recently felt need for external financing, obtained or extended credit lines, and applications for credit. We see this differentiation as essential to gain a proper view of the firms' access to finance. Fig. 1 shows the sequential financing process. In the first step (1), the firms are divided according to their need for bank credit in the previous 12 months ("need" firms; "no-need" firms). The focus of this study is set on the second step (2), where we identify the firms as either "discouraged" or "applying" for credit. Existing empirical literature on credit rationing has often neglected this step and instead focused on whether firms obtain or are denied credit (3). This naturally leads to underestimating the problem of financial constraint. We define discouraged as those firms who need credit, but do not apply for one. As marked with a dashed line in Fig. 1 between (2) and (3), those firms would either be denied or approved if they applied for credit. If they were to be denied, self-rationing would be efficient. If they were to be approved, the self-rationing would be inefficient. By comparing the discouraged firms with the denied and approved firms, we are able to obtain an estimate of the efficiency of this self-rationing mechanism.

The second part of the questionnaire focused on the situation for SMEs after the abolition of the quasi-exchange rate peg of the Swiss Franc to the Euro on 15 January 2015 by the Swiss National Bank (SNB) and the subsequent jump of the Swiss Franc by roughly 20%.

In the last part and in contrast to other studies, our survey asked for firm-specific information that is typically required by banks when a company applies for a loan, such as the debt–equity ratio, the number of bank relationships, export rate, past revenue growth, and growth expectations. This is important in our attempt to identify discouragement as a form of efficient self-rationing process. Rationing is efficient when a bad (high risk) borrower is discouraged. It is inefficient when a good (low risk) borrower, which would have received a bank loan, reports being discouraged.

After the initial design of the questionnaire, it underwent three stages, starting with a qualitative pretest. Then, an expert panel evaluated the content validity

of the questionnaire's individual items. First in an open discussion, and after the resulting revisions also in written feedback. The experts were from the SME Credit Market task force, formed by the Swiss government and including representatives from the private sector, banking and trade associations, and the Swiss National Bank (SNB). Finally, the survey underwent another qualitative pretest, and after the final revisions was conducted between October and December 2016.

4 Data and methodology

4.1 Methodology

We compare discouraged firms to both denied and approved firms. This allows us to estimate the efficiency of this self-rationing mechanism. First, we present a set of descriptive statistics to explore basic relationships in our data. In particular, we use *t* tests to check for statistically significant differences between the means of our SME groups according to our three-step sequential financing process exhibited in Fig. 1.

Second, we assess the impact of the various factors on the probability of being discouraged versus applying for credit. We define a firm as discouraged if it needed more credit but did not apply for it (*discouraged* = 1). The sequential nature of the firms' financing process implies a sample selection problem, because *discouraged* is only observed among firms that expressed a need for more credit (*need* = 1). We employ a bivariate Probit selection model (Greene, 2012; Van de Ven & Van Praag, 1981).⁸ It assumes an existing underlying relationship:

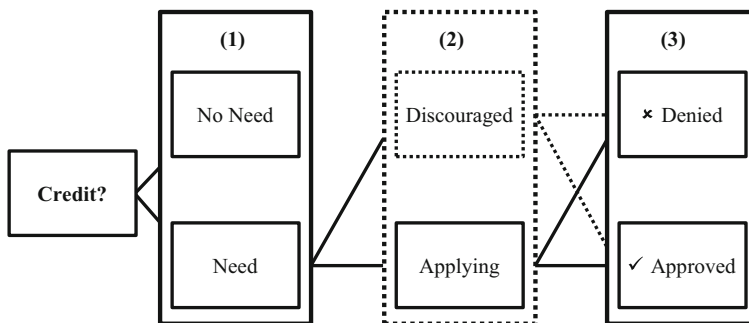
$$y^* = \mathbf{x}'_1 \beta + u, \quad y = 1 \text{ if } y^* > 0, \quad 0 \text{ otherwise,} \quad (1)$$

$$S^* = \mathbf{x}'_2 \alpha + \varepsilon, \quad S = 1 \text{ if } S^* > 0, \quad 0 \text{ otherwise,} \quad (2)$$

where $\varepsilon, u \sim$ bivariate normal(0, 0, 1, 1, ρ) and (y, \mathbf{x}_1) are observed only when $S = 1$. If $\rho \neq 0$, estimating y directly without correcting for sample selection would result in biased coefficients. The log-likelihood function

⁸ The technique has been widely used in other empirical works with similar issues of selection bias (see, for example, Cole & Sokolyk, 2016 & 2018; Cowling et al., 2016; Ferrando et al., 2019; Freel et al., 2012; Gambini & Zazzaro, 2013; Pietrovito & Pozzolo, 2021 and Ongena et al. 2013).

Fig. 1 Sequential financing process



can be formed using the unconditional probabilities of the three outcomes:

$$S = 0 : \text{Prob}(S = 0 | \mathbf{x}_1, \mathbf{x}_2) = 1 - \Phi(\mathbf{x}'_2 \boldsymbol{\alpha}), \quad (3)$$

$$y = 0, S = 1 : \text{Prob}(y = 0, S = 1 | \mathbf{x}_1, \mathbf{x}_2) = \Phi_2(-\mathbf{x}'_1 \boldsymbol{\beta}, \mathbf{x}'_2 \boldsymbol{\alpha}, -\rho), \quad (4)$$

$$y = 1, S = 1 : \text{Prob}(y = 1, S = 1 | \mathbf{x}_1, \mathbf{x}_2) = \Phi_2(\mathbf{x}'_1 \boldsymbol{\beta}, \mathbf{x}'_2 \boldsymbol{\alpha}, \rho). \quad (5)$$

Following the logic of Eqs. (1) and (2), we formulate our empirical model and estimate the coefficients using a maximum likelihood method:⁹

$$\text{discouraged}_i = \beta_1 + \beta_2 \cdot \text{FC}_i + \beta_3 \cdot \text{BD}_i + \beta_4 \cdot \text{BR}_i + u_i \quad (6)$$

$$\text{need}_i = \alpha_1 + \alpha_2 \cdot \text{FC}_i + \alpha_3 \cdot \text{BD}_i + \alpha_4 \cdot \text{BR}_i + \alpha_5 \cdot \text{IR}_i + \varepsilon_i \quad (7)$$

Discouraged is equal to 1 if a firm need credit but does not apply for any. It is only observed if *need* in Eq. (7) is equal to 1, which means a firm expresses a need for external financing. FC are the variables capturing firm characteristics such as firm size, industry, region, age, and export orientation across all firms *i* (see Table 3). BD contains variables capturing business development, such as past and expected future revenues and past employment development. BR are the bank relationship variables capturing the length of the main bank relationship, number of bank relationships, the structure of the main bank, and whether the firm has more than one prevailing credit line. The selection

equation (5) also contains instruments (IR), which are excluded from the outcome equation for identification purposes. For the model of discouraged borrowers, we use two exclusion restrictions.

To evaluate the efficiency of the self-rationing mechanism, we try to evaluate whether a discouraged firm has more in common with approved firms or with denied ones. We first do this descriptively, and then calibrate a model in the style of Eqs. (4) and (5), for which the dependent variables are *denied* and *applied* respectively. Based on this model, we predict the conditional probability of being denied for each firm, and then compare those predictions across the groups of applied versus denied firms to assess the efficiency of the self-rationing.

4.2 Dependent variables

We classify firms reporting that they did not apply for bank credit during the previous 12 months as *No-Need*. This group excludes those who indicated the need for credit but did not apply for it. *Discouraged* firms are those reporting that they did not apply for bank credit during the previous 12 months but answered that they would have needed external financing. We further asked the firms to specify which aspects led to their decision. The seven answers included “application procedures for loans or line of credit are complex,” “costs are too high,” “collateral requirements for loans or line of credit are unattainable,” “bank has recently withdrawn a credit line,” “did not think it would be approved,” “cheaper external financing from non-bank was available,” and “loss of control over the firm.” Firms reporting that they applied for a bank credit during the previous 12 months but were denied a loan are classified as *Denied*, and *Approved* firms are those reporting that they applied for a bank loan during the previous 12 months and were approved for credit.

⁹ We apply this using the command *heckprobit* STATA 16.

As mentioned above, our focus is on the discouraged firms. In most of the existing literature they have not been specifically identified, which categorizes them automatically in the no-need group of firms. Therefore, we first examine the three sequential financing steps in Fig. 1 using descriptive statistics to see whether there are important and significant differences between the groups in each step.

Second, we compare the denied firms with the approved ones. This allows us to estimate the efficiency of the self-rationing mechanism. Inefficient self-rationing indicates that a discouraged firm would have been approved had it applied for credit.

4.3 Independent variables

This section describes the independent variables that we selected for our analyses. Table 1 provides an overview of all variables used. For our independent variables, this study focuses on three broad components to explain the likelihood of needing credit or being discouraged, approved, or denied loans: (i) firm characteristics, (ii) business development, and (iii) the bank relationship.

4.3.1 Firm characteristics

First, we classify firms by industry using a set of dummy variables and following the Swiss NOGA code. The NOGA 2008 (General Classification of Economic Activities) is an essential tool for Swiss companies for structuring, analyzing, and presenting statistical information. It enables the statistical unit of enterprises to be classified by their economic activity and categorized into coherent groups. In our sample, we classify firms into manufacturing, construction, trade, restaurants and hotels, service I and service II firms. Firms in the manufacturing and construction industries are thought to be more creditworthy because they typically have more tangible assets that can be pledged as a collateral than firms in more service-oriented industries or in those considered risky, such as the restaurant and hotel industry.

We expect that the size of the firm, as measured with dummy variables for micro-companies (2–9 employees), small companies (10–49 employees), and medium-sized companies (50–249 employees) to have a significant impact on the level of discouragement and the chance of obtaining credit. Larger firms are expected to be more creditworthy because they tend to be better

established, are typically more diversified, and have more collateral than smaller firms. Empirical studies found that micro and small firms face more obstacles in accessing finance than large firms (Beck, Demirgüç-Kunt, et al., 2008b; Beck et al., 2005). Furthermore, young and small firms are more opaque and might also have fewer alternative financing sources and thus may be more likely to need credit due to information asymmetries. There are higher barriers to collecting information from micro and small firms because it is often more costly and thus inefficient for financial institutions to screen these firms (Baas & Schrooten, 2006). Older firms typically have longer established banking and lending relationships with one or multiple banks and thus usually benefit from easier access to bank debt thanks to reputational effects. Furthermore, these borrowers are also more likely to apply for credit and be less discouraged given their experience and hence face lower application costs. We therefore expect that small firms are more likely to be discouraged from applying for a loan, and more likely to have a loan application denied.

We also analyze whether more export-oriented firms are more likely to be discouraged and less likely to obtain credit. On the one hand, as Brown et al. (2011) find, exporters might have a higher credit demand because they have a greater need for working capital. On the other hand, we expect SMEs with a considerable share of export orientation to suffer more and be more likely to be discouraged and denied after a domestic currency appreciation as experienced in Switzerland in 2015.

We expect that the age of a firm, measured by the number of years since the firm started its operations, has a positive influence on the availability of credit and a negative relation with discouragement. Older firms are thought to be more creditworthy because they have survived the high-risk start-up period in a firm's life cycle and, over time, have developed a public track record that can be scrutinized by prospective lenders. Empirical studies find that older firms report fewer financing issues (Beck et al., 2006).

We also add a dummy variable for the region in which the SME does business. We expect that SMEs in the German-speaking northern part of Switzerland (dummy variable "north") and in the French-speaking west ("west") are less likely to be discouraged and have a better chance of obtaining credit than in the Italian-speaking southern (dummy variable "south") part of

Table 1 Variable definition

Variable category/ name	Definition
Firm characteristics	
Industry	Indicator variable for industry according to the definition of “General Classification of Economic Activities” (FSO, 2008). Excluded are agriculture, forestry, fishing (section A), financial and insurance activities (section K), public administration and defense, compulsory social security (section O), activities of households as employers of domestic personnel (section T), and activities of extraterritorial organizations and bodies (section U)
Manufacturing	Mining (section B), manufacturing (section C), electricity gas steam and air-conditioning supply (section D), and water collection treatment and supply (section E)
Construction	Construction of buildings, civil engineering, and specialized construction activities (section F)
Trade	Wholesale and retail trade and repair of motor vehicles and motorcycles (section G)
Restaurant/hotel	Accommodation, food, and beverage service activities (section I)
Services I	Transportation and storage (section H), information and communication (section J), real estate (section L), professional scientific and technical activities (section M), and administrative and support service activities (section N)
Services II	Education (section P), human health and social work activities (section Q), arts, entertainment, and recreation (section R), and other service activities (section S)
Size	Dummy for number of employees (full time equivalent): 2–9 employees, 10–49 employees, 50–249 employees
Export oriented	Revenue of 25% or more with exports or foreign customers
Age	Age of SME in years
Region	Dummy for main residency of firm by language region: North (German speaking), West (French speaking), and South (Italian speaking)
Private or family owned	Majority of firm is owned by an individual or a family
Mortgage	Mortgages as share of total balance sheet of equal or more than 25%
Equity ratio >60%	Equity share of total balance sheet of equal or more than 60%
Business development	
Past staff reduction	Number of employees decreased over past 12 months
Revenues down	Revenues decreased over previous 12 months
Revenues up	Revenues increased over previous 12 months
Expected revenues down	Firm expects revenues to decrease in the coming 2–3 years
Expected revenues up	Firm expects revenues to increase in the coming 2–3 years
Bank relationship	
Nr. of bank rel.	Dummy for number of banks at which the firm has an account: 1, 2, 3, >3
Changed main bank	Firm has transferred its main bank relationship in previous 12 months
Main bank	Dummy for main bank relationship: large bank (UBS or Credit Suisse), cantonal bank, Raiffeisen bank, regional bank, PostFinance, other (foreign or other bank type)
More than 1 credit	Dummy for having more than 1 credit line at the moment

Switzerland, because the economic growth in the southern part of Switzerland was lower in recent years.

Furthermore, we include a dummy variable for private and family ownership, as opposed to firms that are owned by the public or other firms. The company is “private or family owned” if private individuals own 50% or more of the firm. Generally, we expect that a lender perceives a privately owned company to be more creditworthy because the firm may exhibit lower agency costs than when an outsider manages the firm. This was theoretically suggested by Jensen and Meckling (1976) and empirical support was found by Ang et al. (2000).

For the financial situation of the SME, we first included a dummy variable, “mortgage,” in our regression model. This dummy variable shows whether the firm has a mortgage or not. Due to the apparent existence of collateral in the form of real estate, we expect firms with an existing mortgage to be less discouraged and more likely to obtain credit.

Furthermore, we expect a high equity ratio to lead to a lower probability of needing external financing, but not to have an impact on discouragement. We defined a company with a “high equity ratio” as one with an equity ratio of at least 60%.

4.3.2 Business development

The firms were asked about their past development with questions about the number of employees and revenue, as well as their expected revenue in the coming 12 months. Specifically, we asked whether the development was and is expected to be positive (growing), neutral, or negative (shrinking). We expect firms with a decreasing number of employees, a downward trend in revenues in the past, and with revenues expected to decline in the next 12 months, to be more likely to be discouraged and denied. Conversely, we expect firms with increasing revenues and expecting growth in revenues to have a higher need for credit and a lower probability of being discouraged or denied a loan.

4.3.3 Bank relationship

We add a dummy variable to analyze whether the number of bank relationships has a significant impact on being discouraged, having a need for, or being denied credit. According to our hypothesis 4, we expect the number of bank relationships to correlate negatively with the probability of discouragement. Furthermore,

we add dummy variables for the main bank of the SME. Following the classification of the Swiss National Bank, we differentiate between the large banks, cantonal banks, Raiffeisen banks, regional banks, PostFinance, and others. PostFinance poses a special case as it is not allowed to extend loans on its own account. Firms with their main bank relationship at PostFinance therefore need to obtain their loans from another bank, which imposes an informational disadvantage. According to hypothesis 6, we expect customers from PostFinance to experience a higher degree of discouragement. The same proposition is made for state-owned banks, following the argument of the lack of market discipline stated in Sect. 2. In Switzerland, the 24 cantonal banks combined hold a considerable market share. Small and regional banks are expected to maintain closer ties with an SME than a large bank, thus reducing informational asymmetries. This leads to hypothesis 5, where customers of large banks tend to be discouraged more often than customers of small and regional banks.

4.4 Descriptive statistics

Table 2 reports descriptive statistics for the weighted full sample of 1,922 observations and separately for the groups of no-need, discouraged, denied, and approved firms, according to our sequential financing process shown in Fig. 1.

Sorting by industry, 45% of the firms are active in services, 19% in trade, 13% each in manufacturing and construction, and 10% in the restaurant and hotel sector. Comparing the employment size, 74% of these firms have 2–9 employees, 21% have 10–49 employees, and 4% have between 50 and 249 employees. Roughly 9% of the firms are export oriented, which means that more than 25% of their revenues stem from business and exports abroad. The average firm in our sample has been in business for almost 29 years. Half of these firms have been in business for 20 years or less.

The vast majority of the Swiss SMEs are based in the German-speaking part (north, 71%). About one SME out of four is active in the French-speaking area (west, 23%) and a small minority of the SMEs are located in the Italian-speaking south part of Switzerland (6%). Split by ownership, 75% of the firms are privately or family owned, while the remaining 25% are owned by public shareholders or another firm. Looking at the capital ratio of Swiss SMEs, we find that one in five

Table 2 Descriptive statistics for full sample and subsamples

Variable	Full sample (<i>n</i> = 1922)		No need (<i>n</i> = 1475)		Discouraged (<i>n</i> = 122)		Denied (<i>n</i> = 17)		Approved (<i>n</i> = 262)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Firm characteristics										
Industry										
Manufacturing	13.03%	0.34	12.43%	0.33	6.79%	0.25	16.10%	0.37	19.97%	0.40
Construction	13.19%	0.34	13.77%	0.34	12.79%	0.33	11.56%	0.32	10.54%	0.31
Trade	19.07%	0.39	18.08%	0.38	26.97%	0.44	24.16%	0.43	21.61%	0.41
Restaurant/hotel	9.90%	0.30	9.44%	0.29	15.63%	0.36	10.05%	0.30	9.65%	0.30
Services I	26.39%	0.44	26.46%	0.44	25.25%	0.43	22.44%	0.42	27.51%	0.45
Services II	18.42%	0.39	19.82%	0.40	12.57%	0.33	15.69%	0.36	10.71%	0.31
Size										
2–9 Employees	74.20%	0.44	74.69%	0.43	85.40%	0.35	88.30%	0.32	63.26%	0.48
10–49 Employees	21.47%	0.41	21.55%	0.41	13.51%	0.34	11.70%	0.32	26.71%	0.44
50–249 Employees	4.33%	0.20	3.77%	0.19	1.09%	0.10	0.00%	0.00	10.03%	0.30
Export oriented	9.36%	0.29	8.48%	0.28	13.06%	0.34	14.11%	0.35	14.21%	0.35
Age	28.92	51.48	27.56	46.76	21.02	20.74	27.71	21.46	40.65	82.11
Region										
North	70.99%	0.45	73.71%	0.44	52.76%	0.50	52.65%	0.50	66.27%	0.47
West	23.06%	0.42	20.60%	0.40	36.85%	0.48	40.26%	0.49	28.95%	0.45
South	5.95%	0.24	5.70%	0.23	10.39%	0.31	7.09%	0.26	4.77%	0.21
Private or family owned	74.69%	0.43	73.98%	0.44	82.07%	0.38	92.15%	0.27	76.34%	0.43
Mortgage	19.13%	0.39	15.37%	0.36	7.32%	0.26	20.51%	0.40	49.89%	0.50
Equity ratio >60%	19.69%	0.40	21.89%	0.41	14.11%	0.35	20.51%	0.40	9.60%	0.29
Business development										
Past staff reduction	18.83%	0.39	15.79%	0.36	42.50%	0.49	42.05%	0.49	22.33%	0.42
Revenues down	31.10%	0.46	29.05%	0.45	45.49%	0.50	64.49%	0.48	31.84%	0.47
Revenues up	22.67%	0.42	21.99%	0.41	24.84%	0.43	23.68%	0.43	27.48%	0.45
Expected revenues down	23.03%	0.42	22.41%	0.42	27.52%	0.45	52.99%	0.50	23.18%	0.42
Expected revenues up	32.54%	0.47	30.83%	0.46	41.91%	0.49	23.68%	0.43	37.83%	0.49
Bank relationship										
Nr. of bank rel.										
1	39.08%	0.49	40.30%	0.49	50.69%	0.50	17.55%	0.38	27.38%	0.45
2	28.73%	0.45	28.14%	0.45	27.65%	0.45	54.58%	0.50	31.73%	0.47
3	13.07%	0.34	11.46%	0.32	12.02%	0.33	22.44%	0.42	23.06%	0.42
>3	7.00%	0.26	5.88%	0.24	2.72%	0.16	5.44%	0.23	15.67%	0.36
Changed main bank	2.28%	0.15	1.30%	0.11	5.74%	0.23	5.23%	0.22	7.15%	0.26
Main bank										
Large bank	28.21%	0.45	27.97%	0.45	26.46%	0.44	33.65%	0.47	29.43%	0.46
Cantonal bank	31.44%	0.46	31.41%	0.46	38.94%	0.49	18.58%	0.39	31.05%	0.46
Raiffeisen bank	15.48%	0.36	14.89%	0.36	15.54%	0.36	20.44%	0.40	18.07%	0.38
Regional bank	9.00%	0.29	8.98%	0.29	5.57%	0.23	14.25%	0.35	10.39%	0.31
PostFinance	6.97%	0.25	7.12%	0.26	12.38%	0.33	13.08%	0.34	2.21%	0.15
Other	8.90%	0.28	9.63%	0.30	1.12%	0.11	0.00%	0.00	8.85%	0.28
More than 1 credit	6.23%	0.24	3.73%	0.19	5.44%	0.23	19.13%	0.39	20.48%	0.40

Not shown here is the column of the 46 firms that applied for a loan and were still waiting for approval. Outputs for this table are not weighted

firms has an equity ratio of more than 60%. A similar share has a mortgage loan.

Looking at the business development of Swiss SMEs, we find that almost 19% of the SMEs reduced the number of employees in the previous 12 months; 31% of the Swiss SMEs had decreasing revenues, while 23% were able to further increase their revenues. The remaining 46% of the SMEs did not have a significant change in their revenues in the previous 12 months. When asked about their expectations over the coming 12 months, the overall view is rather positive: 33% of the SMEs expect that revenues are going to go up, whereas only 23% expect their revenues to go down.

As to the firm–bank relationship, Swiss SMEs seem rather loyal. The median firm operates with only two banks (mean: 2.11), and only a little over 2% of the firms have changed their main bank in the past year, whereas 2.5% intend to do so in the coming year. The most important banking groups for the SMEs are the 24 cantonal banks (market share of 31.4%), the large banks UBS and Credit Suisse (market share of 28.2%), and the Raiffeisen Bank (market share of 15.5%).

5 Results

Our empirical analysis is separated into two sections that correspond with the three-step sequential financing process. First, we look at steps one and two: which SMEs need credit and, if so, which are discouraged from applying for credit. The second section addresses the unresolved issue of whether the discouraged firms would have been likely to be denied or approved, and thus allows us a prediction of the efficiency of the self-rationing mechanism.

5.1 Who is discouraged

5.1.1 Descriptive statistics

The left-hand columns in Table 3 present descriptive statistics for firms that need credit and for firms that do not need credit, along with the *t* tests for differences between the means of these two groups. The right-hand columns present descriptive statistics for firms that were discouraged from applying for credit and firms that applied for credit, along with the *t* tests for differences between the means of these two groups.

Most of the firm characteristics differ significantly between the subsamples of firms that need credit and firms that do not need credit. An SME needing credit is more likely to be in the manufacturing industry (16.5% vs. 12.4%) and in trade (22.8% vs. 18.7%) than SMEs with no financing need. The smaller ones are less likely to need credit (60.4% vs. 65.3%) while larger SMEs more often need credit (18.3% vs. 12.5%). Older firms are more likely to need credit (35.4% vs. 29.0%). Companies based in the German-speaking part of Switzerland are less likely to need credit (49.9% vs. 63%), and SMEs from the French-speaking part of Switzerland are more likely to need credit (38.7% vs. 26.8%). Furthermore, companies that are more export oriented are more likely to need credit than companies that focus on the domestic market (14.8% vs. 9.3%). The two groups do not differ significantly in their ownership status, but the financing situation appears to play a significant role. Firms that need credit are twice as likely to have a mortgage than firms without need for credit (32.7% vs. 15.4%). Moreover, only 11.2% of SMEs who need credit have an equity ratio of 60% or more, whereas among those who had no need, 21.6% showed a high equity ratio.

Overall, on a weighted base, 21% of all Swiss SMEs needed credit in the previous 12 months, whereas 79% did not. This result is much lower than the SSBF showed for the USA, where in 2003 49% needed credit (Cole & Sokolyk, 2016). Looking at the variables that measure business development, companies with a staff reduction, fallen revenues, or an expected increase in revenues are more likely to need credit.

Measured by the average squared differences across the categories (Table 3, column 3), the bank relationship variables differ far less between the need SMEs and no-need SMEs than the firm characteristics (0.3% vs. 0.6%). Nevertheless, a firm in need of credit is significantly less likely to have only one bank relationship (32.7% vs. 38%) and more likely to have more than three bank relationships (13.9% vs. 7.5%). Thus, firms that experienced a need for external financing in the previous 12 months were also more likely to have several bank relationships and to be changing their main bank in the future. Differences regarding the structure of the main bank are only seen between the state-owned banks: Customers from PostFinance show less need for external financing, whereas those at cantonal banks report more financing needs.

Table 3 Univariate tests on means I

Variable	(1) No need (<i>n</i> = 1475)	(2) Need (<i>n</i> = 447)	(3) Diff.	(4) Discouraged (<i>n</i> = 122)	(5) Apply (<i>n</i> = 325)	(6) Diff.
Firm characteristics						
Industry						
Manufacturing	12.4%	16.6%	4.2%**	6.6%	20.3%	13.8%***
Construction	12.3%	10.1%	-2.2%	11.5%	9.5%	-1.9%
Trade	18.7%	22.8%	4.1%*	26.2%	21.5%	-4.7%
Restaurant/hotel	8.5%	10.3%	1.8%	15.6%	8.3%	-7.3%***
Services I	28.1%	27.1%	-1.1%	28.7%	26.5%	-2.2%
Services II	20.0%	13.2%	-6.8%***	11.5%	13.9%	2.4%
Size						
2–9 Employees	65.3%	60.4%	-4.9%*	77.9%	53.9%	-24.0%***
10–49 Employees	22.2%	21.3%	-0.0	18.0%	22.5%	4.4%
50–249 Employees	12.5%	18.3%	5.8%***	4.1%	23.7%	19.6%***
Export oriented	9.2%	14.8%	5.5%***	13.9%	15.1%	1.1%
Age	29.0	35.4	6.4**	22.0	40.5	18.5***
Region						
North	63.0%	49.9%	-13.1%***	40.2%	53.5%	13.4%**
West	26.9%	38.7%	11.9%***	42.6%	37.2%	-5.4%
South	10.2%	11.4%	1.2%	17.2%	9.2%	-8.0%**
Private/family owned	69.2%	72.5%	3.3%	77.9%	70.5%	-7.4%
Mortgage	15.4%	32.7%	17.3%***	7.4%	42.2%	34.8%***
Equity ratio >60%	21.6%	11.2%	-10.4%***	13.1%	10.5%	-2.7%
Business development						
Past staff reduction	16.3%	30.4%	14.1%***	41.8%	26.2%	-15.7%***
Revenues down	30.2%	39.2%	9.0%***	47.5%	36.0%	-11.5%**
Revenues up	22.4%	25.1%	2.7%	22.1%	26.2%	4.0%
Expected revenues down	22.2%	25.3%	3.1%	27.1%	24.6%	-2.4%
Expected revenues up	31.5%	39.6%	8.1%***	40.2%	39.4%	-0.8%
Bank relationship						
Nr. of bank relationship						
1	38.0%	32.7%	-5.4%**	48.4%	26.8%	-21.6%***
2	27.5%	30.0%	2.5%	27.9%	30.8%	2.9%
3	12.7%	19.5%	6.8%***	13.9%	21.5%	7.6%*
>3	7.5%	13.9%	6.4%***	4.1%	17.5%	13.4%***
Changed main bank	1.4%	6.5%	5.1%***	6.6%	6.5%	-0.1%
Main bank						
Large bank	30.2%	30.7%	0.4%	27.9%	31.7%	3.8%
Cantonal bank	30.9%	34.0%	3.1%	40.2%	31.7%	-8.5%*
Raiffeisen bank	14.0%	15.2%	1.2%	15.6%	15.1%	-0.5%
Regional bank	8.1%	8.1%	0.0%	4.1%	9.5%	5.4%*
PostFinance	7.1%	5.4%	-1.7%	10.7%	3.4%	-7.3%***
Other	9.7%	6.7%	-3.0%*	1.6%	8.6%	7.0%***
More than 1 credit	4.1%	18.1%	14.0%***	4.9%	23.1%	18.2%***
Total squared diff.		16.8%	0.5%		48.1%	1.4%
Firm sq. diff.		9.5%	0.6%		31.5%	1.9%
Business sq. diff.		3.6%	0.7%		4.0%	0.8%
Bank rel. sq. diff.		3.7%	0.3%		12.6%	1.0%

First two of each subcolumn report the mean of the subsamples, third column their deviation. Asterisks indicate the *p* values of test on proportions: ****p*<0.01, ***p*<0.05, **p*<0.1

If we compare the groups of discouraged borrowers with the group of applying firms, we also find that most of the firm characteristics differ significantly from each other. Similarly, most differences stem from firm characteristics, whereas the bank relationship variables seem to differ less. The restaurant and hotel industry seems to be discouraged more often than any other. Among the smaller firms, a high share is also discouraged, although those from the German-speaking part and those owning a mortgage (7.4% vs. 42%) are discouraged less often. Shrinking staff numbers and revenues are associated with higher rates of discouragement. Maintaining only one bank relationship also tends to raise discouragement.

While 21% of all Swiss SMEs needed credit in the previous 12 months, nearly one-third of them (29%) did not apply. This number is rather high compared to other studies. It is therefore of great interest to look at the reasons the SMEs refrained from applying for bank credit, even though they needed it. Fig. 2 illustrates the reasons, divided into the partial and absolute reasons for being discouraged.¹⁰ The fear of the costs being too high was at least a partial reason not to apply for credit for a minimum of 60% of the discouraged firms. But only one in four of them stated that this was the main reason not to apply.

A much more dominant presumption was that the collateral at hand would not suffice to obtain a loan (82%), followed by the expectation of a cumbersome credit application procedure (79%). It seems rather surprising that a purely bureaucratic argument is the second most common reason for being discouraged. Furthermore, about 70% of the discouraged borrowers did not apply solely because they “expect to be denied”.

5.1.2 Multivariate analysis

We now look at discouraged firms by using a sequential Probit regression. For identification purposes, we omit two variables from the outcome equation. First, we assume that a rise in expected future revenues increases the demand for funding but does not affect discouragement. This is in line with assumptions in Ferrando et al. (2019) and Freel et al. (2012). Second, we argue that a firm that has changed its main bank in the previous 6

months has done so because of an unmet demand for financing. The exclusion restriction should be satisfied because we do not expect this to intervene with the probability of being discouraged. Table 3 has shown that discouraged firms are as likely to have changed their main bank as firms that have applied for external funding (6.6% vs. 6.5%).

Table 4 reports the marginal effects and the standard errors of the outcome (columns 1 and 2) and selection equations (columns 3 and 4). The dependent variable in the outcome equation is discouraged, which is equal to 1 if the firm indicated that it needed credit but was discouraged from applying and equal to 0 if the firm indicated that it needed credit and applied for credit.

Our two instruments in the selection equation are significant. SMEs that changed their main bank in the previous 12 months are more likely to need external financing (+22.8 percentage points). Moreover, firms with an expected rise in revenues are more likely to need a loan (+5.4 percentage points). The estimated inverse hyperbolic tangent of ρ of -0.86 with a standard error of 0.43 indicates that the correlation coefficient between the error terms of the outcome and selection equations is significant at the 5% level. Thus, by the general rule, the technique for treating selection bias should be applied. As a robustness test, we also calculated standard Probit model and find no sign change or noticeable difference (Appendix 2). Nevertheless, the peril of weak instruments exists.¹¹ The industry classification seems to have a statistically and economically significant impact on firms related to their probability of applying for credit if needed. Firms in the manufacturing industry (base dummy variable) have a significantly smaller probability of being discouraged than firms in other industries.

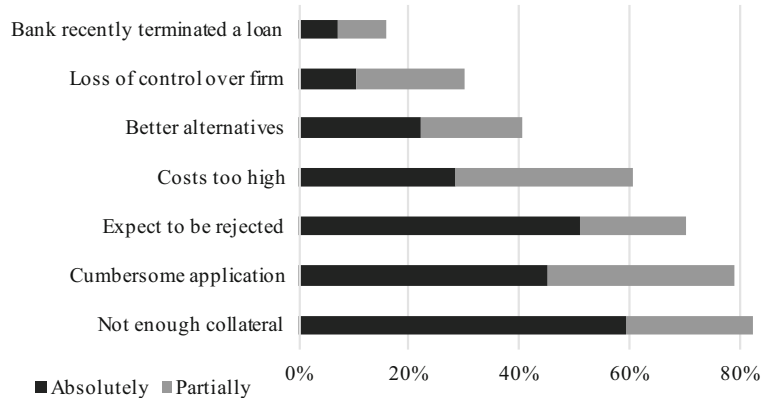
We can support the evidence of other studies that found smaller firms to be more frequently financially constrained. The probability of the smallest firms, those with less than 10 employees, being discouraged is 19.8 percentage points higher than for firms with between 50 and 250 employees.

A less-conclusive factor than differentiation by industry and size is that of age. Firms founded before 1980 are less likely to be discouraged than firms that were founded in 2010 or later (+11.9 percentage points). This result is in line with survey results from European and US SMEs. But in our analysis, the impact of age is not

¹⁰ Firms could for each attribute differentiate whether it was “not,” “partially,” or “absolutely” the reason, and multiple answers were possible.

¹¹ See Murray (2006) for an in-depth discussion of weak instruments.

Fig. 2 Reasons for being discouraged



significant for any age group and indicates to large variations of discouragement among firms of similar age. Therefore, our hypothesis 2, that younger firms are more likely to be discouraged, cannot be supported. It is not clear whether younger firms in Switzerland are actually less discouraged from applying for a bank loan or whether there is an underlying relationship that we failed to capture. Previous empirical work looking at young credit-constrained firms hinted at the potential effect of relationship banking and firm size (Beck et al., 2018; Hadlock & Pierce, 2010). This aspect seems to deserve more attention for future research.¹²

Export-oriented firms in general, those firms that generate at least one quarter of their revenues from exporting goods or services, are not significantly more often discouraged than firms with fewer or no export products. This is surprising given the fact that Switzerland abolished the quasi-exchange-rate peg of the Swiss Franc to the euro on 15 January 2015, which led to a jump of the Swiss Franc of roughly 20%. Export-oriented Swiss firms thus suffered considerable revenue losses due to the sudden currency appreciation. Nevertheless, on average this does not make them less optimistic about their chances of obtaining a bank loan. What we can see from the first-stage regression (3rd and 4th columns of Table 4) is that export-oriented firms are significantly more likely to have needed external financing (+6.1 percentage points). But regarding discouragement, we do not observe a significant impact of being an export-oriented SME.

¹² A solution would be to interact firm age with variables capturing relationship banking and firm size. In our case, more observations would be needed in the corresponding subsamples for a conclusive analysis.

More importantly, regional differences seem to exist. Firms based in the Italian-speaking part of Switzerland (south) are more likely to be discouraged than firms in the German- (north) and French-speaking (west) parts. This correlation coincides with the corresponding development of economic growth in these regions in recent years.

Private or family-owned firms, which make up nearly 75% of Swiss SMEs, are slightly more likely to be discouraged. This is against our expectation of lower agency costs for privately held firms, as theoretically suggested by Jensen and Meckling (1976) and empirically supported by Ang and Cole (2000). But it agrees with evidence found for the Italian manufacturing industry between 1995 and 2006 (Murro & Peruzzi, 2019). They concluded that “family owned firms are more likely to experience credit restrictions.” They identified two means for family businesses to overcome their financial constraints: public guarantees and long-lasting and closer bank lending relationships.

SMEs with a mortgage loan account for nearly 20% of our full sample. Of the firms with a need for external financing over the past year, one third had a mortgage. For mortgages, the lending bank does not have to rely solely on soft information to evaluate the creditworthiness of the firm. A relevant factor is the market value of the mortgaged property. Our results show that firms with a mortgage are far less likely to be discouraged (−24.8 percentage points), which is in support of our 3rd hypothesis.

As to business development, we find that the development of the past revenues has no significant impact on the firm’s financing decision process. But firms who had to reduce their staff were much more likely (by 11.7 percentage points) to be discouraged than other firms.

Table 4 Probit selection model results: discouraged

Variable	Discouraged		Need	
	M.E.	Std. Err	M.E.	Std. Err
Firm characteristics				
Industry (base = manufacturing)				
Construction	+21.4%**	0.084	-0.2%	0.011
Trade	+25.6%***	0.074	+1.4%	0.011
Restaurant/hotel	+11.2%	0.080	-0.8%	0.020
Services I	+16.3%***	0.063	+0.1%	0.018
Services II	+8.6%	0.076	-2.0%	0.014
Size (base = 50–249)				
2–9 Employees	+19.5%***	0.074	-0.3%	0.021
10–49 Employees	+11.4%	0.082	-5.4%**	0.024
Export (> 25% of revenue)	+3.8%	0.065	+6.1%**	0.026
Founded (base = before 1980)				
1980–1989	+6.9%	0.078	+0.2%	0.031
1990–1999	+5.3%	0.069	-1.8%	0.023
2000–2009	+0.8%	0.067	-2.7%	0.027
2010–2016	+11.9%	0.077	-3.5%	0.037
Region (base = North)				
West	-2.7%	0.048	+13.7%***	0.013
South	+14.2%***	0.069	+8.7%***	0.020
Private or family owned	+5.8%	0.051	+2.0%	0.023
Mortgage	-24.8%***	0.048	+7.1%**	0.030
More than 60% equity	+15.6%**	0.065	-22.3%***	0.030
Business development				
Past staff reduction	+11.7%**	0.055	+12.9%***	0.031
Revenues down	+6.6%	0.058	+1.2%	0.020
Revenues up	+7.0%	0.058	+2.8%	0.028
Expected revenues up			+5.4%*	0.027
Bank relationship				
Nr bank rel. (base=1)				
2	-9.2%*	0.053	+0.2%	0.015
3	-11.5%*	0.069	+6.4%***	0.024
>3	-23.1%***	0.073	+2.8%	0.042
Changed main bank			+22.8%***	0.062
Main bank (base = large)				
Cantonal bank	+11.4%**	0.058	+1.3%	0.019
Raiffeisen bank	-7.7%	0.068	+3.4%	0.030
Regional bank	-1.1%	0.098	-0.6%	0.035
PostFinance	+18.5%**	0.093	+5.0%	0.045
More than 1 credit	-4.1%	0.084	+11.8%**	0.054
Inverse hyperbolic tangent of ρ			-0.86**	0.43
Wald test of indep. eqns. ($\rho = 0$) $\chi^2(1) = 4.03$ Prob > $\chi^2 = 0.045$				

First two columns report average marginal effects (M.E.) and standard errors of the outcome equation, and third and fourth columns the average marginal effects and standard errors of the selection equation. Asterisks indicate the *p*-values of test on proportions: ****p*<0.01, ***p*<0.05, **p*<0.1. “Expected revenues up” and “Changed main bank” are identifying restrictions and are therefore only included in the selection equation

Our firm–bank relationship factors are of statistical and economic significance. We find that SMEs with several bank relationships are much less likely to be discouraged than firms with only one bank relationship. Having two relationships compared to only one lowers the probability for being discouraged by 9.2 percentage points. Firms with three or more bank relationships are even less likely (-23.1 percentage points) to be discouraged. This supports our fourth hypothesis.

Concerning the main bank relationship, we find that firms with a main relationship to smaller banks, such as the regional banks and Raiffeisen banks, are less likely to be discouraged from applying for credit. These banks generally try to distinguish themselves by their regional market know-how and their appreciation of stronger firm–bank relationships. This gives us supporting evidence for our fifth hypothesis.

By contrast, customers from cantonal banks and PostFinance, both mostly state owned, are significantly more often discouraged than those of large, regional, and Raiffeisen banks. This supports our sixth hypothesis. PostFinance poses a special case as it is not allowed to make loans on its own account. This means that firms whose main bank relationship is with PostFinance need to obtain their loan or mortgage from a bank that is not their main banking partner. This makes it more difficult for the lending bank to evaluate a firm’s creditworthiness, as the main transaction accounts are not within their reach. We see this as new evidence for the importance of a strong relationship between a firm and its main bank.

5.2 Efficiency of self-rationing

Discouragement can also be viewed as an efficient self-rationing mechanism. But if “good” borrowers, who would have obtained credit from a bank, did not apply for a loan due to discouragement, then self-rationing is inefficient. In this section, we focus on the third step of our sequential financing process and discuss our first hypothesis, regarding discouragement and firm quality. By analyzing what kind of applying SMEs were recently denied or approved by banks, we obtain a pattern of the banks’ credit decisions. Applying this to the discouraged firm then allows us to estimate the efficiency of this self-rationing mechanism.

Table 5 Univariate tests on mean II—approved or denied

Variable	Discouraged (<i>n</i> = 122)	Approved (<i>n</i> = 262)	Diff. to discourag.	Denied (<i>n</i> = 17)	Diff. to discourag.
Firm characteristics					
Industry					
Manufacturing	6.6%	22.5%	16.0%***	11.8%	5.2%
Construction	11.5%	9.9%	-1.6%	11.8%	0.3%
Trade	26.2%	21.4%	-4.9%	29.4%	3.2%
Restaurant/hotel	15.6%	7.6%	-7.9%**	11.8%	-3.8%
Services I	28.7%	26.7%	-2.0%	23.5%	-5.2%
Services II	11.5%	11.8%	0.4%	11.8%	0.3%
Size					
2–9 Employees	77.9%	49.2%	-28.6%***	88.2%	10.4%
10–49 Employees	18.0%	23.7%	5.6%	11.8%	-6.3%
50–249 Emp	4.1%	27.1%	23.0%***	0.0%	-4.1%
Export oriented	13.9%	17.6%	3.6%	11.8%	-2.2%
Age	22.0	42.4	20.5***	26.7	4.7
Region					
North	40.2%	55.3%	15.2%***	41.2%	1.0%
West	42.6%	35.9%	-6.8%	47.1%	4.4%
South	17.2%	8.8%	-8.4%**	11.8%	-5.5%
Private/family owned	77.9%	70.6%	-7.3%	94.1%	16.3%
Mortgage	7.4%	47.7%	40.3%***	23.5%	16.2%**
Equity ratio >60%	13.1%	10.3%	-2.8%	17.7%	4.5%
Business developm.					
Past staff reduction	41.8%	24.1%	-17.8%***	47.1%	5.3%
Revenues down	47.5%	32.8%	-14.7%***	64.7%	17.2%
Revenues up	22.1%	28.2%	6.1%	23.5%	1.4%
Expected rev. down	27.1%	23.3%	-3.8%	52.9%	25.9%**
Expected rev. up	40.2%	40.1%	-0.1%	23.5%	-16.6%
Bank relationship					
Nr. of bank relationship					
1	48.4%	25.2%	-23.2%***	17.7%	-30.7%**
2	27.9%	30.2%	2.3%	58.8%	31.0%***
3	13.9%	22.5%	8.6%**	17.7%	3.7%
>3	4.1%	19.5%	15.4%***	5.9%	5.1%
Changed main bank	6.6%	7.6%	1.1%	5.9%	-0.7%
Intends to change bank	3.3%	3.4%	0.2%	17.7%	14.4%**
Main bank					
Large Bank	27.9%	31.7%	3.8%	29.4%	1.5%
Cantonal bank	40.2%	33.6%	-6.6%	17.7%	-22.5%*
Raiffeisen bank	15.6%	14.1%	-1.5%	23.5%	8.0%
Regional bank	4.1%	9.2%	5.1%*	17.7%	13.6%**
PostFinance	10.7%	1.9%	-8.8%***	11.8%	1.1%
More than 1 credit	4.9%	25.2%	20.3%***	17.7%	12.7%**
Squared diff. (sum/avg.)		58.6%	1.7%	50.2%	1.5%
Firm squared diff.		41.9%	2.5%	8.6%	0.5%
Business squared diff.		5.8%	1.2%	12.7%	2.5%
Bank rel. squared diff.		10.8%	0.9%	28.9%	2.4%

Columns 1, 2, and 4 report the mean, columns 3 and 5 the deviations of the subsamples approved and denied from the means of the discouraged. Asterisks indicate the *p* values of tests on proportions: ****p* < 0.01, ***p* < 0.05, **p* < 0.1. The last four rows show the average of the squared differences between the groups overall and for the three sub-categories of the variables

5.2.1 Univariate statistics

Table 5 presents univariate statistics for discouraged borrowers, along with *t* tests for differences in means between this group and the groups of approved and denied borrowers. These results provide a first indication that discouraged firms might be more similar to the group of denied borrowers than to the group of approved borrowers. Relative to an approved firm, a discouraged firm has significantly fewer employees, is younger, had significantly more staff reductions and reduced revenues in the previous year, and is less likely to be in the manufacturing industry and more likely to be in the restaurant and hotel industry. Furthermore, a discouraged firm is less likely to have a mortgage loan or its headquarters in the German-speaking part of Switzerland (north) and is more likely to have only one bank relationship. The groups of discouraged and approved firms thus seem to be rather different.

The groups of denied borrowers and discouraged borrowers seem to have fewer significant differences. Relative to the discouraged firms, a denied firm is more likely to have a mortgage, to expect its revenues to go down, and to have two bank relationships rather than only one.

A very interesting observation is that nearly all denied firms are private or family owned. The share of the privately owned SMEs in Switzerland is 75%, and they are not significantly more likely to need credit or be discouraged, as seen in Table 4. But among the SMEs that were denied a bank loan in the previous 12 months, privately owned firms accounted for 94% (fourth row of Table 5).

The bigger picture shows that across our three groups of variables, the denied and the discouraged firms show the greatest resemblance in firm characteristics, whereas they differ most in their bank relationships (last four rows in Table 5). Interestingly, for the comparison between the discouraged and approved firms the opposite is true. The vast part of the difference stem from the firm characteristics.

5.2.2 Multivariate statistics

Table 6 presents the results from our Probit selection model comparing denied firms with approved ones. It should be noted here that with a sample of 279 firms that applied for financing but only 17 denied firms, the estimates are to be treated with caution. Furthermore, our first-stage estimates for loan applications (columns 3 and 4) are indicative of weak instruments, which make

our results prone to selection bias. We have also estimated a simple probit model and found no significant alteration of the marginal effects.

The average marginal effects of our first-stage results (columns 3 and 4) show that a firm applying for a loan is less likely to be in the restaurant and hotel or service II industries and more likely to have a mortgage loan. Also, we find that export-oriented firms seem to apply for loans more often than other firms. The same is observed for firms that already have more than one credit line.

The second stage results (columns 1 and 2) indicate that a firm that is denied is more likely to be in the construction industry, privately or family owned, and have experienced diminishing revenues. Furthermore, those without a mortgage loan are more likely to be denied. Surprisingly, we find that age does not seem to significantly affect the denial rate; rather it is firm size that matters. Smaller SMEs show a considerably higher probability of being denied than larger SMEs.

In the bank categories, we have previously observed higher discouragement across customers from state-owned banks. But we do not find a significant difference in denial rates among customers of cantonal banks. It seems that the self-rationing is more efficient within this bank group than the others. The other state-owned bank, PostFinance, shows higher denial rates among its clients. This is in line with our expectations, because SMEs with their main bank relationship at PostFinance need to apply for their loan at another bank due to regulatory limitations.

Table 7 shows the predicted probabilities of being denied credit based on the estimation results in Table 6. We are especially interested in the probability of a discouraged firm obtaining credit, as this allows us to discuss our first hypothesis. We therefore report the means of the predictions for the firms that applied, from which we observed the denial rate, and for our main group of interest, the discouraged firms. The first column reports the means of the predicted conditional probabilities across the two groups of SMEs and the difference. For the second column, we took the predicted probability and created a binary variable representing a prediction of either denied (0) or approved (1). The cut-off rate used was chosen conservatively at 0.05.¹³ All the denied firms were correctly identified, but the rejection rate was significantly overestimated.

¹³ The cut-off rate refers to the predicted probability, a continuous variable between 0 and 1. If this prediction is larger than 5%, we define the firm as potentially denied.

Table 6 Who is rejected: Probit selection model result

Variable	Denied		Apply	
	Coef.	Std. Err	Coef.	Std. Err
Firm characteristics				
Industry (base = manufacturing)				
Construction	+13.7%**	0.065	-3.9%	0.030
Trade	+2.2%	0.030	-2.6%	0.027
Restaurant/hotel	+0.4%	0.031	-5.5%*	0.031
Services I	+5.3%*	0.028	-2.8%	0.026
Services II	+12.5%*	0.065	-6.3%**	0.027
Size (base = 2–9)				
10–49 Employees	-9.7%***	0.021	-2.0%	0.017
50–249 Employees	-11.2%***	0.023	+4.2%*	0.025
Export (> 25% of revenue)	+0.9%	0.041	+6.8%**	0.028
Founded (base = before 1980)				
1980–1989	-7.5%	0.056	+0.7%	0.027
1990–1999	-5.8%	0.065	-4.7%**	0.023
2000–2009	-7.9%	0.061	-2.9%	0.023
2010–2016	-2.4%	0.070	-4.7%*	0.028
Region (base = north)				
West	+1.6%	0.031	+8.5%***	0.018
South	+1.0%	0.061	+1.2%	0.024
Private or family owned	+9.3%***	0.024	+1.6%	0.017
Mortgage	-7.1%***	0.025	+9.2%***	0.025
Business development				
Past staff reduction	+5.0%	0.063	+2.8%	0.021
Revenues down	+13.1%**	0.064	-1.6%	0.018
Revenues up	+10.0%*	0.054	+2.5%	0.020
Expected revenues down	+2.1%	0.045	+1.4%	0.020
Expected revenues up	-4.3%	0.032	+1.7%	0.018
Bank relationship				
Nr bank rel. (base = 1)				
2	+9.1%**	0.040	+2.4%	0.020
3	+11.8%	0.073	+3.6%	0.025
>3	-3.2%	0.030	+2.9%	0.030
Changed main bank	+2.3%	0.081	+15.6%***	0.056
Main bank (base = large)				
Cantonal bank	-4.8%	0.032	+0.5%	0.018
Raiffeisen bank	-2.9%	0.039	+1.8%	0.024
Regional bank	-0.6%	0.044	+1.1%	0.028
PostFinance	+21.1%*	0.126	-3.9%	0.030
More than 1 credit	+10.9%	0.073	+9.3%***	0.034

First two columns report marginal effects and standard errors of the outcome equation (being denied credit), third and fourth columns the marginal effects and standard errors of the selection equation (applying for credit). Asterisks indicate the p values of test on proportions: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7 Predicted denial rate for discouraged firms

	Probability of being denied conditional on applying in %	Binary prediction of being denied with cut-off at 5% in %
Applied	6.40	23.38
Discouraged	13.19	40.16
Difference	-6.79***	-16.78***

The predicted rejection rates in % for firms that applied for a loan and those who were discouraged are compared here. The predictions are based on the results from Table 6. The first column shows the mean of the probability of success conditional on applying. The second column shows the mean of binary predictions with cut-off rate at 0.05. We chose 5% to obtain a conservative estimate of the share that could have received a loan, due to the fact that only 17 firms in our sample were denied. Asterisks indicate the p values of test on proportions: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The observed rejection rate for the firms that applied was 6.09%, and our prediction was 6.40%. The corresponding prediction for the discouraged firms was nearly double that rate, but still well below 15%. Our conservatively constructed binary indicator predicted a rejection rate of 23.38% for the firms that applied, and 40.16% for the discouraged. The difference is again significant and thus hints at the presence of some degree of self-selection, meaning that firms anticipate that they will be rejected and thus do not apply for a loan. Nevertheless, even our conservative prediction suggests that about 60% of the discouraged firms would have obtained credit if they had applied for it. This leads to the conclusion that the majority of the discouraged firms would in fact obtain a loan, and therefore the self-rationing mechanism observed is rather inefficient.

6 Discussion and Conclusion

6.1 Discussion of the results

We construct and conduct a representative survey among small and medium sized enterprises specifically to analyze their perceived financing situation. With 1,922 participating SMEs, our sample represents 1.21% of the SME population in Switzerland. One in five participating SMEs had a need for external financing over the previous 12 months. Slightly more than half of those obtained financing, but nearly a third of the firms with a need, or 6.2% of all the participating SMEs, was discouraged from applying. However, only 6.1% of the applicants were denied a

loan, which corresponds to just 0.9% of all SMEs in the sample. Our results thus show that discouraged firms clearly outnumber denied firms. Empirical findings for the share of discouraged SMEs vary vastly across both countries and time. Estimates are low for Canada at 0.51% (Chandler, 2011), and for the UK at 2.65% (Cowling et al., 2016). Higher shares are estimated in the US with 8.75–14.04% (Cole & Sokolyk, 2016; Han et al., 2009) and France with 22.3% (Cieply & Dejardin, 2009).

In an international context, the percentage of discouragement among all firms is therefore not very high. But it is important to note that the share of Swiss SMEs with actual need for external financing over the 12 months prior to our survey was rather low at 21%. Measured on the basis of those SMEs who needed financing, the rate is 29% and comparable with results from the UK of 30% (Cowling et al., 2016) and the US at 18% and 37% in the years 2003 and 1998 respectively (Cole & Sokolyk, 2016).

Our results indicate that the group of discouraged borrowers is more similar to that of denied borrowers than to that of approved borrowers, but only with respect to firm characteristics. For variables describing business development and firm–bank relationship, discouraged SMEs have less in common with credit-constrained firms than with their unconstrained counterparts. This is of special interest because Swiss SMEs are six times more likely to be discouraged than rejected.

Using a sample selection model, we first identified factors associated with firms needing external financing, and then examined what the firms that refrained from applying for credit have in common. Among our main foci are the firm–bank relationship factors, of which two out of three are relevant determinants. We find consistent evidence that the number of bank relationships is negatively related to the probability of being discouraged. Furthermore, we find significant evidence that firms that maintain their main bank relationship with a government-owned bank are more likely to be discouraged. The special case of PostFinance, which is not allowed to issue loans, is very interesting. Firms with their main relationship at PostFinance need to apply for their loans at other banks, implying an informational disadvantage. These firms are 21.1 percentage points more likely to be discouraged than customers at large banks. The difference from those at cantonal, regional and Raiffeisen banks is even larger. We see this as new evidence for the importance of a strong relationship between a firm and its main bank.

Analysis of the discouraged firms is particularly interesting in the context of Switzerland in 2016 because its

open and export-oriented economy had to deal with an unexpected major shock in 2015 after the Swiss National Bank (SNB) lifted the minimum exchange rate of CHF1.20 per euro, introduced in September 2011. This decision led to a sudden and persistent increase of the Swiss Franc of roughly 20%. This put the 10% of export-oriented firms under particular pressure as prices and production cost were already comparatively high. However, our results show that the export-oriented firms indeed had a higher demand for external financing than other firms, but were not significantly more discouraged.

In our analysis, we also challenged the assumption that self-rationing is efficient. To do so, we estimated a second selection model for the denied firms that compared them to those who applied. We observed a rejection rate for firms that applied for a loan of 6.1%. Using the parameters from this model, we constructed a binary indicator with a conservative cut-off rate of 0.05, which predicted a rejection rate 40.2% for the discouraged SMEs. Thus, even with our conservative predictions, more than half of the discouraged firms would have obtained credit if they had applied for it. This supports our first hypothesis and leads to the conclusion that the majority of the discouraged firms would in fact obtain a loan, and therefore the self-rationing mechanism observed is rather inefficient. Banks and policy makers should thus think about how to minimize the group of discouraged borrowers. The dominant reason for being discouraged was the presumption that the collateral at hand would not suffice to obtain a loan, followed by the expectation of a cumbersome credit application procedure. It seems rather surprising that this purely bureaucratic argument is more often the reason for being discouraged than the expectation of being denied.

6.2 Recommendations for Banks, SME and policy makers

Our findings show that less than 1% of all SMEs were denied a loan.¹⁴ This means that nearly seven times more firms were discouraged than were denied a loan. With a total population of nearly 160,000 firms falling within the parameters of our study,¹⁵ this results in an estimate of around 10,000 discouraged Swiss SMEs.

¹⁴ If calculated from those firms with a financing need, the share is 6%.

¹⁵ The total number of SMEs is much larger at around 576,000. Firms excluded from the survey were those from the public, primary, and financial sectors, as well as private households, extraterritorial organizations, and firms with two or fewer employees.

Analyzing the main reasons the SMEs named for being discouraged, we see three options for making the self-rationing mechanism more efficient. First, many SMEs believe that the costs of a loan are too high. For nearly two thirds of the discouraged SMEs, this was at least a partial reason for not applying for a loan. However, and as our survey showed, the interest rates are not an issue for the firms with a credit line. Together with the fact that most discouraged SMEs have only one bank relationship, we think that a fast online way to obtain an indicative interest rate based on some individual company facts might help to reduce informational frictions and thus lower the number of discouraged borrowers. This kind of service should also interest banks, as most financial institutions seek new loan customers from the SME sector.

Secondly, nearly 80% of discouraged borrowers claim that the application process is cumbersome, which makes this the second most important factor for discouragement. Commercial banks could respond to this problem by enabling existing and potential corporate clients to submit a credit request online. A credit service in the online banking would offer SMEs a simple tool for corporate financing purposes as well as for monitoring all credit products. All documents (e.g. balance sheets, income statements, and business plans) relating to the credit request might be submitted online. Once all the necessary documents have been submitted, clients should expect an indicative response in real time and a final credit decision within 24 to 48 h. An easier application process might above all help small SMEs avoid discouragement. In addition, some SMEs might initially be reluctant to disclose their figures and provide personal and company identifying data. Ensuring that the query-of-credit conditions were anonymous might help to further reduce the inhibition to obtain an indicative offer.

Third, the collateral requirements of banks are still very high. A lack of collateral is the main reason for discouragement among 60% of the firms, and a partial reason for another 23%. This issue seems to be more difficult to solve, because banks secure almost all loans. However, in Switzerland, the federal government assists efficient and viable SMEs in obtaining bank credits by funding loan guarantee cooperatives. These cooperatives guarantee loans of up to CHF 1 million. The Confederation insures up to 65% of the associated risk. The authorities also pay a proportion of their administrative costs. This instrument could help many SMEs in obtaining credit. However, only 14% of the Swiss SMEs are aware of this option. It thus seems to be important

that policy makers put their focus mainly on making this offering better known among SMEs.

Overall, we find that many discouraged borrowers would have obtained credit if they had applied for it. Our conservative estimates put the number at around 5000 SMEs that would have obtained a loan in 2016—had they applied. This is a surprise in a country with such a sophisticated financial market as Switzerland’s. In our view, the suggestions made above should help to reduce the number of discouraged borrowers. However, improving the situation will require efforts on the part of banks with easier credit application processes, fast indications of interest rates, and online loans. But policymakers could also make loan guarantee cooperatives better known to the firms. Finally, the SMEs themselves and their trade associations could work on

reducing their barriers on financial issues and foster knowledge transfer.

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Appendix 1

Table 8 Sample and population weights

Region	Micro (2-9 FTE)			Small (10-49 FTE)			Medium (50-249 FTE)			All SME	
	Population	Sample	Factor	Population	Sample	Factor	Population	Sample	Factor	Population	Sample
North	52.20%	38.29%	1.42	15.63%	13.16%	1.36	3.16%	8.48%		70.99%	59.94%
Manufacturing	5.55%	3.90%	1.62	3.12%	2.29%	1.09	0.87%	1.93%	0.45	9.53%	8.12%
Construction	6.48%	4.01%	1.30	2.56%	2.34%	1.13	0.34%	0.99%	0.34	9.38%	7.34%
Trade	10.37%	7.96%	1.26	2.54%	2.24%	1.10	0.46%	1.25%	0.36	13.36%	11.45%
Services 1	14.25%	11.29%	1.42	3.96%	3.59%	1.40	0.75%	2.13%	0.35	18.97%	17.01%
Rest./ Hotel	5.01%	3.54%	1.39	1.31%	0.94%	1.21	0.17%	0.36%	0.46	6.49%	4.84%
Services 2	10.53%	7.60%		2.14%	1.77%		0.59%	1.82%	0.32	13.25%	11.19%
West	17.29%	19.15%	0.91	4.80%	6.50%	0.80	0.96%	3.95%		23.05%	29.60%
Manufacturing	1.75%	1.93%	1.07	0.87%	1.09%	0.96	0.23%	0.78%	0.29	2.84%	3.80%
Construction	2.12%	1.98%	0.79	0.80%	0.83%	0.62	0.11%	0.47%	0.23	3.03%	3.28%
Trade	3.50%	4.42%	0.92	0.77%	1.25%	0.66	0.12%	0.36%	0.33	4.39%	6.04%
Services 1	4.37%	4.73%	0.89	1.17%	1.77%	0.87	0.24%	1.04%	0.23	5.78%	7.54%
Rest./ Hotel	2.21%	2.50%	0.93	0.45%	0.52%	0.70	0.04%	0.16%	0.23	2.70%	3.17%
Services 2	3.34%	3.59%		0.73%	1.04%		0.23%	1.14%	0.20	4.30%	5.78%
South	4.72%	6.71%	0.86	1.04%	2.29%	0.45	0.20%	1.46%		5.96%	10.46%
Manufacturing	0.40%	0.47%	0.67	0.19%	0.42%	0.66	0.09%	0.57%	0.15	0.68%	1.46%
Construction	0.52%	0.78%	0.58	0.24%	0.36%	0.59				0.76%	1.14%
Trade	1.08%	1.87%	0.67	0.19%	0.31%	0.37	0.07%	0.62%	0.11	1.33%	2.81%
Services 1	1.35%	2.03%	0.91	0.25%	0.68%	0.40				1.60%	2.71%
Rest./ Hotel	0.62%	0.68%	0.84	0.08%	0.21%	0.28				0.70%	0.88%
Services 2	0.74%	0.88%		0.09%	0.31%		0.04%	0.26%	0.17	0.88%	1.46%
Total	74.21%	64.15%		21.46%	21.96%		4.33%			100.00%	

1) „Services 1“ includes transportation and logistics, information & communication, real estate, academic & technical services .

2) „Services 2“ includes education, health care, social affairs, art, entertainment & leisure.

Table 9 Comparison of Probit and Heckman equation results

Variable	Standard Probit		Heckman	
	M.E.	Std. Err	M.E.	Std. Err
Firm characteristics				
Industry (base = manufacturing)				
Construction	+17.9%**	0.076	+21.4%**	0.084
Trade	+22.4%***	0.066	+25.6%***	0.074
Restaurant/hotel	+10.3%	0.072	+11.2%	0.080
Services I	+14.9%***	0.057	+16.3%***	0.063
Services II	+6.5%	0.068	+8.6%	0.076
Size (base = 50–249)				
2–9 Employees	+18.2%***	0.063	+19.5%***	0.074
10–49 Employees	+10.9%	0.069	+11.4%	0.082
Export (> 25% of revenue)	+3.4%	0.059	+3.8%	0.065
Founded (base = before 1980)				
1980–1989	+5.6%	0.072	+6.9%	0.078
1990–1999	+5.0%	0.064	+5.3%	0.069
2000–2009	+1.0%	0.062	+0.8%	0.067
2010–2016	+11.3%	0.072	+11.9%	0.077
Region (base = North)				
West	–2.9%	0.043	–2.7%	0.048
South	+13.1%**	0.065	+14.2%**	0.069
Private or family owned	+5.0%	0.047	+5.8%	0.051
Mortgage	–24.7%***	0.048	–24.8%***	0.048
More than 60% equity	+4.2%	0.109	+15.6%**	0.065
Business development				
Past staff reduction	+10.1%**	0.051	+11.7%**	0.055
Revenues down	+4.9%	0.053	+6.6%	0.058
Revenues up	+6.4%	0.053	+7.0%	0.058
Expected revenues up				
Bank relationship				
Nr. bank rel. (base = 1)				
2	–7.4%	0.050	–9.2%*	0.053
3	–10.2%	0.065	–11.5%*	0.069
>3	–19.9%***	0.075	–23.1%***	0.073
Changed main bank				
Main bank (base = large)				
Cantonal bank	+9.6%**	0.052	+11.4%**	0.058
Raiffeisen bank	–7.2%	0.059	–7.7%	0.068
Regional bank	–2.0%	0.084	–1.1%	0.098
PostFinance	+16.1%*	0.085	+18.5%**	0.093
More than 1 credit	–3.6%	0.078	–4.1%	0.084

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