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Partly risky, partly solid – Performance study of public innovation loans

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ABSTRACT

In this paper I attempt to measure the ability of a Norwegian publicly subsidized loan program to identify innovative firms that are victims of market imperfections. I apply three complementary control groups, which all have in common that they address specific unobservable characteristics of the program participants. The program participants perform better on a variety of growth measures compared to the firms rejected by the program. Compared with firms that receive private credit financing, I do not find that the program participants perform better in the upper quantiles of the contingent performance distribution despite a lower survival rate. The latter result suggests that the program does not seem to succeed in identifying a target group of firms with a sufficiently high growth potential. Firms with innovation loans are not outperformed by venture portfolio companies with respect to sales growth. The venture portfolio companies do, however, have higher survival rates as well as stronger growth in employment and assets. The latter result possibly indicates that the venture portfolio companies are more likely to succeed in the long run. The overall results indicate that the selection competency of the bureaucrats administrating the program is at level with that of private banks, and possibly also of that of venture funds. Still, in order for the program to provide the same level of welfare improvement as regular business credit provided by the private market, I find that the positive externalities from the program must be sufficiently large to compensate for the direct public subsidy element including risk adjusted return on equity and social costs of public funds.

1. Introduction

With the financial crisis of 2008–09, policies that intend to supplement private financial markets received renewed interest as a response to tightened bank credit lines. According to OECD (2009), government loan and credit guarantee schemes were the most frequently applied public measures to enhance SME liquidity in response to the financial crisis. Public credit programs appeal to policy makers as they leverage public funds, have limited up front costs, and the liabilities are contingent and pushed into the future (Honohan, 2010). This gives credit programs an advantage over schemes providing grants, equity and tax credits.

Following the global proliferation of publicly financed loan and guarantee schemes, there are numerous studies from different countries that try to measure the effectiveness of public credit programs (Warwick and Nolan, 2014; Valentin and Wolf, 2013; Samujh et al., 2012; Beck et al., 2008). The results are, however, ambiguous, partly due to differences in program scope and design across countries, but also likely due to varying methods.

As described by Curran (2000), the main challenge in evaluating small business policies is finding a proper control group. This challenge still remains to be solved, as private sector development programs rarely are designed with a component of random participation (Warwick and Nolan, 2014). As a second best approach, one can either try to find well-controlled comparisons and/or natural quasi experiments (Angrist and Pischke, 2008). There are severe methodological challenges related to sampling in non-randomized studies. Storey (1998) distinguishes between two types of sampling biases arising from selective public policy programs: (1) Self-selection bias arising from motivated firms applying to be part of the programs, and (2) the administrative bias arising from the scheme providers choosing which firms to finance.

Several effect studies of private sector development programs apply propensity score matching (PSM) to identify control groups that prior to treatment are as similar as possible to the program participants (see e.g. Oh et al., 2009; Norrman and Bager-Sjögren, 2010; Uesugi et al., 2010; Foreman-Peck, 2013; Autio and Rannikko, 2016). The control groups selected with PSM, however, fail to address non-observable firm characteristics that are potentially important for the self-selection into the program and/or being selected by the program administrators. In this paper, I approach the problem with non-observable sources of bias by applying three different control groups which all address potential

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problems with this kind of sample selection biases. Takalo (2009) emphasizes that any public innovation policy tool should be judged on whether it yields an expected net increase in social welfare. However, most impact studies aim at measuring the counterfactual outcome — what would have happened to the firms had they not received loan financing from the public program? I also try to measure the counterfactual outcome of not receiving an innovation loan. My main focus, however, is on output measures — such as survival, profitability and growth in sales, value added and employment — applying control groups that serve as benchmarks of the alternative use of resources outside the program.

This paper presents an effect study on the performance of firms with an innovative project receiving funding from the Norwegian publicly financed and administrated direct lending program — "the innovation loan program". The first control group contains firms which applied for innovation loans but were rejected. Program rejects are a popular control group because it indirectly controls for the firms' motivation to apply, cf. Storey's self-selection bias. Moreover, it is a cost effective control group as it constitutes an easily identifiable control group available for most programs. If there is no administration bias, this control group measures the counterfactual outcome had the firms not received an innovation loan. However, this is an imperfect control if the program administrators are able to make good judgements on which projects they choose to finance and which they do not. Hence, this comparison can only be considered as an upper bound of the program's effect, as the projects selected by the program administrators presumably are better than those rejected on average, even after controlling for observable characteristics.

The second control group consists of firms which received loans from a private credit institution. By comparing with a group that is in demand of credit and has been screened by an external loan officer, I implicitly control for several non-observable firm characteristics that otherwise could lead to self-selection and administrative biases. Such non-observable characteristics could be growth ambitions, the entrepreneur's quality, and the quality of the project. Still, the innovation loan program is designed in such a way that it attracts a group of firms which are perceived as too risky to receive credit in the private market. Thus, this source of self-selection is not controlled for by comparing with firms with private bank loans. However, since the average risk of the innovation loan portfolio compared to a regular bank portfolio is known, it is possible to draw expectations with regard to how the innovation loan portfolio firms should perform in order to be successful. In particular, as firms with private bank loans receive the same type of treatment as firms with innovation loans, i.e. credit financing, that creates a natural welfare benchmark for the innovation loan program.

A potential disadvantage of using firms which receive private bank loans as a control group is that these firms do not necessarily take on innovative projects. Thus, if innovative projects take longer time to develop and generate sales, this control group can lead to a false conclusion due to a too short post-treatment period. In order to address this potential measurement problem, I also compare the firms receiving innovation loans with firms with venture capital financing. These make up my third control group. The advantage with this control group is that venture capitalist funds invest in innovative projects which typically do not have debt financing in the private market. This comparison with the performance of venture capital portfolio companies is also a measure of the alternative use of resources for the innovation loan program. Moreover, it gives a benchmark regarding the time it takes before one should expect innovative projects to start generating sales and eventually surpluses. While the control group consisting of venture portfolio companies is not likely to contain a self-selection bias, there is probably an administrative bias due to a tighter selection of companies into the venture fund portfolios compared to the innovation loan program. Again, although this control group is not perfect either, since I know the control group's characteristics it is possible to formulate hypotheses on what observed relative performance of the innovation loan portfolio would suggest that the program is welfare-improving.

The outline of this paper is as follows: In Section 2 I discuss the rationale for public intervention in the capital markets, in particular in funding young innovative companies. Section 3 contains a literature review of former evaluations of policy schemes providing finance to young innovative companies. In Section 4 I present and discuss the mandate of the innovation loan programme, while in Section 5 I describe the data set and the variables included in this study. In Section 6 I first present the control groups' characteristics and what conclusions it is possible to draw based on the comparison with the innovation loan companies. Then I present the empirical strategy and the results from comparing the performance of firms with innovation loans with the firms in each of the different control groups. In Section 7 I discuss the welfare effects of the innovation loan program, and in Section 8 I summarize and conclude on the results.

2. Capital market imperfections for young innovative companies

The starting point for public intervention in capital markets is that there exist projects with a positive net present value that do not receive financing. There are several theoretical models that explain such capital market imperfections. The explanatory factors are typically due to asymmetric information between entrepreneur and investor and/or the presence of positive externalities that neither of them have incentives to account for.

In their seminal paper, Stiglitz and Weiss (1981) assume a situation where debt is the preferred instrument of entrepreneurs, and where there is asymmetric information between entrepreneur and lender. The result is underinvestment in equilibrium, as many projects with a positive net present value are not financed. Besanko and Thakor (1987) and Bester (1985) point to the fact that banks use collateral as a sorting criterion to solve this problem. Entrepreneurs with high quality projects and low risk of default will be willing to provide collateral, while entrepreneurs with low quality projects will not be willing to risk their assets. However, entrepreneurs with high quality projects but no securities available to serve as collateral will still be victims of credit rationing à la Stiglitz and Weiss.

By altering a single assumption of the model, De Meza and Webb (1987) come to the opposite conclusion of Stiglitz and Weiss (1983). De Meza and Webb's theoretical model shows that there should be no credit rationing, and in fact that there is too much investment in entrepreneurship in equilibrium. While in Stiglitz and Weiss the optimal policy would be to subsidize interest rates, in de Meza and Webb's model it is optimal to tax interest rates. De Meza and Webb, however, remove the interesting feature of the Stiglitz and Weiss model that lenders and borrowers have different perspectives on what a good type of project is. While Stiglitz and Weiss assumed that projects have different risk profiles but the same expected value, de Meza and Webb assume that the projects have the same outcome if they succeed, but that they differ in probability of success.

While suitable for some types of projects, the de Meza and Webb assumption does not seem realistic when it comes to comparing innovative projects with businesses applying well known standard technologies. The firms eligible for private bank credit are typically characterized by having a steady cash flow and access to collateral. The firms receiving innovation loans, however, might have completely different risk-return profiles. Interestingly, de Meza and Webb show that in the Stiglitz and Weiss model, equity would have been the preferred instrument as long as the projects' returns are costly to verify ex post and there are no particular transaction costs related to equity contracts.

Myers and Majluf (1984) formalize a pecking order theory, predicting that when financing new projects the firm will exhaust all equity before trying to access external financing. In need of external financing, however, the firm will prefer to issue debt financing, while external equity markets are a last resort when other sources of financing are