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IMPACT OF FINANCIAL CONSTRAINTS ON INNOVATION: WHAT CAN BE LEARNED FROM A DIRECT MEASURE?

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Abstract

This paper examines the impact of financial constraints on innovation for established firms. We make use of a direct measure of the existence of financial constraints obtained thanks to a specific survey addressed to French established firms. This is a distinctive feature of this paper as most of previous studies had to rely on proxies (like the cash-flow sensitivity), which may be subject to interpretation problems. The probability to have innovative activities and the probability to face financial constraints are simultaneously estimated by a recursive bivariate probit model. Accounting for the endogeneity of the financial constraint variable, we find that financial constraints significantly reduce the likelihood that firms have innovative activities. The probability to encounter financial constraints is explained by firms' ex ante financing structure and economic performances.

Keywords:

Innovation | Financing constraints | Recursive bivariate probit

JEL Classification :

G31 | C35 | 031

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Notes

[1]The Community Innovation Surveys (CIS) are conducted in each country by the national statistical entities in order to collect information about the innovative activities of firms. In each country, they are based on the same questionnaire that may be completed by additional questions. The survey used here (Financement de l'Innovation Technologique, FIT) is different because it is fully focused on the financing of innovation. However, its methodological framework is the same as the well-known CIS’ one, in particular concerning the definition of innovation and the design of the questionnaire.

[2]This qualitative information is then similar to the one used by Angelini and Generale (2005) to examine the effect of financial constraints on firm size. Guiso (1998) and Piga and Atzeni (2007) focus on the determinants of credit rationing and they also adopt a

direct indicator of financing constraints taken from a survey. They consider that firms are financially constrained when they applied to bank credit but failed to obtain it.

[3]Our dataset is presented in the appendix.

[4]See the details of the identification of innovative, non-innovative firms in the appendix.

[5]Firms were allowed to provide multiple answers.

[6]More recently, Aghion et al. (2005) proposed a model with an inverted U-shape relationship between innovation and competition. In this model, competition may increase innovation profit margin but strong competition may also reduce incentives to innovate for laggards.

[7]The importance of technological opportunities is given by a qualitative measure issued from the FIT survey. The same indicator was used in previous works such as Crépon et al. (1998) or Barlet et al. (1998). In the survey, the firms are asked:“Do You consider that Your market is technologically: not innovative? weakly innovative? moderately innovative? or strongly innovative?”. We take the first level “not innovative” as reference and include in the regression three dummies TP2, TP3, and TP4 for the other levels.

[8]See the definitions of the variables in the Appendix (Table II). Moreover, let us remind that in the FIT survey, firms were asked about their innovative behavior and possible constraints over the years 1997–1999. To ensure that there is no time inconsistency in the definition of the dependent variable and the regressors, the latter are taken at their value measured ex ante, in 1996.

[9]In the FIT survey, there is no information to construct a demand pull indicator as it was done by Crépon et al. (1998). In order to try to account for demand effect, we have introduced the growth rate of sales of the firm between 1996 and 1997. But we did not obtain a significant estimate. However, the industry dummies control for specific demand effect in each industry sector.

[10]There is some confusion about this question because of Maddala's assertion (1983, p. 222). He states that the parameters of the first equation are not identified if there is no exclusion restriction on the exogenous variables (as in the linear case). But Wilde (2000) shows that this is only true in the simple example of Maddala's book, where x_{2i}

and x_{1i} are both constants. Wilde shows that identification in the simultaneous probit case is achieved as soon as both equations of the model contain a varying exogenous regressor. However, as examined by Monfardini and Radice (2004), without instruments, the identification of the parameters of the first equation strongly relies on the functional form of the distribution of errors and in practice, availability of instruments help to obtain results which are more robust to distributional misspecification.

[11]See the details of these definitions in the Appendix.

[12]The univariate probit regression on the subsample of 'potentially innovative' firms is given in the Appendix (Table I).

[13]Such a test have been made with cash flow or profit margins and the results can be obtained from the author.

[14]We have also checked for nonlinear effects by introducing the square of firm size but it does not change the results.

[15]The 'Centrale de bilans' dataset.

[16]The manufacture of coke, refined petroleum products and nuclear fuel has been deleted because only two firms were present in the merged dataset. In addition, the firms with negative value added or with abnormally high investment rates have been excluded. This concerns only two firms.

Additional information

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