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Do spillovers matter? CDM model estimates for Spain using panel data

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OBJECTIVE

The general aim of this paper is to analyse the current relationship between R&D, innovation and productivity in Spain for the period 2004-2010. We use a structural model to capture the whole process: firm's decision to perform R&D, the amount of money they spend on it, how they turn this investment into innovations and the impact of these innovations on firm's productivity. In particular, the main goal of this paper is to assess the extent to which external knowledge may have an impact on firm's behaviour and performance. Thus, we analyse if firm's decision whether to undertake R&D activities or not is influenced by what other firms in its sector do as well as if firm's productivity is affected by innovation carried out by other firms (in the same sector or in other sectors). Additionally, firm's technology level is taken into account in order to ascertain whether there are any differences in this regard between high-tech and low-tech firms both in industrial and service sectors.

MAIN RESULTS AND POLICY IMPLICATIONS

Firstly, the findings presented in the paper have made possible to state that not only is R&D important in order to increase firm's productivity, but also the firm's ability to turn this investment into innovations strictly speaking. Secondly, although the coefficients vary across technology level along the model, they do not follow any specific pattern. Last of all, our results point out that external knowledge plays a role along the process. We have found that the firm's decision whether to engage in R&D activities or not is influenced by what other firms do. In particular, the higher the number of firms undertaking R&D activities, the more likely to start R&D projects the firm is. Therefore, an external pool of knowledge would encourage firms to carry out R&D activities (in both industrial and service sector). An implication of this is the possible existence of a "virtuous cycle", since the fact that firms in a sector innovate stimulate the others to do the same, and so on and so forth. On the other hand, it seems that there is a complementary between manufacturing firms (not service), both between firms in the same sector and firms operated in different sectors. Thus, R&D expenditures incurred by firms in the same sector (intra-industry externalities) or in

other sectors (inter-industry externalities) - provided that they achieve and innovation with their investment - have a positive impact on firm's productivity.

In view of the findings of this study, it would be interesting design some policies to foster R&D investment from government and public institutions in order to increase productivity levels and become more competitive. First of all, we have seen that the more a firm invests in R&D and the fact that it is done continuously, the more likely to achieve an innovation, which increases its productivity. Given that public funding is a clear determinant not only in the innovative effort but also in the firm's decision whether to engage in R&D activities or not, governments should maintain this financial support even though the current economic situation. It should be borne in mind that cut back public subsidies or any other funding will condition Spanish firms' behaviour. Moreover, as we have seen innovate is a learning process being the probability of achieving an innovation greater when it is done continuously. For this reason, financial support should not be aimed at particular projects, but it ought to be addressed to promote R&D activities in a continuous way.

On the other hand, the more firms undertaking R&D projects, the better, since, as we have seen this increases the probability of starting R&D activities. Moreover, the greater the R&D expenditures in a sector or in other sectors, the more a firm is going to increase its productivity. Thereby, government support to help one particular firm would overtake the boundaries of this company, having a positive effect on both firm's behaviour as well as firm's productivity. In addition, firm size favour both firm decision whether to engage in R&D activities or not and the probability of achieving a process innovation. However Spanish economy is made up of small and medium firms. For this reason, policies should seek cooperation between these firms in order to palliate their small size, as well as, promote enlargement or fusion of firms. Last of all, the results obtained here point out that operating in international markets is a factor which encourages firms to start R&D projects. Therefore, helps aimed at promoting internationalization are also important and governments should bear this in mind when they design their policies.