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Reconciling the Firm Size and Innovation Puzzle

KNOTT, Anne Marie / VIEREGGER, Carl: Reconciling The Firm Size And Innovation Puzzle, Center for Economic Studies (CES) 16-20, March 2016

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Summary

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Abstract

In the present paper, the authors examine the impact of company size on innovation. Based on recent and more extensive data regarding research and development (R&D) activities of US companies, the authors found that company size significantly affects R&D strategy. Data also showed that both R&D spending and R&D productivity increase with company size. Accordingly, the authors argue that there are no R&D strategies favoring small companies. The notion that small companies conducting R&D benefit disproportionately from spillover effects, particularly derived from large companies' R&D investments, is also not backed by data examined.

Summary

Over decades, there has been a debate regarding the impact of company size on innovation. The view was taken, that large companies are more effective with their investments in research and development (R&D) than small companies, mainly because they dispose of the required expertise in-house and are better able to absorb the risk attached with R&D by pooling it over a broader portfolio of projects.

On the other hand, voices in economic literature suggested that small companies are more productive with their R&D. By having fewer employees and fewer levels of hierarchy they are closer to both the technology and the customers and can, therefore, better link technological possibilities to market needs.

This inconsistency in theory was reflected by studies indicating that, although R&D investments increased with scale, R&D productivity decreased with scale. Based on these findings it was very hard to rationally explain, why large companies continued investing in R&D.

In order to answer this question, the authors analyzed recent and more extensive data regarding R&D activities of US companies, applying a new research model. In particular, the authors used recent data collected from the National Science Foundation (NSF) Business R&D and Innovation Survey (BRDIS), an annual survey of companies' R&D behavior conducted by the NSF in conjunction with the U.S Census Bureau, covering approximately 40,000 companies. Further, the authors used another measure of R&D effectiveness, the so called "Research Quotient" (RQ), which represents the percentage increase in revenues from a 1% increase in R&D, holding constant other inputs and their elasticities.

The authors found that R&D strategy is endogenously determined by company size (meaning that companies choose strategies coherent with their size) and that both R&D spending and R&D productivity

(net returns to R&D) increase with scale. Indeed, company size increases the likelihood of incremental R&D, process R&D, basic research as well as product and service R&D.

The above findings confirmed, on the one hand, prior results indicating that R&D spending increases with scale, but, on the other hand, conflicted with prior results indicating that productivity decreases with scale. According to the authors, this is, probably, owed to the fact that prior studies used product or patent counts as measures for productivity, which may tend to underweight contributions from the R&D strategies favored by large companies. Due to the lack of means to link patent data to the anonymous companies covered by BRDIS, this assumption cannot, however, be fully verified.

Besides the above, the authors also identified that there is no R&D strategy favoring small companies. Moreover, only strategies exist, for which the penalty for small companies is less severe. These findings, naturally, pose the question why small companies conduct R&D.

Although a reasonable answer to that question could be that small companies benefit disproportionately from spillovers effects, particularly derived from large companies' R&D investments, the data examined did not verify this hypothesis. On the contrary, the findings indicate that large companies are better exploiting spillovers, since the net effect of spillovers is also increasing with scale.

The authors draw the conclusion that large companies are the main engine of innovation and, accordingly, economic growth. Large companies conduct more R&D, in aggregate, and have a 13 % higher productivity with that R&D than small companies. Furthermore, large companies R&D generate spillovers, from which small companies can benefit.