

Firm Size and Innovation

Reply to Scheirer

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William Scheirer's comment gives me an opportunity to clarify some of the issues in my paper and to be more explicit on some of their implications. His insistence on a precise definition of what is meant by 'innovativeness' is justified as different notions have indeed different quantitative connotations. Measuring 'innovation' by means of R&D input leads us to a somewhat different appreciation of the 'innovativeness' of small and medium sized firms (SMEs) than when taking an 'output' — indicator such as the number of innovations introduced into the market place, as has been done in the Edwards and Gordon (1984) study. In my paper, I used the notion of 'innovativeness' as a shorthand for R&D — intensity which is an input indicator of the innovation process, whereas Scheirer wishes to reserve this notion for an 'output' measure of innovation. In my view, the use of both definitions of 'innovativeness' is legitimate.

Independent of this, I agree with Scheirer on three points: First, the number of innovations per firm as well as the number of R&D man-years per firm are (absolutely) lower in SMEs as compared to large firms. Second, SMEs are less likely to introduce innovations and are also less likely to engage in R&D. Third, it follows from the Edwards and Gordon (1984) study that SMEs introduced more innovations than their larger counterparts if we take numbers of innovations per employee (including the employees of firms which do not innovate). The first point comes as

no surprise. The second point is well documented in a number of contributions, including my paper. The third point, however, deserves more discussion. Let me first refer to the second point and then turn to the third.

The second point is relevant to my paper as I dealt with the possibility of a bias relating to the 37% of non-responding firms in my postal survey. I proposed that firms which have no R&D-activities might be less motivated to respond to an innovation survey. Hence a naive extrapolation of the data might lead to an over-estimation of the overall R&D-intensity of firms. In my survey, SMEs generally responded less than large firms. I suggested that this may have to do with the lower percentage of SMEs (as compared to large firms) which perform R&D. If this holds true, we run the risk of over-estimating the R&D-intensity of SMEs. Scheirer should be able to accept this argument, as he would arrive at a similar conclusion when judging from an output indicator. In other words, the possibility of a non-response bias exists, independently of which measure of 'innovativeness' we use. Of course, this does not exclude that still other reasons can exist for a lower response rate of SMEs.

As to the third point, there seems to exist a discrepancy between the R&D input and the innovation 'output' indicators. Referring to Edwards and Gordon (1984), Scheirer argues that SMEs have a greater number of innovations per employee than their larger counterparts, even if the number of employees in firms that do not innovate is included in the denominator. On the other hand, there is some consensus in the literature that R&D-intensity increases *at least* proportionately with firm size. This means that, in the best case, SMEs are as R&D-intensive as large firms, but often they appear to be less so (Baldwin and Scott, 1987; Scherer, 1990).

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This consensus on R&D-intensity is called into question by my paper. I argue that the official R&D surveys in the OECD area are biased towards undercounting small-scale and informal R&D activities in SMEs. My alternative survey tries to take account of the latter, showing that R&D-intensity increases *less* than proportionately with firm size when looking at firms which perform some R&D (when including the many SMEs which perform *no* R&D, the 'average' R&D-intensity of SMEs is slightly lower than that of large firms). I would like to add here that these results have meanwhile been confirmed by a second survey. From the latter it turns out that the undercounting of R&D also holds for the service sector. More importantly, we meanwhile had the possibility to compare our estimate to a third independent source: the records on firms which received government subsidies on R&D. This latter source confirms our conclusion that the official R&D survey underestimates (by orders of magnitude!) the number of SMEs which perform some R&D (Kleinknecht, Reijnen and Verweij, 1990; Kleinknecht, Poot and Reijnen, 1991). Although this finding relates only to a small country (i.e., the Netherlands), it is likely to be of more general relevance, as the Dutch Central Statistical Office coordinates its R&D surveys with other OECD countries in order to guarantee international comparability of R&D data. This implies that similar measurement problems are likely to exist in other OECD countries.

Judging from our alternative measurement of R&D, several points emerge. First, those SMEs which perform some R&D are still a minority, but this minority is considerably larger than is suggested by the official surveys. Second, the concentration of R&D in large firms is less dramatic than is generally assumed.¹ Third, market power has a weaker impact on R&D-intensity when judging from our survey as opposed to the official R&D data (see also our paper in the December 1989 issue of this journal). Fourth, relating R&D input to some measure of innovation 'output', we would expect SMEs to have less innovations per unit of R&D input than when using the official R&D data. Although this latter point still remains to be examined, it is obvious that my alternative measurement of R&D in SMEs closes at least part of the above-mentioned gap between R&D input and innovation 'output'.

Nonetheless, notable differences between input and output indicators might persist due to the more or less efficient use of innovation inputs by different types of firms. Scheirer is therefore right when insisting on a precise definition of what is meant when speaking about 'innovativeness'. Moreover, it appears to be inadequate to speak about *the* innovativeness of SMEs: Whatever measure of innovation (or of the innovation process) we use, there remains an enormous discrepancy between on the one hand a majority of SMEs which does not innovate at all, and, on the other hand, a minority which is (sometimes highly) innovative. Given this discrepancy, generalizing statements such as: 'SMEs are more (or less) innovative than large firms' are therefore neither right nor wrong, but inappropriate.

Note

¹ According to the official R&D survey, about 84% of Dutch private R&D during 1985/86 took place in firms which have 500 or more employees. According to our survey (relating to 1988), this figure is only 57% (Kleinknecht, Poot and Reijnen, 1991).

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