Discussion Paper No. 2015-39 (Hollenstein/Berger)

Answers to the Referee Report

1) Definition of RDFOR and MODE: The two variables are clearly defined in the paper (p.1), though without reference to the specific items of the questionnaire, what, in my view, is not necessary (clear definitions available; unnecessary overload of the paper because two questionnaires would have to be discussed).

   But to react more specifically to the referee's comment: The data set contains only firms active in R&D based on the answers on *question 1.14* of the Swiss questionnaire (R&D yes/no). From *question 2.2* we know whether a firm invests in R&D *also* abroad, and whether it does so based on a) an own R&D affiliate, b) a R&D joint venture (major, minor equity stake), c) a R&D co-operation agreement (or a combination of these forms). This question allows an unambiguous measurement of RDFOR (foreign R&D yes/no) and MODE: value 1 = own R&D affiliate and/or R&D joint venture, *with or without* R&D co-operation; value 0 = R&D co-operation *without* any other governance mode. These definitions are clearly stated on p.1 of the paper but not repeated in the subsection dealing with the specification of the dependent variable (p.12). One could dispel any doubts by referring on p.12 to p.1.

2) Integration of foreign R&D in the parent company's activities, which is stronger in case of an equity-based than a non-equity mode of governance, positively affects firm performance, as shown, for example, by the empirical studies referred to on p.7. Moreover, the gain of knowledge from co-operative foreign R&D often is reduced as a consequence of insufficient trust among co-operation partners or because of different objectives pursued by the parties involved in co-operation. Such problems are clearly less relevant in case of equity-based foreign R&D where the ties between parent companies and foreign units are stronger. Against this background, we do not see a need to change the argumentation put forward in subsection 3.1.

3) As presumed by the referee, a (substantial) share of the firms being active abroad in R&D also performs other foreign activities (e.g. production). Therefore, it may not be excluded that our estimates of the performance effect of foreign R&D are biased. However, our procedure is common practice in previous research and obviously no hindrance for a publication in refereed journals (see the papers dealing with the performance effects of foreign R&D we referred to in subsection 3.2, pp. 8). Therefore, we stick to the

specification of the equation but may signal the problem put forward by the referee in a footnote.

4) It is correct that in innovation research most studies explaining innovation output include, among other things, R&D as a variable capturing the input side of innovative activity. However, by using human capital (LHC) we capture the resource use in the innovation process in a broader way what is needed in view of the substantial share of services firms in our sample (R&D is of minor importance in the service sector, except in IT and similar services). By the way: by using industry dummies we also control, to a certain extent, for the R&D intensity of firms. Besides, our specification is in line with other contributions in refereed journals dealing with the innovation effect of foreign R&D (see the papers analysing the innovation effects of foreign R&D we referred to in subsection 3.2.1). Against this background, we stick to the present specification of the equation explaining innovation performance.

Minor comments

1) The provided link indeed leads to a report presenting the results of a study on international R&D of Austrian firms published in November 2011 (and not in 2007 as mentioned by the referee). The questionnaire of the internationalisation survey conducted in 2010 which we used in our paper is shown in the appendix of this report but there is no separate link leading *only* to the questionnaire. We could complement footnote 8 by explicitly referring to those pages of the report that contain the questionnaire (Berger *et al.* 2011: 191-197).

2) Our discussion of the characteristics of the Austrian sample in Section 4 indeed does not allow to definitely assessing the representativeness of the final sample (as we clearly say at the top of p.11). The fact that the *industry and size composition* of our dataset (it contains only the R&D performing firms) is very similar to that of the official R&D statistics (see *p. 80 and Table 28* of the report mentioned in the previous paragraph)[1] indicates, in our view, that a potential bias may not be too large. The marginal benefit of a more in-depth analysis of the representativeness of our dataset drawing on additional data sources (such as those proposed by the referee) is too low to justifying further investigations (the more as the samples underlying model estimation differ among the various equations we estimated). It suffices, in our view, to admit, as already mentioned, that the data quality in the Austrian case does not match that of the Swiss sample.

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[11] There is only some underrepresentation of wholesaling and some overrepresentation of business services.

3) Marginal effects: In *model A*, RDFOR and MODE are the *dependent* variables that are explained by the core elements of an (extended) OLI model of internationalisation. Reporting the *significance* of the OLI-variables suffices to show whether RDFOR and MODE can be explained by the OLI approach (what is indeed the case). The estimates of *model B* show whether RDFOR and MODE (*independent* variables) have a statistically significant positive effect on firm performance. The other variables included in the equations only serve to *control* for potential other influences on firm performance (implying that the size of their effect is of secondary importance). Moreover, finding, for example, that firms with foreign R&D (RDFOR = 1) have a productivity advantage over firms with no foreign R&D (RDFOR = 0) of, say, x% may be a misleading information as this percentage (implicitly) also depends on the size of the foreign R&D investment underlying a move from RDFOR = 0 to RDFOR = 1. Given that our foreign R&D variable is a dummy (0/1) we only can say whether RDFOR has or has not a significant impact on firm performance. Consequently, we did not provide the marginal effects.

Multicollinearity is no effective problem. For instance, among the variables used in equation 1 of Table 4 on p.22 (Switzerland) only 10 of 256 correlation coefficients are higher than 0.2.