

# In-house and contractual R&D of start-up firms: The role of entrepreneurial human capital\*

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## Abstract

This paper investigates in-house and contractual research and development (R&D) of firms during the start-up period, using panel data from questionnaire surveys conducted in Japan. In particular, we highlight the role of entrepreneurial human capital in firms' propensities to engage in in-house R&D and contractual R&D (i.e., licensing-in, joint R&D). By estimating a bivariate probit model, we provide evidence that firms managed by entrepreneurs with high levels of human capital are more likely to engage both in the decisions of in-house and contractual R&D. In particular, while generic human capital, such as educational attainment, plays a significant role in explaining in-house R&D, specific human capital, such as prior work experience in the related field or innovation experience, tends to have a prominent influence on the establishment of contractual R&D agreements. As a supplementary analysis, we link such R&D activities to subsequent innovation outcomes (product innovations and patent applications) and find evidence that firms pursuing in-house and contractual R&D simultaneously are more likely to achieve innovation outcomes.

*Keywords:* Start-up, entrepreneurial human capital, in-house R&D, contractual R&D, licensing, joint R&D.

*JEL Classifications:* M13, L26, O32, O38.

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