

Title: Innovation strategies of firms – identification, dynamics and intra-industry heterogeneity

This is an interesting paper that yields important insights with respect to innovation strategies and their contribution to firm performance. It contains three parts: a first one dealing with the identification and interpretation of innovation modes based on cluster analysis that are interpreted as possible innovation strategies of the firms, a second one referring to dynamic aspects, namely the change as well as direction of change of strategy over time, and a third one investigating the relationship between innovation strategies and firm performance. The paper is well-structured and well-written, covers comprehensively existing empirical literature, has a sound conceptual background ('strategic management view' versus 'technological regime approach'), has a sound methodology and is based on a rich firm dataset from the Swiss business sector for the period 1997-2008. All in all, this is a genuine contribution to existing empirical literature that would meet the active interest of many economists dealing with innovation economics.

Some thoughts and remarks to section 6 ("Innovation modes and firm performance"):

(a) Comments to the estimates in Table 10, p. 44: I am not sure that the results demonstrate explicitly the weakness of the 'strategy' (firm-specific) approach compared to the 'technological regime' (industry) approach.

First, there may exist some space for further optimizing the productivity model by dropping the R&D variable (it is already covered by the innovation strategy variables because it is a component of the clusters); by even dropping the human capital variables (or construct a single human capital variable), which presumably strongly correlate not only with the R&D variable but also with the strategy variables. A possible further version could be a model containing – besides the strategy variables and the industry dummies – firm size, the variable for foreign ownership and the variable for physical capital. At any rate, it would be good to add such alternative specifications to those already presented in Table 10.

Second, it is important to conduct a *significance test for the sum of the coefficients (joint effect)* of the two focal entities (strategies; industry affiliation) and compare the algebraic sum of the coefficients, which would give a better assessment of the relative importance of the two entities (given that both of them are composed of binary variables) than the change of R^2 of alternative specifications.

(b) Perhaps 'standard' regression that refers to averages is not the most appropriate method for the question at hand. Productivity differences among industries are mostly historically given and thus path-dependent. It might be that the effect of strategy refer to the high-productivity firms in every industry and not to the 'average' firm. Conducting a *quantile regression* might reveal differences as to the effects of strategies for different productivity levels. Hence, an

additional hypothesis could be, for example: Strategies contribute to productivity only for high-productivity firms.

(c) For further future research, it may be interesting to test an alternative modelling based on a *knowledge production function framework*. In this case, the variable ‘sales share of innovative products’ could be the goal variable instead of productivity, which is a step more distant from the innovation process than (market-oriented) innovation performance. Of course, this variable has to be dropped from the cluster construction.

Comment to section 4:

An additional table with the frequencies of the five strategies over time would be useful for the reader, before starting to read the quite interesting analysis of the ‘frequency of a change of strategy’ and the ‘direction of a change of strategy’.

For further future research, it may be interesting to investigate *possible determinants of the propensity to change strategy* (see Arvanitis/Seliger for such an approach with respect to transitions between ‘innovators’ and ‘imitators’).

Reference

Arvanitis, S. and F. Seliger (2014): Imitation versus Innovation. What Makes the Difference? *KOF Working Papers No. 367*, Zurich.