Comments on « Minimum Quality Standards and Novelty Requirements in a One-Shot Development Race »

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Summary

This paper analyses R&D competition between two firms in a one-shot stopping game. The firms' products are both horizontally and vertically differentiated. While the degree of horizontal differentiation is exogenous in the model, the 'vertical' quality of each product depends on the timing of its introduction. It is therefore decided upon by the firms, which allows the follower to opt for either an incremental or a drastic innovation. There is no R&D cost, and the key parameter of the model is θ_i, denoting firm i's skill in improving the product's quality over time.

After solving for this game, the authors analyze the effect of two policy instruments on the timing of product introduction and the resulting welfare. The first instrument is a minimum quality standard on the first product. The second instrument is a novelty requirement (which can be seen as a minimum quality improvement of the second product over the first one). The analysis is carried out successively for symmetric and asymmetric θ_is.

Contribution

The paper is based on the model of Dutta et al. (1995). This basic setting generates two types of Nash equilibria (in pure strategies), both of which involve sequential product introduction, namely a 'stand-alone' equilibrium and a rent-dissipating 'pre-emption' equilibria. Based on this setting, the main contributions pertain to the specification of product differentiation and the analysis of policy instruments:

- Using a particular specification for vertical and horizontal product differentiation, the authors first highlight a correlation between the firms' research ability θ in the industry and the type of equilibrium when θ is symmetric. Indeed, the rent-dissipating pre-emptive equilibrium prevails only when θ is high. By allowing the θ_i to be asymmetric, the authors also show that the high ability firm may not necessarily introduce its product first.

- When θ is symmetric, the welfare analysis shows that the timing of product introduction at equilibrum is not optimal. Depending on the intervals of θ, the date of first introduction may be too early or too late, and the delay between the first and second introductions too short or too long. Consequently, the authors find that introducing a minimum quality standard or a novelty requirement would be welfare improving only for some ranges of the parameters. When the

θ_is are asymmetric, they also show that a minimum quality standard can reverse the order of product introduction.

In my view, the main interest of the model lies in the specification of the firms' R&D technology and product differentiatio (as captured in the parameter θ) and in the subsequent analysis of equilibria and welfare.

At this stage, the policy analysis is of more limited interest for two reasons. First, the results are ambiguous in that they strongly depend on various ranges of θ, and do not make it possible to formulate clear policy recommandations. Moreover, the definition of the policy instruments–the minimum quality standard and novelty requirement–seems ad hoc and should be better justified. The minimum quality standard is for instance defined ex ante for a product that does not exist yet. Is there an example of such an instrument? As noted by the authors, their definition of the novelty requirement is also unusual in that innovation is not cumulative, which implies that novelty is defined not in terms of technology but in terms of utility for the consumer. Here too a motivating example would be useful.

Comments on the analysis

The analysis seems correct but its presentation in the Appendix makes is difficult to read through. Some steps are skipped which makes the Proofs uneasy to follow for me.

For example, some Lemmas in the Appendix do not exist in the paper, or some numerical values in conditions page 36 seem incorrect (2c instead of 1.5c). It is also not clear how the optimal dates of entry are calculated in the Proof of Proposition 3: the authors do not state explicitely whether they calculate the first best or second best solution (given the equilibrium delay before second introduction, or the optimal delay). This has an implication for the discussion of minimum quality standard when θ is symmtric (page 20, end of second paragraph): indeed it seems to me that the argument would hold only in a second best world.

It also seems to me that there is a discrepancy between the formulation of Proposition 3 and its interpretation page 19 (last sentence of the proposition and last sentence of the next paragraph).