

Competition and Innovation

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Outline

- 1 Introduction
 - State of affairs
- 2 First results
- 3 Endogeneity
- 4 Instruments
- 5 Policy questions
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Where are we in the project?

- At this stage we are working on the relation between competition and innovation
- We have now for each industry a range of competition measures and innovation measures
- Due to data problems we have not yet worked with the firm level innovation measures (we are working on this)
- We merge “Productie statistieken” (1993-2004) and Community Innovations Survey (1996-2004, even years)
- Because we do not have CIS data in “odd” years, we lose observations

Relation between competition and innovation

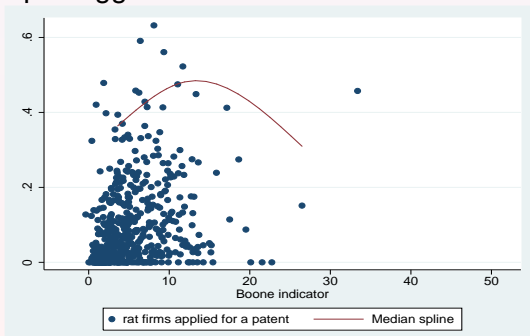
- We are interested in the relation between competition intensity and innovation
- Does more intense competition lead to more or less innovation, or is there an (inverse) U shaped relation
- We use as a measure of competition intensity the Profit Elasticity, PE
- PE measures the percentage fall in a firm's profits in response to a 1% increase in the firm's cost per unit of output

Relation between competition and innovation 2

- PE is higher in more competitive sectors: the same loss in efficiency leads to a bigger percentage fall in profits
- If PE is high, there is a lot to be gained from cost reductions through process innovation
- The higher is PE, the higher the incentive to reduce the competition intensity by differentiating your product from that of your competitors => product innovation

Relation between competition and innovation

- Innovation is measured here using the ratio of firms in an industry that have applied for a patent in a certain year
- Competition is measured using PE
- The graph suggests an inverted-U relation



Fixed effects estimation

	ratio of firms applied for patent	ratio of sales new to market	ratio of firms with product innovation
PE	0.008 (2.6)**	0.01 (1.2)	0.01 (1.7)*
PE^2	-0.0003 (-2.1)**	-0.0003 (-1.1)	-0.001 (-2.3)**
R^2	0.02	0.003	0.05

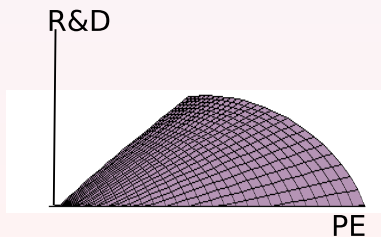
- With fixed effects, we control for differences between industries
- Although not always significant, we do find some indication for an inverted U
- Biggest problem: endogeneity

Theory

- Why is intensity of competition not exogenous?
- Because firms may use innovation to differentiate and thereby reduce the competition intensity they face
- Simple model in which firms can invest in R&D to differentiate
- Initial intensity of competition of θ
- firm i 's profits $\pi_i(c_i, \theta)$
- by investing ρ_i in R&D firm moves away leading to profit function $\pi_i(c_i, \theta - \delta(\rho_i))$

Graph

- When θ is low, every firm has market power, little reason to move away
- as θ goes up, firms invest more in R&D, thereby reducing observed PE
- Hence intensity of competition is endogenous: affected by innovation



Instruments we use now

- To cope with endogeneity, we need instruments
- Instruments for competition are variables that are correlated with competition but not directly with innovation
- Variables that we use from the PS are: import penetration, fraction of firms that exit and enter
- None of these is very convincing
- the R-squared is low from the instrument regressions
- Hence we do not get meaningful results

Policy instruments for competition

- Thus we need better instruments!
- The NMa has now started to compile a dataset of its interventions since 1998.
- These are wonderful instruments as most interventions will not be triggered by lack of innovation
- It would be very very useful if EZ did a similar exercise with interventions in specific years and/or sectors
- Create a dataset with MDW interventions, generic interventions etc.

Policy instruments for innovation

- Similarly we will need instruments for innovation to establish the effect of innovation on competition
- Here we need a dataset with policy interventions affecting innovation
- One can think of changes in WBSO over time
- “Innovatie programmas/Technologische Topinstuten” like Wageningen Centre for Food Sciences, Point One, “Innovatieprestatiecontracten” (when was this started, how long did it last etc.)
- All these changes affect innovation without directly being correlated with competition intensity

Moving away from abstract “competition”

- Having this data also makes our research more policy relevant
- Instead of analyzing the effects of an abstract notion of competition, we can directly consider the effects of concrete and relevant policy interventions
- Hence we can see which MDW interventions managed to stimulate R&D and which did not
- We can consider whether “Innovatie programmas” are more effective in more competitive industries
- Other questions are: in which industries should competition be used to stimulate innovation and in which should innovation be stimulated through subsidies etc.

Summarizing

- We analyze the effect of intensity of competition on innovation
- Currently we are working with industry level data and soon we hope to have firm level innovation data
- The first results look promising and we seem to get an inverted U
- Our main problem is addressing the endogeneity issue
- For this we need a data set with instruments based on EZ policies in the past years