Innovative Performances in Hospitality: Determinants and Consequences

Federico Boffa[1] Marianna Succurro[2]

[1]Università di Macerata

[2]Università della Calabria

Friday, December 13th 2013

Motivation - I

- Literature on innovation
  - Link between innovation and patenting (Moser, Moser and Voena, Dosi)
  - Explores mainly the determinants of innovation
    - Patenting used mostly as measure of innovation
- Little has been done on patenting in the tourism sector
  - while the tourism sector is known to be significantly innovative (Hjalager, 2010)
- Possibly, patenting was not a good way to capture "traditional innovations" in tourism
  - Service sector
- Recent changes, in particular digitalization, may have changed this pattern
  - There appears to be an increasing trend in patents in the hospitality sector.

Motivation - II

- Classes of innovations in tourism
  - Product or service innovations
  - Process innovations
  - Managerial innovations
  - Management innovations
  - Institutional innovation
- Determinants of patenting (since Schumpeter)
  - size
  - market power
  - technological opportunities
  - market opportunities

Overview of the paper

- We analyze the determinants of the patenting behavior in the Italian hospitality sector
  - We find that larger and younger firms patent more, while firms with more market power patent less
- We analyze the impact of patenting activity on firms' performances
  - We find that patenting very significantly (1%) increases turnover, while it has no significant impact on labor productivity
- Based on the relation between market power and propensity to patent, we build a theory model to rationalize this behavior

Data

- Italian accounting data $\longrightarrow$ Amadeus database (Bureau van Dijk)
- Patents data $\longrightarrow$ Orbis database (Bureau van Dijk)
- We measure innovative performance in terms of successful patents applications
- We measure firms' economic performance in terms of:
  - **turnover**
  - **productivity**
    - productivity measured as (value added/employees)
  - **profit**
  - **ROI**
- Our sample spans the 2003-2010 years

Descriptives (2010)

- Patenting and non-patenting firms respectively:

Variable	Obs	Mean	Std. Dev	Min	Max
Turnover 2010	172	11110,21	103234,7	0	1352687
Age	202	72,54455	16,06115	1	108
Ia_TA_2010	171	0,2553475	0,310469	0	1
MP_2010	160	1,139661	0,63349601	0,7217848	8
Region	202	10,34653	5,115454	1	20
Legal form	202	0,0544554	0,227478	0	1

Variable	Obs	Mean	Std. Dev	Min	Max
Turnover 2010	165	1006,285	1873,262	0	20938
Age	203	17,39901	14,4333	1	80
Ia_TA_2010	163	0,2285877	0,3088372	0	1
MP_2010	157	2,254501	14,608	0,4683908	184
Region	203	11,133	5,298706	1	20
Legal form	203	0,0344828	0,1829167	0	1

Sample

- Initial sample includes:
  - Patenting firms $N = 202$
  - Non patenting firms $N = 10490$
- Patenting activity still a rare event in the sample!
- Transform the panel into a balanced panel
  - Patenting firms $N = 202$
  - Non patenting firms $N = 202$ (randomly extracted from the population)

Empirical model - step I

- Two-step logit regression
- Step I: Estimate the determinants of patenting.

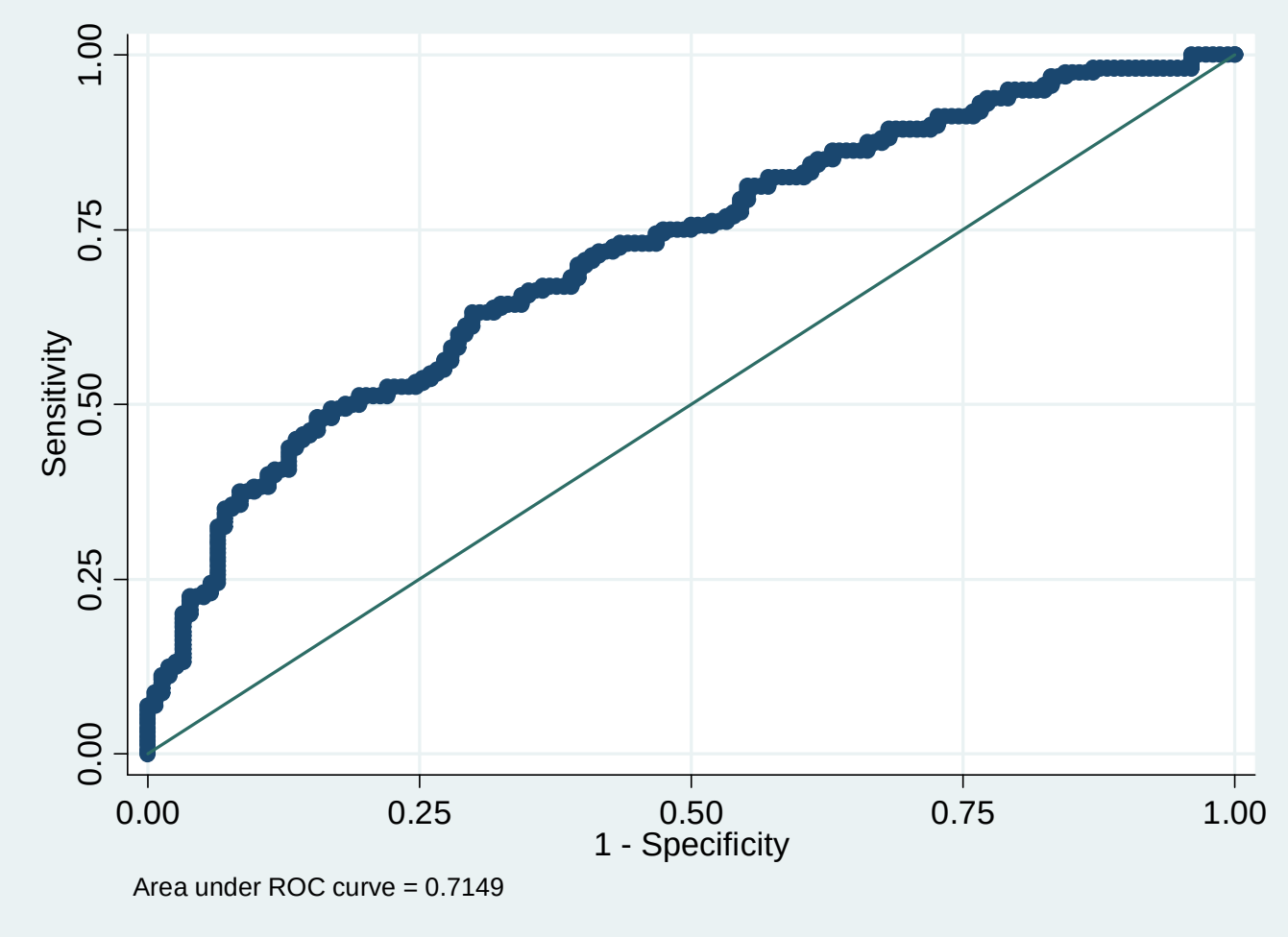
$$\begin{aligned} PAT_i &= \beta_0 + \beta_1 SIZE_i + \beta_2 AGE_i + \beta_3 AGE_i^2 + \beta_4 INT_i + \\ &+ \beta_5 LF_i + \beta_6 MP_i + \beta_7 R_i + \epsilon_i \end{aligned}$$

- where:
  - PAT_i dummy variable equal to 1 for firms with successful patents applications over the period 2003-2010
  - $SIZE_i$ of the firm, measured in terms of annual turnover
  - AGE_i measured as the difference between 2010 and the year of foundation
  - INT_i indicates intangibles over total assets
  - LF_i indicates the legal form and equals 1 for listed company, 0 otherwise
  - MP_i is a proxy for market power, equal to profits/production costs
    - Measure of the margin, which proxies for market power
  - R_i indicates regional dummy variables

Determinants of patenting

Patent Probability - Logistic Regression		
	Coefficient β	Marginal effects dy/dx
SIZE	2,157***	0,406***
	(0,658)	(0,058)
AGE	-0,060**	-0,011**
	(0,028)	(0,005)
AGE - squared	0,001**	0,000**
	(0,000)	(0,000)
INT	1,347**	0,289**
	(0,400)	(0,086)
LF	-1,091	-0,246
	(0,771)	(0,187)
MP	-0,018	-0,003
	(0,038)	(0,007)
Regional Dummies	included	included
constant	0,224	
	(0,870)	
	Log-likelihood: - 191,76	
	Pseudo R^2 = 0,16	
	LR chi-square(22) =48,88	
	Prob>chi-square=0,000	
	N=315	

ROC curve


Sensitivity
0.00
0.25
0.50
0.75
1.00
0.00
0.25
0.50
0.75
1.00
1 - Specificity
Area under ROC curve = 0.7149

Empirical model - Step II

- Step II: determining the effects of patenting on firms' performances
-

$$\begin{aligned} TURN_i &= \beta_0 + \beta_1 \widehat{PAT}_i + \beta_2 X_i + \epsilon_i \\ PROD_i &= \beta_0 + \beta_1 \widehat{PAT}_i + \beta_2 X_i + \epsilon_i \end{aligned}$$

- where:
  - $TURN_i$ is a dummy equal to 1 if the firm has a positive % variation in turnover
  - $PROD_i$ is a dummy equal to 1 if the firm has a positive % variation in productivity
  - $\widehat{PAT}_i$ is the step 1 predicted patenting probability
  - X_i is a matrix of control variables
  - ϵ_i is a random error term

Effects of patenting on turnover

Increase in Turnover – Logistic Regression

	Coefficient β	Marginal effects dy/dx
Predicted PATENT prob.	5.466*** -1.782	0.448*** (0.156)
Controls	included	included
constant	0.001** (0.000)	

Effects of patenting on performances

Increase in Productivity – Logistic Regression

	Coefficient β	Marginal effects dy/dx
Predicted PATENT prob.	3.000 -2.003	0,133333333 (0.164)
Controls	included	included
constant	0.001** (0.000)	

The model (sketch)

- Puzzle from the empirical analysis: more competition involves more incentives to innovate.
- Idea behind theory model: mix IO models of horizontal and vertical differentiation to capture a specific feature of the tourism industry.
- Patent increases the level of vertical differentiation.
- We show that, when products are closer substitutes horizontally (i.e., more competition), firms have more incentives to patent.
- Intuition: horizontal differentiation is not sufficient to relax competition.
  - Marginal benefits from relaxing competition are larger if competition is tougher to start with
  - Relaxing competition has decreasing returns.
- Hence, more innovation under smaller horizontal differentiation.

Conclusions

- Age and size have a significant effect on the probability of patenting, as does expenditure on intangibles.
- Market power appears to have a negative effect on the probability of patenting.
  - although it is not significant in the current specification
- Legal form has no effect (although the sample of listed companies may be too small to draw implications).
- Patenting behavior has a very significant (1% significance) effect on turnover, a 10% significant effect on operating profit and ROI, while no significant effect on labor productivity.
- Theory model rationalizes why patenting is associated to more competition (lower horizontal differentiation).
- Future steps:
  - logit for rare events
  - suggestions welcome

THANKS FOR YOUR ATTENTION