

**12TH INTERNATIONAL CONFERENCE ON "TECHNOLOGY
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**Commercialisation strategies of
research-based spin-offs: the case of
companies that operate in the market
for technologies**

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RBSOs and their role: *heterogeneity*

- RBSOs are **heterogeneous** companies (Mustar et al, 2003)
- **Variety** affect way the transformation of *scientific & technological knowledge into economic value* is conducted
- Result in **different functions** in the innovation system
 - Nature of transformation tasks performed (activities)
 - Outcomes of these tasks (outputs)
 - Knowledge articulation role (interactions with partners, suppliers and clients)
- ➔ One potential source of heterogeneity:
commercialisation strategy

Commercialisation strategy

→ **Basic decision:** (Gans and Stern, 2003)

- Develop **products or services** based on the technology and sell them in the market – alone or through alliances – the “*traditional route*”
- Opt instead for **selling or licensing the actual technology** (IP-based)
- **Major strategic decision** with impact on:
 - organisation of firms activities and
 - way firms interact with their environment
- **Imprinting effect** of early choices

Conceptual framework

- RBSOs **main asset**: their knowledge/ technology
- Decisions influenced by factors related with:
 - the **technology** and the **nature of knowledge underlying** it – i.e, “technological imperatives”
(Malerba an Orsenigo, 1993; Klevorick et al, 1995)
 - conditions that enable firms **to capture value** from that technology (Teece, 1986; Arora et al, 2001)
- In addition: influence of specific features of **source environment** (non-commercial)

Factors influencing decision

- General hypotheses on factors that influence RBSO decision(s) on **mode of technology commercialisation**:
 - **Nature of knowledge** being exploited
 - **Appropriability** conditions, i.e capacity to **protect** technology
 - Location and control of **non-technological competences & resources** (complementary assets)
 - **Institutional origin**: influence of parent organisation; impact of founders background upon competence base

Research focus

- Look at firms specialising in production & sale of intellectual property (IP – based) (Hicks and Hedge, 2005)
 - ↳ thus *targetting Technology Markets*
- business model becoming more frequent as markets for technology develop
- still less well understood organisational form.
- RBSOs may be particularly prone to adopt this model given nature of their key assets:
 - technology (proximity to science)
 - entrepreneurs (academic backgrounds)

Specific research questions

- *Focus: decision to start-up & continue operating in technology markets*
- Which factors influence RBSOs early business orientation towards technology markets.
- Which factors influence RBSOs capacity to operate on technology markets as their main business.
- How determinant are early decisions on subsequent positioning ?

Hip: Nature of Knowledge

RBSOs operating in TM are more likely to:

- Have more generic /pervasive technologies (*"platform" type supporting continuous stream of developments; less directly related to applications*) (Orsenigo et al, 2001)
- Have technologies that involve a greater component of new knowledge (*more valuable for potential acquirers*) (Shane, 2001)
- Start-up with technologies developed in the context of the parent research organisation (*as opposed to tacit knowledge later developed in-house*) (Saviotti, 1998)
- Involve founders whose technological backgrounds are exclusively academic (*preference for R&D/building technology portfolio*) (Ensley and Hmieleski, 2005).

Hip: Appropriability

RBSOs operating in TM are more likely to:

- Operate in sectors where appropriability is (perceived as) higher (*sectoral differences in appropriability & effectiveness patents*) (*Cohen et al, 2000; Hall, 2005*)
- Protect their technology with patents & (*Arora and Merges, 2004*)
- Attribute greater importance to patents as compared to other IP protection mechanisms (*legal protection as requirement; information asymmetries*) (*Gambardella and Giarratana, 2007*)
- Start-up with technology already protected by patents granted to parent organisation (*add parent reputation; increased IP protection in ROs*) (*Lichtenthaler and Ernst, 2007*)

Hip: Complementary assets

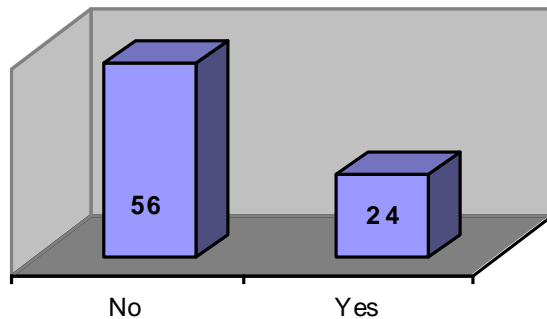
RBSOs are more likely to opt for TM:

- if some downstream CAs perceived as key to capture the value from the technology are controlled by incumbent firms (*Gans and Stern, 2003*)
- if they do not possess the skills/resources to develop or to access them in favourable conditions (entrepreneurs backgrounds) (*Elfring and Hulsink, 2003*)
- are exploiting basic knowledge being involved in upstream transformation processes (*that do not require them to engage in downstream activity*) (*Arora et al, 2001*)
- and fulfill requirements to trade in such markets (appropriability and nature of technology)

Empirical research

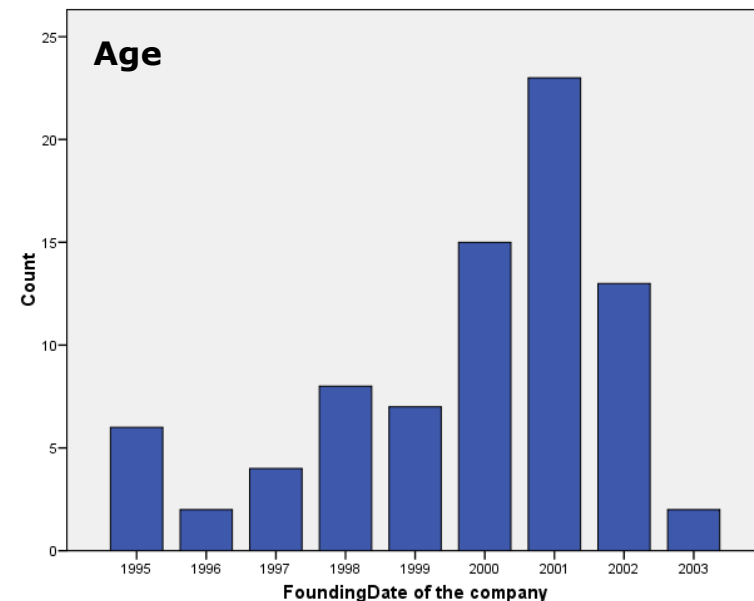
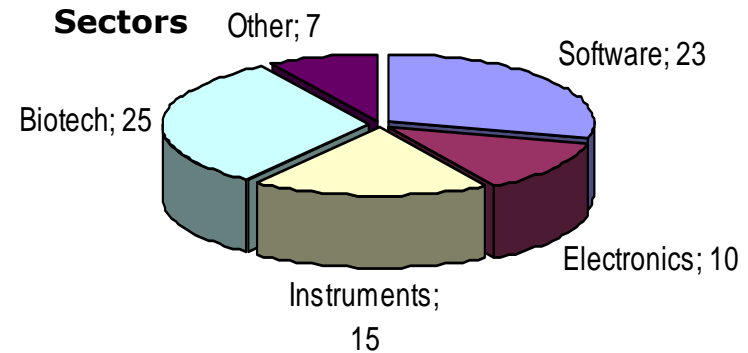
Sample:

- 80 RBSOs
- 6 countries (BE,FR,IT,PT,SL,UK)
- Between 5-15 years old
- Data collection (2007)
- Face to face interviews based in questionnaire



Technology Market Start-up

30% in technology market



Methodology

→ To test hypotheses:

- ❑ Build 3 Models explaining RBSOs operation in the market for technologies.
- ❑ Run logistic regression.

Two stage approach:

- ❑ Model (1) for "*conditions that influence an early business orientation towards market for technologies*"

Dependent variable: Main business orientation at start-up is "to sell or license technology"

Methodology

- Models (2&3) for “*conditions associated with earning money from the market for technologies, as RBSOs main business*”

Dependent variable: Licenses as main source of revenue expected in future

Include *early decision* as independent variable

- In both models:

Independent variables: Measures of appropriability, nature of knowledge, founders backgrounds, control over complementary assets.

Control for Industry & Age.

Findings - adopting strategy

RBSOs more likely **to adopt** IP-based strategy when:

- technology involve greater component of **new knowledge**
- technology was mostly developed in the parent organisation
- and was protected by a **parent patent**
- **founders** had no technological experience in industry & had stronger academic backgrounds
- operate in **biotech** industry (proximity to science)

Findings – sustaining strategy

→ **Early decision** on this business orientation, increase propensity to have it as main business in future

Strategy is more likely to **be sustained** when:

- firms operate in sectors where **appropriability** is (perceived by the entrepreneurs as) higher
- **complementary assets**, related to production and commercialisation, are perceived as controlled by existing firms
- in science-based industries

Findings: puzzling results

- ❑ IP-based firms *not* more likely to have **own patents** – *although more likely to have **parent patents***
- ❑ Patents more highly rated as protection mechanisms but so are *non-patent mechanisms*
 - patent protection also necessary for product-based firms ?
 - IP-based need a combination of protection mechanisms
- **RBSO-specific pattern of behaviour ?**
 - Patent protection **is important**
 - **Parent patents** protect technology driving creation
 - ... since own patents may not have emerged yet

Findings: puzzling results

- Firms with “**pervasive**” technologies (platform type) *not* more likely to adopt strategy
 - Technologies enable **wide variety of applications**
 - large scope for strategic choice
 - also favourable for product-based firms in fast changing markets!

- Firms that adopted strategy more likely to have also founders with **non-technological backgrounds** in team
 - Intervention of **external shareholders** ?
 - **Skills required** to manage IP-based company

Implications for Policy

→ **Key message:** take into account heterogeneity of RBSO strategies and different needs associated to them

□ Go beyond start-up conditions

→ capacity for *sustaining*

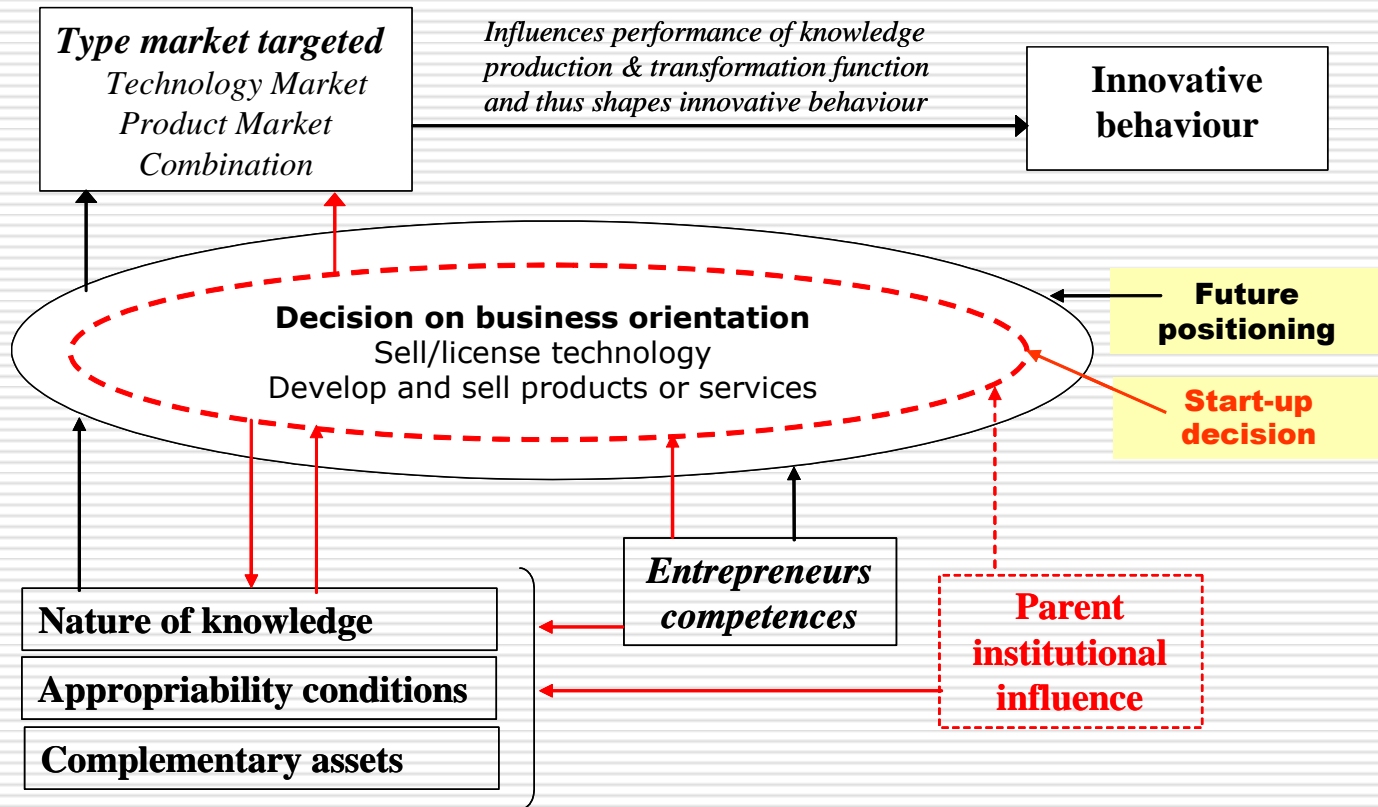
Implications for Policy

→ *Case of (emerging) IP-based strategy:*

- Consider **specific role played**: upstream transformation of scientific knowledge in basic but **tradeable** technologies.
- Our results offer **indications for policies** that:
 - reinforce RBSO **strengths**: Novelty; IP; knowledge intensity
 - assist in potential **difficulties**:
 - strong information needs (assess conditions regarding complementary assets; identify and capture interest of technology acquirers);
 - access to missing competences and resources;
 - power asymmetries in negotiation
 - guarantee the effective functioning of technology markets

THANK YOU FOR YOUR ATTENTION!!

Model



Logistic regression - Model 1

Dependent variable: Main business orientation at start-up

Method: Backward Stepwise LR

Variables	Model 1 Exp (B)
IPIndustry	
ParentPatent	5.629**
TechBroadStart*TechOppBasSci	0.942**
TechInnov_DK_inv	2.101**
FoundExpAcad	
FoundExpTechIndYN	0.111*
FoundPrevMgmtExp	2.892**
Soft_Mult	
Elect_comp	
Instr	
Biotec	6.641**
R2N	0,504
Valid N	73

* Sig < 0.10

** Sig < 0.05

Models 2 & 3

Variables	Exp (B)			
	Model 1	Model 2a	Model 2b	Models 3a & 3b
IPIndustry		0.515**	0.484**	
ParentPatent	5.629**			13,714**
TechBroadStart*TechOppBasSci	.942**			
TechInnov_DK_inv	2.101**			
FoundExpAcad		0.658**	0.779*	0.798 ⁽¹⁾
FoundExpTechIndYN	0.111*			
FoundPrevMgmtExp	2.892**			
Biotec	6.641**			30,049***
Soft_Mult				
Elect_comp				
Instr				
CA_Mnf				
CA_Mkt				
CA_Sales				
CACTRLComm_nm		2.001**		
CACtrlMnf_nm		1.557*		
FTEProducA		0.399*	0.534*	0.523**
TechProtPat				
AppIFamY_N				
AppNoPat			1.632*	
Age		0.527**	0.650**	
TechMarket		84.958***	20,220***	
R2N	0,504	0.714	0.619	0.668
Valid N	73	77	77	70

* Sig < 0.10

** Sig < 0.05

***Sig < 0.01