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The territorial dimension of university-industry collaboration: the role of formal and informal drivers

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Outline

- Reassembling the pieces of the U-I puzzle: what do we know about the ‘dynamic’ process of tech transfer?
- A framework for the comparative case study analysis
- An application to the empirical analysis of two Italian universities



Reassembling the pieces of U-I puzzle

- Different channels of TT have proven to be of fundamental importance for sustaining the innovation capacity of the firms:
 - University licensing (Narin et al., 1997; McMillan et al., 2000; Cohen et al., 2002).
 - Contract research/collaborative research (Meyer-Krahmer and Schmoch, 1998; Scharfetter et al, 2002)
 - Services offered by TTO (Bercovitz et al 2001)
 - Informal links between entrepreneurs and researchers (Link et al, 2007)
 - Mobility of researchers (Balconi et al., 2004)
 - University-based startups (Audretsch and Stephan, 1996)
 - Mobility of students and graduates (Dietz and Bozeman, 2005)
- Such channels have specific scientific and technological variations (Bekkers and Bodas Freitas, 2008), but also specific territorial features (Polt et al., 2001; Lawton Smith, 2003) → the role of institutional frameworks

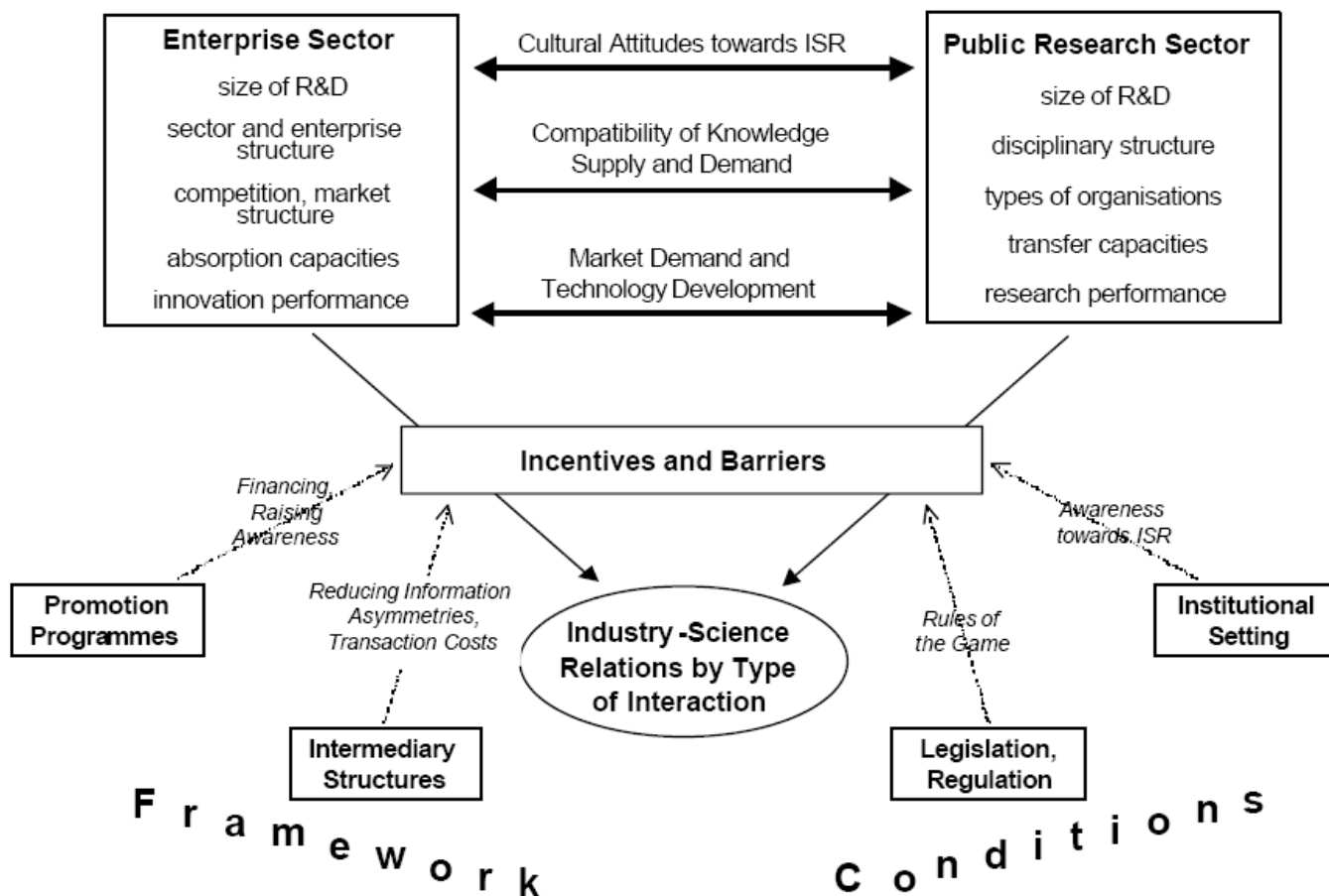


Institutional frameworks and knowledge creation: Our research questions

- Which is the influence of different institutional frameworks on the development of U-I collaborative relations? We have a set of partial responses based either on university rules (e.g. Bay Doyle act) sectors, technologies, or territorial contexts, but we need a comprehensive approach to the whole phenomenon. Some attempts, such as the one developed by Polt et al., 2001 upon which we try to build a fine-grained analysis
- Which is the influence of such institutional contexts in the (dynamic) process of creation of new knowledge? And, most important, how this process occurs? Case studies analysis provide us with a rich source of data, but we need a unitary framework for performing comparative analysis



The importance of framework conditions





A framework for the comparative case study analysis

How can we use complex logic models into the empirical analysis?

Which are the main determinants of U-I rels and how can we measure them?

We focus on:

1. The absorptive capacity of the context
2. The features of the University
3. The institutional context



The absorptive capacity of the context

Two levels of analysis:

- The **sectoral&technological context**, which is characterised by different learning patterns and different level of technology opportunities (Bekkers and Bodas-Freitas, 2008)
- The **business context**, made by enterprises that are characterized by their specific knowledge and competencies as well as by their specific level of absorptive capacities



The features of the University

Two levels of analysis:

- (meso-level) Features of the University/Department (e.g. prestige, ranking)
- (micro-level) Features of the agents involved: their specific knowledge base, their scientific interests, their history of (formal and informal) collaborations with industry, their status



The institutional context

- University rules on TT processes
- The activity of industrial or other kind of private/collective local stakeholders
- Regional policies and other public TT support strategies



The comparative analysis

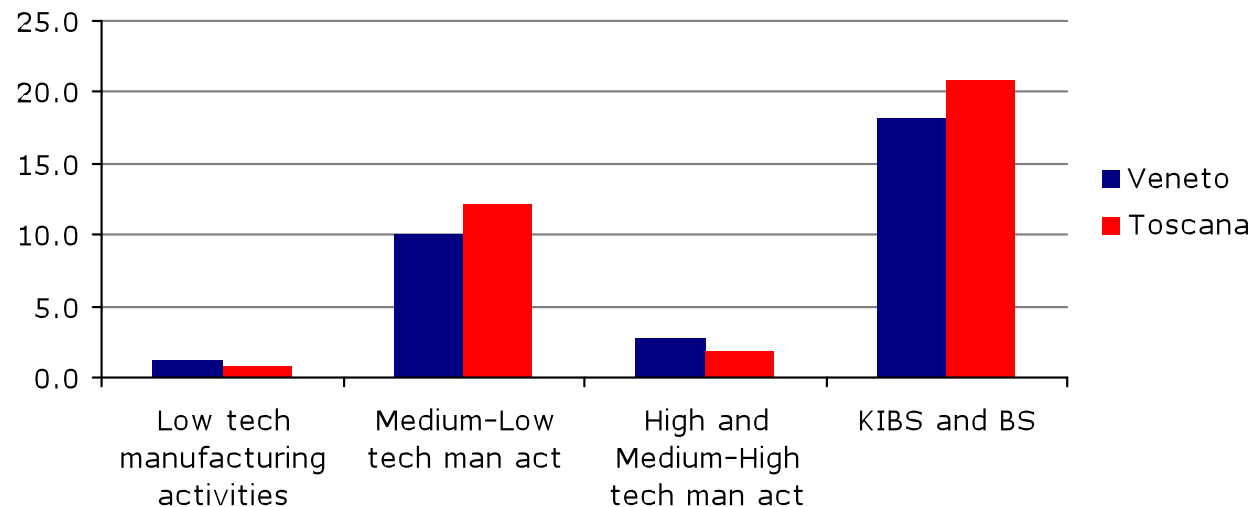
- We focus on contract research, which is an important form of U-I knowledge transfer (Kingsley et al., 1996; Meyer-Krahmer and Schmoch, 1998; Monjon and Waelbroeck, 2003).
- In Italy, Piccaluga (2008) observes a progressive growth of contract research, from 16% of the total uni budget in 2004 to around 26% in 2007. In the same period, the incidence of transfers from central government decreases from 44,1% to 27% of the total uni budget
- We compare two public generalist universities (and their relative contexts): Padua and Florence
 - Unifi: 12 schools, 70 depts, more than 60.000 students and 2288 researchers/professors in 2009.
 - Unipd: 13 schools, 66 depts, around 61000 students and 2400 researchers/professors in 2009.

1. The absorptive capacity of the context



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The sectoral/technological context



PD area: Presence of an agglomeration of SMEs operating in the ICT sector (Trigilia and Burroni, 2011)

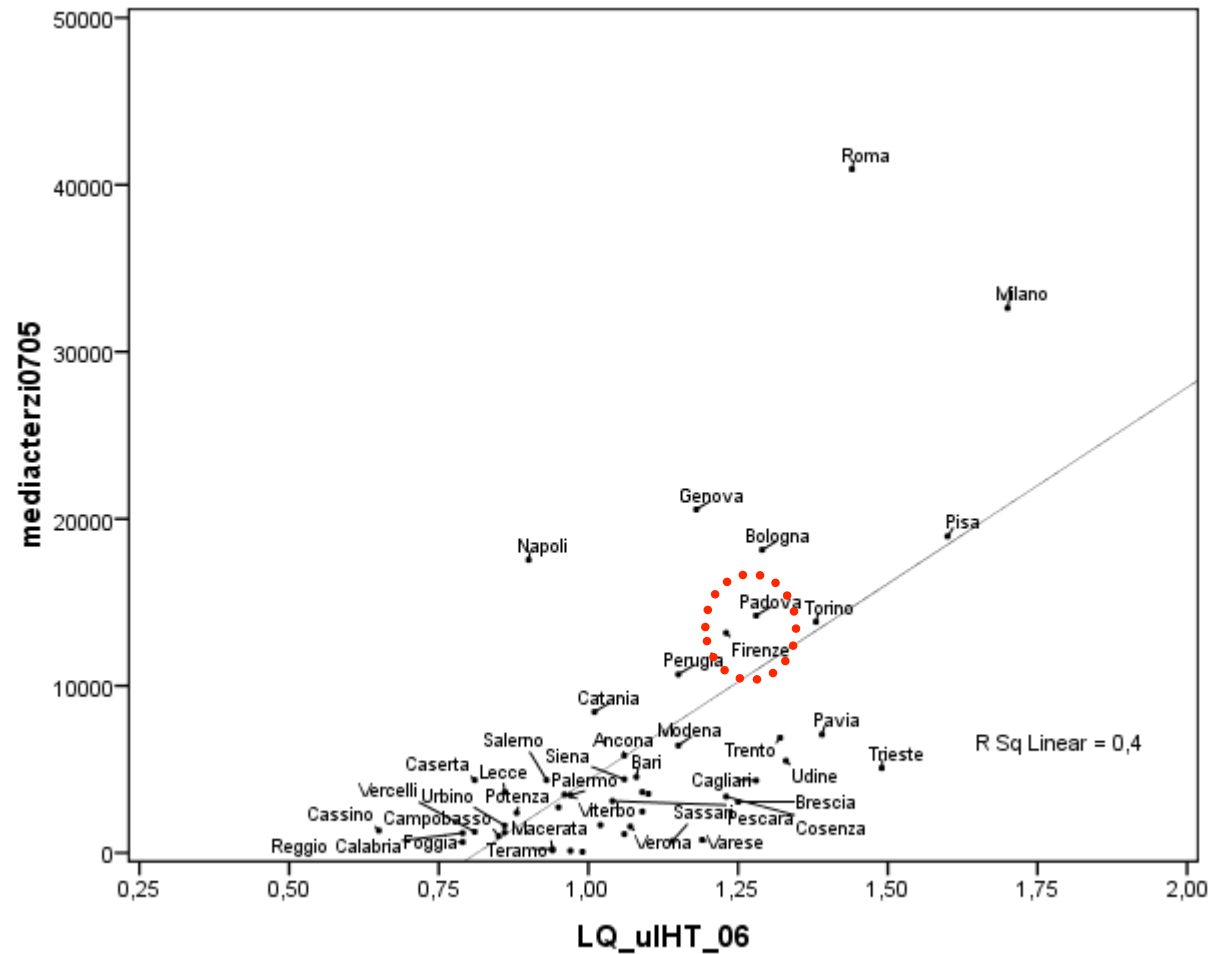
FI area: A fragmented urban area hosting a set of MNEs, but a relevant concentration of innovative activities (measured by patents) in advanced mechanics & biomedical industry (Caloffi and Mariani, 2011)

1. The absorptive capacity of the context



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Research contract and local innovative context



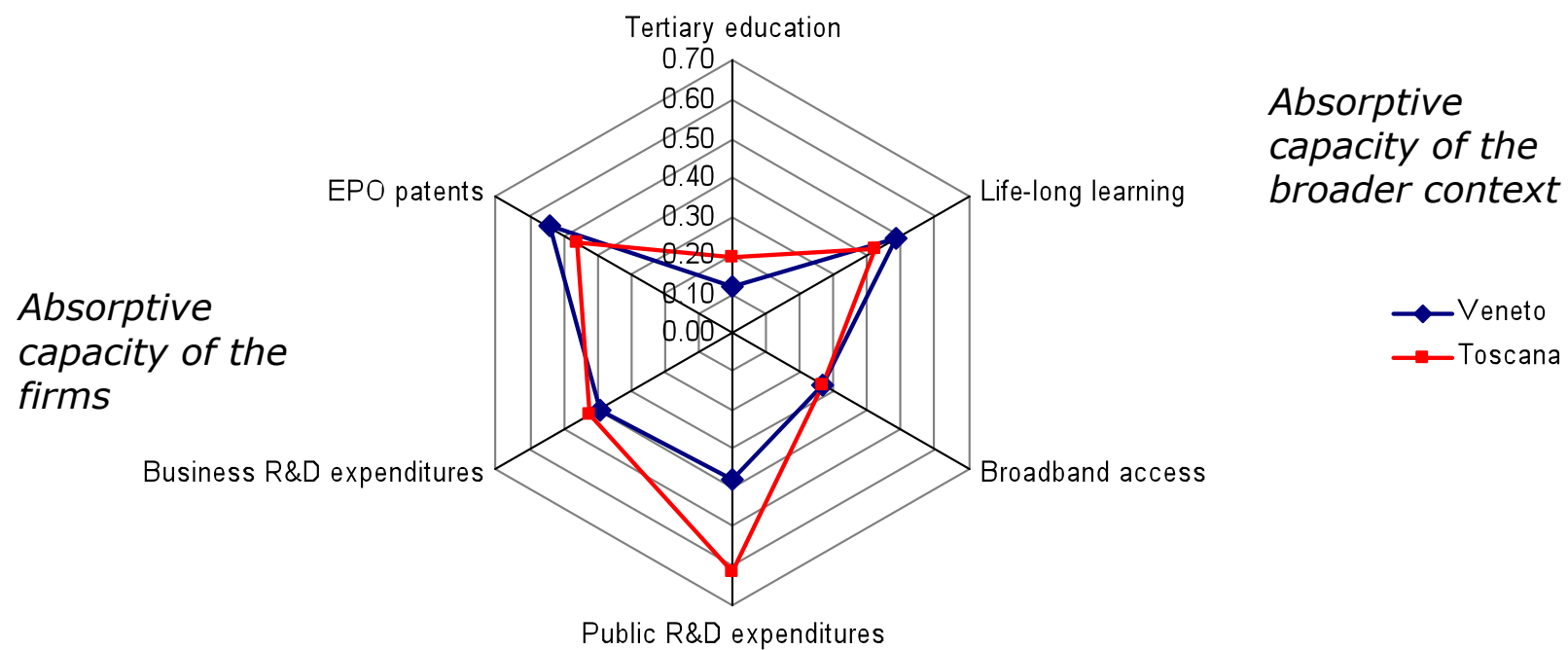
1. The absorptive capacity of the context



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The absorptive capacity of the context

Enablers & firms activities (RIS 2010)



2. The features of the University



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University ranking

	UnFlorence 2010	UnPadua 2010	UnFlorence 2009	UnPadua 2009	UnFlorence 2008	UnPadua 2008	UnFlorence 2007	UnPadua 2007
Arts & Humanities	158=	181=	180=	195=	171=	174	138	169
Natural Sciences	129=	112=	125=	146=	156=	163=	159=	194=
Engineering & IT	N/A	231=	N/A	276=	N/A	276	286	319=
Social Sciences	181	272=	179	284=	171	291=	256=	310=
Life Sciences	263=	230=	N/A	191=	N/A	198=	337=	190=
Overall Ranking	328	261	377	312=	349	296=	329	312=

Source: QS World ranking, 2010.

Survey data collection on: academic reputation, employer reputation, citation per paper differently weighted for subjects

PD and FI: Better position in natural sciences

PD: natural sciences & life sciences

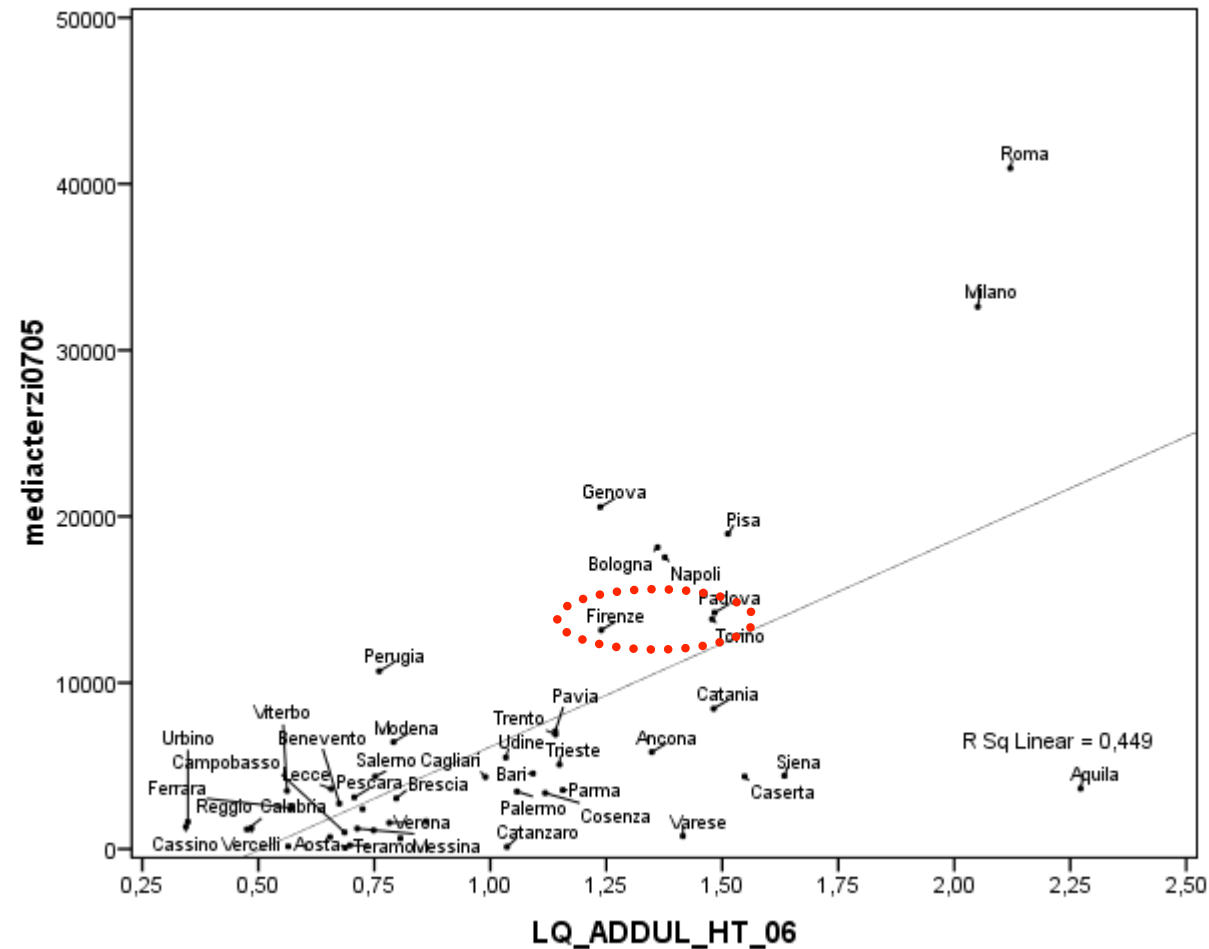
FI: arts & humanities and social sciences

1. The absorptive capacity of the context



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Research contract and local innovative context II



2. The features of the University



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Excellence Group ranking

Country	Depart.						Political	
	total	Biology	Chemistry	Economics	Math	Physics	Science	Psych
United Kingdom	120	21	13	23	9	11	21	22
Germany	79	15	12	7	11	16	8	10
The Netherlands	41	7	7	7	3	6	2	9
France	35	8	7	5	6	6		3
Italy	29	2	5	4	4	8	3	3
Spain	29	1	8	7	5	5	1	2
Sweden	28	6	5	3	3	5	2	4
Switzerland	22	7	2	3	2	4	3	1
Belgium	16	2	1	4	2	2	2	3
Denmark	12	3	2	1	2	2	2	
Austria	10	1	1	1	5	2		
Finland	7	1	1	1	1	1	1	1
Poland	6		4			1	1	
Czech Republic	5			2	1		2	
Ireland	4	1		2	1		1	
Hungary	3			1	1	1	1	
Norway	1	1			1		1	
Estonia	1						1	
Portugal								1

Source: QS World ranking, 2010.

Florence has one field in the Excellence Group, Physics, while **Padua** has four fields, Biology, Mathematics, Physics and Psychology.

2. The features of the University



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Research contract activities

Yr	N RC PD	€ RC PD	Avg € RC	N RC FI	€ RC FI	Avg € FI
2008	639	21722501.55	33994.5	368	9,207,875.92	25021.4
2009	721	15838560.33	21967.5	461	11,712,420.39	25406.6
2010	672	14322539.84	21313.3	494	15,437,913.62	31250.8
TOT	2032	51883601.72	25533.3	1323	36358209.93	27481.6

493 researchers involved

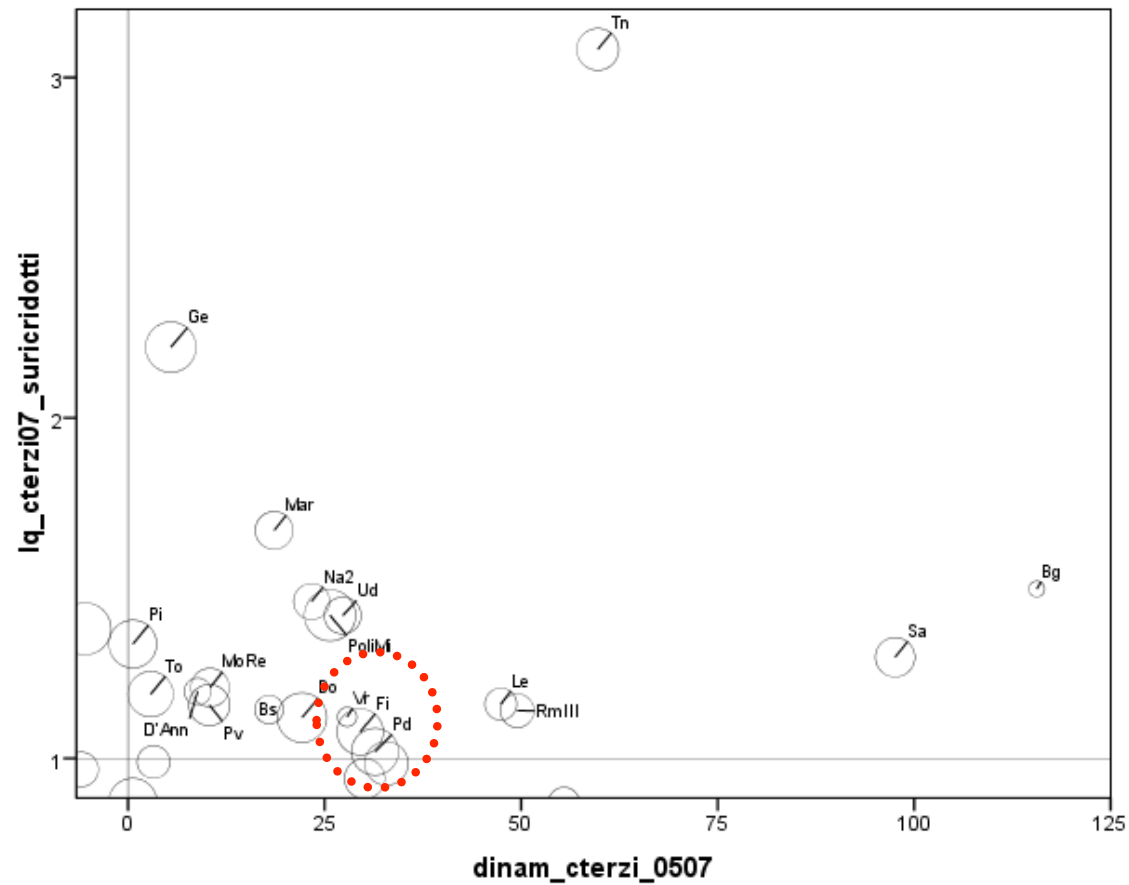
440 researchers involved

2. The features of the University



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The incidence of contract research





The type of clients

→ Private enterprises (mostly local SMEs in the case of PD) are the majority

FI: 66% of the total number of RC is signed with private enterprises (63% in terms of €)

PD: figures are 63% (N° RC) and 68% (€RC) respectively. Most of the enterprises are SMEs

→ However, in both cases, the regional government (and/or the regional agencies) is the most important “client”

FI: 33% of the partners are localized in the local area (province) + 24% in the region [figures rise to 26% and 22% respectively when considering €RC]

PD: 26% of the partners are localized in the local area (province) + 33% in the region [figures rise to 42% and 36% respectively when considering €RC]

→ The typical client:

FI: an italian firm

PD: a local SME



U-I rels: what are we talking about?

RC by €classes	UNIFI		UNIPD	
	N° RC (% on total)	€RC (% on total)	N° RC (% on total)	€RC (% on total)
below 5000€	1.6	19.9	2.7	31.4
5000-9999€	3.6	15.6	4.5	15.7
10000-49999€	38.2	48.8	35.8	40.0
50000-99999€	24.7	10.8	21.4	7.8
100000-500000€	25.3	4.6	32.5	5.0
over 500000€	6.6	0.3	3.1	0.1
Total	100.0	100.00	100.0	100.0

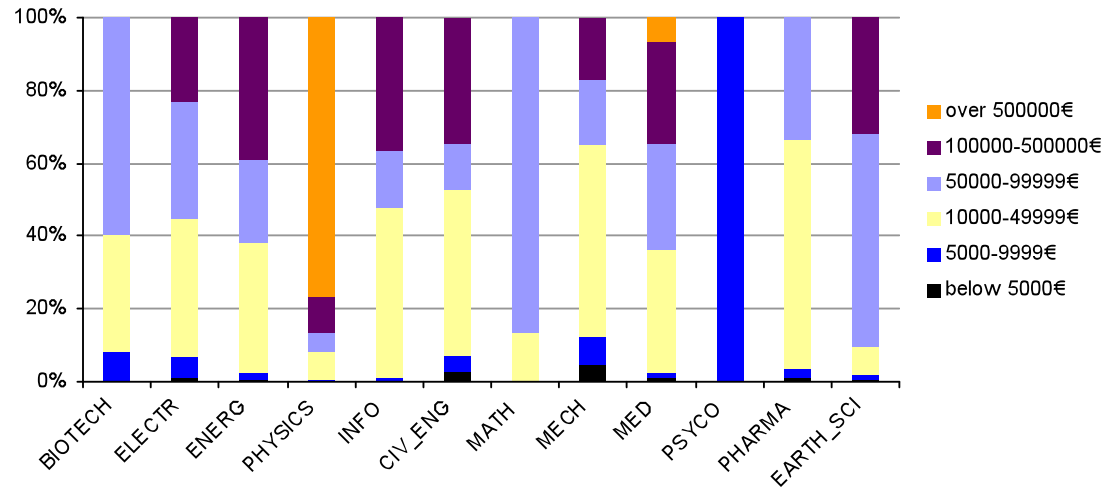
A large incidence of very small and small scale RC
U-I is just daily consultancy or joint research?

2. The features of the University



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Uni ranking and RC with enterprises



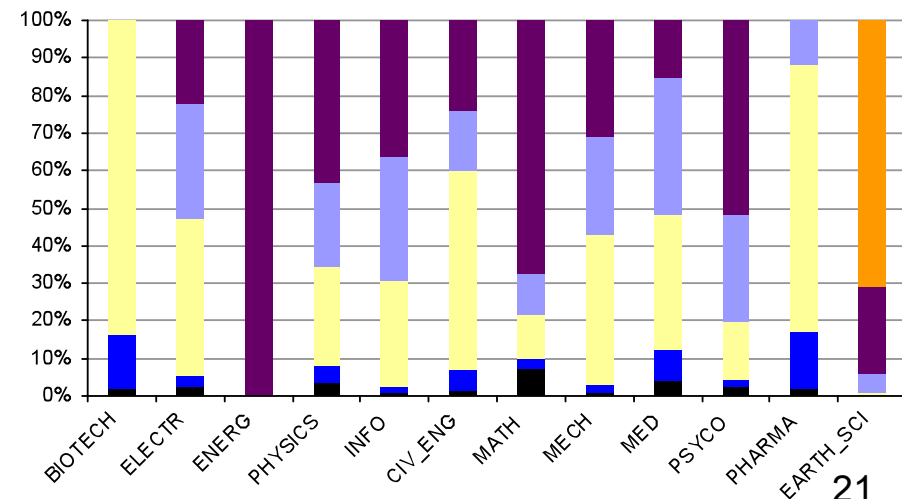
UNIFI

RC by €classes - most
important scientific areas in
terms of €volume of RCs

Large-scale RC are quite
concentrated in the areas of
excellence as defined by the
uni rankings (physics and
earth_sci)

Small-scale projects are more
rooted in the dynamic of the
local industry

UNIPD





Management of Technological Transfer at the Unipd

Different ways of TT have been created:

- **Patents:** the service centre manages the development, administration and defence of patents on technologies produced inside the University;
- **Start-Cube:** University incubator for start-ups;
- **Spin-off:** consulting for business management, helpdesk for business plan design and to draw up agreements with industrial and financial partners;
- **Patavina Technologies:** service centre for design and prototype of ICT;
- **Progetto Impresa:** the service centre exploit and promote research activity, economically;
- **Uni2B:** it is a browser for competences, research projects and patents of four Italian Universities (Padova, Pavia, Perugia, Trento);
- **BanVeneto:** service centre to match business angels, technologies, start-ups;
- **Start-Cup Veneto:** award for the technological content of the best entrepreneurial idea



Management of Technological Transfer at the Unifi

Different ways of TT have been created:

- **Patents:** the TT office manages the development, administration and defence of patents on technologies produced inside the University;
- **IUF:** University incubator for academic spin-offs, created in 2009;
- **Spin-off:** CSAvri, the consortium that manage the IUF, offers various kind of support services for the promotion of spin-offs, among which a ;
- **Uni-ind labs:** an agreement between the local business association and the TT office signed in 2006 promote the formation of uni-ind joint labs.
- **OpenLab:** a data-base on competencies and research projects of the Unifi (scientific and technological areas)
- **Research Obs:** a knowledge data-base on competencies, research projects and patents of the 4 main universities of the region (Unifi, Unipi, Unisi, Sant'Anna);
- **Florence 2010:** a new uni-ind service centre specialized in the promotion of cultural and environmental technologies;
- **Start-Cup:** award for the technological content of the best entrepreneurial idea



The activity of local stakeholders

- In both systems, Chamber of Commerce (together with their specialized agencies), business associations, as well as other local organizations have implemented several (mostly small-scale) projects/strategies encouraging the development of U-I rels.
- PD: Start-cup and Start Cube to support the birth of new firms; prizes for innovative ideas and innovative thesis; Business Plan Competition is a prize for the best technological idea developed by students; BanVeneto to match competences, venture capital and technological networks.
- FI: Start cup and PNI cube for the promotion of spin-offs; ACA clubs of innovators; InnoContest and Leonardo prizes for young innovators, INUN joint lab for the promotion of uni-ind rels.



The local and extra-local policies for innovation

- Network policies, INNOvouchers, and other policies supporting various kind of U-I joint R&D projects (Toscana Region). In the programming period 2000-2006, 40% of the regional fundings for the support of innovation have been explicitly devoted to the support of Uni-Ind rels. The incidence is increasing in the present programming period (2007-2013).
- Network policies are promoted by the Veneto Innovazione Agency to support R&D and technological transfer at different territorial levels. In 2007, the research area of the Venetian universities represented the 28% of the regional R&D expenditures. This quota shows an increasing trend (even if the regional R&D expenditure is lower than the national mean).



Different policies for supporting different kind of RCs?

- Large-scale joint research projects seems to be linked to the presence of specific areas of excellence in the U-research (where excellence also means good publications) → the promotion of this kind of U-I rels is very much linked to academic policies
- What is the role (if any) of regional policies/local stakeholders activity in the promotion of such kind of U-I rels? → what is the role of the local framework conditions?



Next research steps

- We investigate, more deeply, the nature of the research contracts to detect what kind of technological relationships constitute the university-industry collaboration.
- FI-PD universities are very similar but their institutional contexts do not converge to a similar social system.
We deepen the analysis focusing on the impact of small and large research projects :
 - ✓ on the organization of research system at the university level
 - ✓ on the innovative capacity of the interested production system.
- We map the contract research networks of each university to detect what territorial level is more relevant for research production and technological transfer.



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