

# Organisational Change and the Institutionalisation of University Patenting Activity in Italy

Nicola Baldini · Riccardo Fini · Rosa Grimaldi ·  
Maurizio Sobrero

Published online: 4 January 2014  
© Springer Science+Business Media Dordrecht 2014

**Abstract** As universities are increasingly called by their national governments for a more entrepreneurial management of public research results, they started to develop internal structures and policies to take a proactive role in the commercialisation of university research. For the first time, this paper presents a detailed chronicle of how country-level reforms on Intellectual Property Rights (IPRs) were translated into organisation-level mechanisms to regulate university-patenting activity. The analysis is based on the complete list of patent policies issued between 1993 and 2009 by the population of Italian universities. Our evidence suggests that universities first dealt with legislative changes on IPRs by enacting isomorphic behaviours, then by creating a community of practices, and finally by leveraging on such community to influence government reforms on IP-related matters. We discuss our results in the light of institutional theory and public policy.

**Keywords** University patents · Patent policies · Institutional change · Isomorphic behaviour

## Introduction

For a long time, universities have been required to support the practices of open science. This has meant ensuring that university scientists created and diffused knowledge as a public good, thus producing positive externalities for the society (Argyres and Liebeskind 1998). Such an image of universities has gradually been changing all over the world to account for an increasing interest in technology transfer and the commercialisation of research results (Perkmann et al. 2013).

---

N. Baldini · R. Fini (✉) · R. Grimaldi · M. Sobrero  
Department of Management, University of Bologna, Bologna, Italy  
e-mail: Riccardo.fini@unibo.it

In Europe, the research systems in most countries have historically relied primarily on governmental transfers: the enforcement of the Maastricht criteria for joining the European common currency led to a period of shrinking budgets starting from the 1990s (Geuna 2003), thus encouraging universities to search for new sources of funds in the industry. At the same time, the constraints on public expenditures led to a greater demand for accountability<sup>1</sup> for public spending (Geuna 2001). Both performance and fiscal accountability emerged as new key elements of the research process (Geuna and Martin 2003), while patents and spin-offs became widely used indicators for measuring the return on the public money invested in research. Many European countries also decided to reform their national innovation systems, so that public research became more proactive in fostering international competitiveness, and in enhancing quality of life (Etzkowitz et al. 2000; Gulbrandsen and Langfeldt 2004).

Additional pressure to renovation came from US success stories like Stanford and the Silicon Valley (Fisher 1998), or MIT and Route 128 (Etzkowitz 2002), which stimulated emulation among the European universities (Jacob et al. 2003; Acworth 2008). Similarly, while mainly located in the Anglo-Saxon countries (where it is more developed), the venture capital industry also played a role in the entrepreneurial transformation of academia by its preference to invest in patented technology rather than in non-patented counterparts (Mazzoleni and Nelson 1998).

Scholars looked at these changes from different perspectives, focusing on the legislative and regulatory reforms (Henrekson and Rosenberg 2001; Goldfarb and Henrekson 2003; Valentin and Jensen 2007), and on the impact that such laws may have on the quality and number of patenting activities (Meyer 2003; Baldini et al. 2006; Iversen et al. 2007; Lissoni et al. 2008) and research productivity (Breschi et al. 2008; Czarnitzki et al. 2007), as well as addressing the internal transformation of universities triggered by the legislative changes on IPRs (Jacob et al. 2003; Marques et al. 2006; Rasmussen et al. 2006). As for the latter, extant research mostly analysed specific university settings, and focused either on single cases or on a few organisations, thus providing only a limited and idiosyncratic understanding of the phenomenon. Based on our knowledge, indeed, there are no studies that, by undertaking a country-level perspective, assess the impact of IP legislative reforms on university-level policies and practices.

In an attempt to fill this void, we draw on neo-institutional theory to characterise how Italian universities enacted organisational changes in response to reforms of both the academic management system and IP legislation. Our analysis is based on the complete set of 90 patent policies issued between 1993 and 2009 by the 64 Science, Technology, Engineering, and Mathematical (STEM)<sup>2</sup> universities in Italy (Fini et al. 2011). We complemented archival data with interviews with university personnel in charge of IP management. Results illustrate that university patenting activity emerged through a bottom-up process, in which each individual Italian

<sup>1</sup> Starting from the 1980s, the concept of New Public Management depicts a broad movement for the public research towards managerial instruments that are already successfully used in the private sector, with particular reference to performance management systems (Lindgren 2001).

<sup>2</sup> Universities with at least one technical department and/or school, such as engineering, architecture, mathematics, medicine, veterinary medicine, science, physics, and chemistry ([www.nsf.gov/nsb/stem/](http://www.nsf.gov/nsb/stem/)).

university proposed a set of idiosyncratic norms and policies, after a transformation (not related to IPRs) of the academic management system as a whole. Initially, as a result of uncertainties about the new regulatory system in which they had to operate, only very few Italian institutions issued a patent policy; the vast majority of universities waited for the most prestigious ones to act, and finally replicated—almost verbatim—their regulations in the area of IPRs. Later on, once the Government changed the IP law via a top-down reform with potentially disruptive effects by introducing the so-called “professor’s privilege”,<sup>3</sup> the universities refused to comply, and developed a community of practices to resist the legislative coercion. Finally, government relaxed its reform of IP legislation and enacted a compromise that favoured the university ownership of IPRs.

The paper is organised as follows. In the next section, we introduce neo-institutional theory as a possible interpretative lens to understand the response of Italian universities to legislative changes in IPRs. After that, we describe changes in the national legislation that affected—directly or indirectly—university patenting activity. Subsequently, we present the method and our data, and we then explain how university-level patent policies diffused across Italian institutions and connected with national legislation over the last 20 years. In the final section, we discuss our results in light of neo-institutional theory, concluding with some suggestions for further research.

### **Institutional Change: Neo-Institutionalism as an Interpretative Lens**

Since the seminal contribution of Meyer and Rowan (1977), neo-institutionalists underscored that organisations compete not just for resources and customers, but also for political power and legitimacy. Organisations like schools, R&D units, and governmental bureaucracies, including the Italian universities, use ambiguous technologies to produce outputs that are difficult to appraise (Merton 1973). Efficiency therefore cannot be used as a basis for an evaluation. In such cases when the aspiration to achieve organisational legitimacy is a more powerful driver than efficiency considerations, isomorphic behaviours may emerge (Meyer and Rowan 1977).

There are three potential drivers of isomorphism. First, particular practices that are supposed to be rationally effective and are diffused through rational networks; second, legal mandates created and interpreted by legislative and judicial authorities; third, rules of practice established by administrative agencies (Meyer and Rowan 1977). Correspondingly, there are three mechanisms through which isomorphic change occurs (DiMaggio and Powell 1983): (a) mimetic isomorphism, resulting from standard responses to uncertainty; (b) coercive isomorphism that stems from political influence and need for legitimacy; and (c) normative isomorphism, associated with professionalization.

---

<sup>3</sup> The professor’s privilege exempts academics from standard rules related to IPRs, and grants patents to the inventors rather than to the employers.

These three mechanisms can overlap and intermingle, but they derive from different conditions. Mimetic isomorphism stems from the need to cope with uncertainty by imitating organisations that are perceived to be more legitimate or more successful. Coercive isomorphism is the response to an external pressure (such as a government mandate) or dependence on key organisations. By contrast, normative isomorphism is induced by professionalization. Professionals and their associations produce a common cognitive base and a shared legitimisation of occupational autonomy, which make organisational structures similar to one another. Normative isomorphism creates similarity between organisations due to the diffusion of norms and standards through professional networks.

Government action—or, more generally, state intervention—has consistently been conceived of as playing a central function in catalysing the structural transformation of other organisations (Frumkin and Galaskiewicz 2004). Recently, EU legislation has been underscored as a powerful stimulus for the diffusion of common economic rules in different countries; for examples, see Sahariadis (2005) for the case of the UK competition authority, and Pedersen (2006) for the case of country-level authorities and regulations in the field of electricity and natural gas.

As legal and regulatory pressure increases, both non-profit and business organisations respond with higher levels of institutionalised rules and procedures. In fact, according to the neo-institutional perspective (Meyer and Rowan 1977; Tolbert and Zucker 1983; Edelman 1992), regulations may become important sources for the diffusion and legitimation of organisational practices by faculty members (Fini and Lacetera 2010). Consistently,<sup>4</sup> in the next section we report major governmental interventions imposed upon the Italian academic system and on patent legislation related to public research results.

## Conceptualising the Italian Context

### *The Reform of the Italian Academic System*

The Italian academic system has long been a typical example of a fully public and highly centralised governance structure, with low levels of autonomy at the university level, and a key role played by the central government through different ministries (Woolf 2003). Moreover, before 2010, no evaluation and monitoring systems of faculty research performance were in place.<sup>5</sup>

The autonomy acquisition process began at the end of the 1980s (Law n. 168/1989) with the creation of a specific institution responsible for the management of research (the Ministry of University and Scientific and Technological Research, now called Ministry of Education, University and Research, MIUR). A new regulation (Law n. 421/1992) to define the organisational rules for the application of

<sup>4</sup> See, e.g., Zomer et al. (2010) for previous use of this perspective in the research commercialization domain.

<sup>5</sup> In 2010, the National Agency for the Evaluation of the University System started its operations. While its role and functions had been set since 2006, it took two Governments and four years of discussion to define its composition and fine-tune its mission (Moscati and Vaira 2008).

financial and accounting autonomy appeared as early as 1992; however, it was only in 1996—when the new accounting-principle regulation was proposed and accepted by the ministry (D.M.<sup>6</sup> 9th February 1996, henceforth called “1996 Law”)—that self-administration could be effectively implemented by the universities.

The new regime significantly changed the nature of Italian universities, which then had, for the first time, the possibility of planning and controlling their own budget, defining priorities for financing research and managing staff, and—most importantly—keeping the surplus generated by their activities. Before that, the national government had significant power in deciding the allocation of financial resources, not only defining the distribution among universities (as is still the case), but even determining, within each institution, the allocation of specific resources (e.g., how much should be spent on stationery, and how much on building maintenance). Also, the recruitment and the promotion of teaching and non-teaching staff needed to be negotiated with the central government.

Moreover, such a new environment also induced competition between universities for student recruitment, as well as the necessity for resource rationing (Capano 2003; Moscati et al. 2010; Moscati and Vaira 2008). Since 1996, with different speed and priorities, almost all universities responded to the preceding changes by creating several mechanisms to commercially exploit research results, ranging from technology transfer offices (TTOs) to investments in academic start-up firms, and to university incubators. The new instruments were accompanied by a proliferation of internal policies to define their managerial rules and mission and, more generally, what to do in case of patents, spin-offs, and consultancies.

### *Changes in the Italian IP Law*

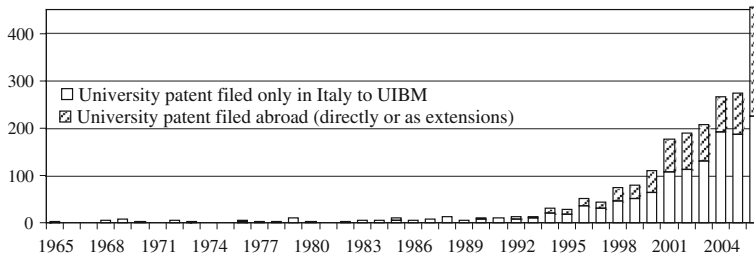
The original Italian IP law can be traced back to 1939 (Royal Decree<sup>7</sup> n. 1127/1939). Such legislation stated that IPRs on employees’ inventions were granted to the employer, if the invention stemmed from research carried out during the accomplishment of employees’ duties or during a contract. If the invention was not specifically rewarded, the inventor deserved a monetary prize in proportion to the importance of the invention.

Despite IP law created the legal condition that allowed universities to claim patents (as employers of the faculty members), it was quite difficult for them to do so, given that the ministry had the power to determine, within each institution, how much money should be invested in each activity, including IP management. Figure 1 reports the trends for Italian university patents filed between 1965–2006 to the Italian patent office (UIBM), as well as abroad (directly or as extensions). The exhibit shows a substantial increment in the patenting activity in the last decade since the introduction of the 1996 Law.

---

<sup>6</sup> The *Decreto Ministeriale* (abbreviated in D.M.) is an administrative decision that is adopted by a minister to define rules and practices for the ministry and/or the organisations controlled/supervised by the ministry.

<sup>7</sup> Italy was a kingdom between 1861 and 1946, and several laws remained effective after changing into a republic.



**Fig. 1** Academic patenting in Italy (1965–2006). *Source* PATUNIT database (Baldini et al. 2006)

In 2001, the newly elected government—consistent<sup>8</sup> with the set of norms put in place to support economic growth and technology transfer activities (i.e., deregulating the state intervention in entrepreneurial activities)—amended the existing IP law with Law n. 383/2001 of 18th October 2001 (henceforth called “2001 Law”). The resulting legislation introduced the so-called “professor’s privilege” under the assumption that individual inventors would be in a better position to profit from their discoveries because universities (and public research institutions in general) lacked the competence and the culture to promote patenting. IPRs of public employees’ inventions were thus granted to the inventor(s), with the employer being rewarded with 30% to 50% of the revenues stemming from the commercial exploitation of the invention. However, no differences were recorded in the number of patent applications immediately before and after the introduction of the new IP legislation (Baldini et al. 2006; Lissoni et al. 2012).

After the introduction of the 2001 Law, a heated debate arose in the country; this debate involved different actors including industry associations, universities, and public research organisations, as well as political parties. Despite their different mandates, they unanimously called for the elimination of such a law, claiming that it discriminated between private employees and public ones, it increased complexity and uncertainty in IP negotiations in case of jointly private-public projects, and it provided no incentives to universities and public research organisations to strategically manage inventions developed in their labs. Partially resulting from such institutional pressures, the national government finally recognised that public researchers had rarely patented and economically exploited their inventions, and thus issued a new IP code (D.Lgs.<sup>9</sup> n. 10/2005 of the 10th February 2005, henceforth

<sup>8</sup> More precisely, the 2001 Reform was included in the so-called “decreto dei 100 giorni”, a decree including the most urgent issues prepared for the newly elected centre-right government (to be faced/solved within the first 100 days of activity). These were motivated by liberalisation, flexibility, and self-achievement principles, stated to be central in the agenda of the newly elected government. The myth of entrepreneurship was therefore opposed to the rhetoric of the State intervention into the economy, traditionally praised by politicians in the centre-left wing of the parliament. Interestingly, the largest Italian industrial association, notwithstanding its support to the new government, strongly argued against the 2001 reform, which was expected to raise transaction costs because firms would have to negotiate IPRs with each individual inventor, rather than only with a designated university representative.

<sup>9</sup> The legislative function in Italy is usually a prerogative of the Parliament. Sometimes the Parliament can delegate the ability to exercise legislative functions to the Government for a given period of time, if the matter is thought to be particularly difficult and relevant. In such a case, the resulting norm is called *Decreto Legislativo* (abbreviated in D.Lgs.) instead of *Legge* (Law).

“2005 Law”). This new law modified the existing IP regime to the extent that the professor’s privilege did not apply to inventions stemming from research that was at least partially privately financed or from a “specific research project that was financed by a public institution different from that of the inventor”<sup>10</sup> (the reader should note that such cases—i.e., being at least partially subsidised by external funds—are the vast majority).

### *IP Law in Europe*

Similar trends characterised the European scenario. Until 2000, European countries experienced some degree of heterogeneity in IP laws. In some of them, universities were exempted from standard IP provisions, being allowed to grant IPRs to their employees (levering the so-called professor’s privilege or teacher exemption clause). After 2000, however, several European countries revoked such privileges, having IPRs transferred from individual inventors to universities. The rationale behind this trend included, among others, the catalytic effect of the Bayh-Dole Act on university–industry technology transfer. The aim was to exploit research results generated with public funds that might otherwise remain unexploited, thus creating jobs through academic spin-offs, and eliminating barriers to international collaborations created by different IP laws (Calderini et al. 2003; Mowery and Sampat 2005). The professor’s privilege was abolished in 1999 in Denmark (effective on 1st January 2000), in 2001 in Germany (effective on 7th February 2002), in 2002 in Austria (effective on 1st January 2004), in 2002 in Norway (effective on 1st January 2003), and in 2006 in Finland (effective on 1st January 2006).

Such normative changes resulted in new opportunities for research. In particular, starting from Balconi et al. (2003), several authors compared the number and characteristics of university-invented-but-not-owned patents with the university-invented-and-owned ones (Meyer et al. 2005; Azagra-Caro et al. 2006; Giuri et al. 2007; Breschi et al. 2008; Kenney and Patton 2011). The results showed that, in all of the analysed countries, the former outperformed the latter in all dimensions. Although we believe that such results are interesting per se, we see the Italian case as being even more informative because it shows and emphasises the misalignment between individual behaviours and the existing institutional norms and regulations.

## **Research Design**

### *University-Level Patent Policy: What It Is and How It Works*

As a result of the 1996 Law, which awarded single institutions with higher autonomy, universities started to expand their own statutes and internal regulations

---

<sup>10</sup> Overall, the IP legislation in Italy has been extremely uncertain in the last 15 years. As an example, a proposal to abolish the 2001 Law was approved by the Senate as early as 29<sup>th</sup> January 2002, and it was still pending in the chamber of deputy in September 2002. More recently, the draft for the first amendment to the new IP code (D.Lgs. n. 131/2010) originally meant to totally abolish the professor’s privilege (where it was still in place) and revert it to a right of first refusal for the inventors. This new rule, however, disappeared from the version of the law that was finally approved on 13th August 2010.

(e.g., patent policies), that precisely defined the condition of work, so making the law effective, and exercising the university's newly acquired autonomy. Specifically, patent policies apply to all patentable inventions that (a) are filed by academic and non-academic staff, (b) stem from university research, and (c) are delivered using university facilities and/or financial resources. Such policies also describe the practices related to the patenting procedure (i.e., which university employees and offices are involved in the process, as well as their specific tasks and responsibilities).

Patent policies, therefore, have two main goals: (a) identifying to whom the invention must be disclosed and who is entitled to the patent; and (b) guaranteeing the university's involvement, which includes legal, financial, and marketing support, as well as a reward for the inventor, calculated as a percentage of the net revenues stemming from the exploitation of the invention. Certainly, patenting processes require several competencies. First, technical knowledge: patents require novelty, non-triviality, and usefulness. Second, legal competencies: the filing procedures are different from country to country, and correctly filing a patent application necessitates specific knowledge. Finally, skills in managing a patent portfolio: patents need to be exploited in order to produce value, and to (at least) cover the costs associated with their generation, registration, and maintenance.

### *Data and Methods*

The data collection started in October 2002 by first accessing the list of Italian universities on the website of the Ministry of Education, University and Research (MIUR, [www.miur.it](http://www.miur.it)). Relying on the reported information, we retained only those universities with at least one technical department and/or school (such as engineering, architecture, medicine, veterinary medicine, science, physics, and chemistry); the final sample included the 64 STEM universities. We then relied on multiple sources in order to minimise the possibility that some patent policies would remain undetected: the universities' websites and several persons who, because of their role, were most likely to be informed about this material (e.g., the head of the research office, the head of the legal office, the NetVal<sup>11</sup> representative, and the Rector's office).

Phone calls were also used to speed-up the process of identifying, contacting, and questioning the key informants (at least) twice, after the implementation of the 2001 and 2005 laws. Several people showed great interest in the present research and wanted to share their opinions on different aspects of the subject under investigation. Eleven of them provided detailed feedback, which developed into conversations lasting up to twenty minutes. Despite pledging anonymity and honouring confidentiality requirements, the probability of getting "politically-corrected" versions of latent true opinions on this issue was high (for similar cases,

---

<sup>11</sup> The NetVal network ([www.netval.it](http://www.netval.it)) has been an important source of information. The network was promoted by the Polytechnic of Milan in November 2002, and was initially joined by 29 Italian universities to address the difficulties in developing a valorisation strategy tailored to the characteristics of each institution, the scant resources to be devoted to IP-related activities, the scarcity of trained personnel, the absence of places to socialise personal experiences, and the difficulties in making money from IP.



**Table 1** Interviewed key-informants: characteristics

Key informant (pseudonym)	Gender	Interviewed in	Role	University localization	University size (# of academics)
Ms. A	Female	November 2002	Head of research office	North-West	Medium
Mr. B	Male	November 2002	Head of research office	Centre	Small
Mr. C	Male	November 2002	Rector's staff	South	Medium
Mr. D	Male	November 2002 and May 2005	Research office employee	Centre	Small
Ms. E	Female	Winter 2002–2003 and Spring 2004	Research office employee	North-West	Large
Mr. F	Male	Winter 2002–2003 and Spring 2004	Patent office employee	North-West	Medium
Ms. G	Female	Winter 2002–2003, Summer 2004, and Summer 2005	Research office employee	North-West	Large
Prof. H	Male	February 2003 and May 2005	Professor, research office consultant	South	Small
Prof. J	Male	Spring 2003	Professor, pro-rector for research	North-East	Small
Ms. K	Female	Spring and Summer 2003	Head of research office	North-East	Small
Mr. L	Male	February 2004	Legal office employee	North-East	Medium

University size in year 2010: Small = less than 800; Medium = 800–1,500; Large = more than 1,500 (source: MIUR)

see, e.g., Thursby and Thursby 2002). Therefore, we decided not to develop a structured interview protocol but, rather, to simply record the unsolicited comments of the key informants, if any. We then used such information to contextualise the reported trends and to offer potential explanations for their emergence.

In Table 1, we provide the descriptive information of the key informants (quotations identifying specific themes that emerged from key informants are presented in Table 5). The actual names of the key informants have been replaced by pseudonyms. Because it would be possible to reconstruct the identity of some respondents based on the combination of personal attributes such as role, gender, and university, we kept the belonging institution anonymous as well. By doing so, we also recognise that the respondents' opinions were not necessarily those of their university, and were conveyed to us solely for this research.

By the beginning of 2010, we managed to collect the full text of the 90 patent policies that had been issued by the 64 Italian STEM universities between 1993 and 2009. In Table 2, we report the complete list of STEM universities that adopted a patent policy, with the date of first adoption, as well as the subsequent amendments and newer versions. By the end of 2009, 75% of universities in our sample adopted at least one patent policy. Table 2 also unfolds the universities' affiliation with

**Table 2** Date (dd/mm/yyyy) of adoption of patent policies and NetVal affiliation

Name of the university	Phase I (before 25/10/2001)		Phase II (from 25/10/2001 to 4/3/2005)		Phase III (after 4/3/2005)	
					NetVal	NetVal
U. of Ancona			05/04/2004		§	§
U. of Aquila						21/01/2008 §
U. of Bari			06/09/2004		§	18/05/2006 §
U. of Basilicata			25/06/2002			
U. of Bergamo					§	03/04/2006 20/09/2007 §
U. of Bologna	29/02/1996				§	§
U. of Brescia			29/10/2004		§	31/10/2008 §
U. of Cagliari					§	14/09/2008 §
U. of Calabria			03/03/2003		§	28/06/2006 §
U. of Camerino	09/06/1995					§
U. of Catania	08/06/1996		19/05/2003			§
U. of Catanzaro	29/01/1999				§	§
U. of Eastern Piedmont			30/12/2003		§	§
U. of Ferrara	19/12/1997				§	28/04/2008 §
U. of Florence	26/11/1993		06/02/2002		§	
U. of Foggia			14/03/2003		§	§
U. of Genoa	02/04/2001				§	§
U. of Lecce			27/06/2002		§	§
Catholic U. of Milan			30/01/2005			
Polytechnic of Milan	07/07/1998	08/02/1999	04/12/2001		§	05/05/2008 §
U. of Milan	08/11/1994	19/06/2000			§	13/01/2010 §
U. of Milan Bicocca					§	08/06/2005 22/09/2006 §
U. of Modena & Reggio E.					§	20/12/2006 §
U. of Molise			30/04/2004		§	
U. of Naples—“Federico II”			19/03/2003			
U. of Padua	09/10/2001				§	18/10/2006 §
U. of Palermo			22/01/2004			10/09/2007 15/06/2009 §
U. of Parma			28/12/2001		§	18/09/2006
U. of Pavia	28/10/1999				§	§
U. of Perugia					§	29/03/2006 §
SSSUP “St. Anne” of Pisa	15/03/2000		22/07/2002		§	24/07/2007 §
U. of Pisa	08/10/2001		21/07/2003	23/12/2003	§	13/02/2007 25/05/2007 §
U. of Reggio Calabria						01/06/2006 09/05/2008 §
U. of Rome—“La Sapienza”	13/12/1999	05/06/2001	11/12/2003		§	13/10/2008 §
U. Rome Three	13/06/2000		24/07/2002		§	

**Table 2** continued

Name of the university	Phase I (before 25/10/2001)	Phase II (from 25/10/2001 to 4/3/2005)	Phase III (after 4/3/2005)	
			NetVal	NetVal
U. of Salerno		18/11/2004	§	§
U. of Sassari	11/04/2000			14/09/2007 §
U. of Siena	13/09/2000	28/04/2004	§	08/11/2006 §
Polytechnic of Turin	29/03/2001		§	22/07/2007 §
U. of Turin		19/03/2003	§	15/07/2009 §
U. of Trento	06/07/2000			03/10/2006 §
SISSA of Trieste	16/06/1997		§	12/01/2009 §
U. of Trieste			§	31/10/2007 §
U. of Tuscia			§	04/11/2008
U. of Udine	21/05/1998	20/05/2003		28/06/2005 14/11/2007 §
U. of Urbino				23/09/2005
U. of Venetia				04/07/2007 11/09/2009 §
U. of Verona		18/08/2003	§	19/05/2005 24/06/2008 §

16 STEM universities have not issued a patent policy as of the date of this research. NetVal was established in 2002 (Phase I was therefore over): affiliation (marked with §) in Phase II was assessed at the end of 2004, whereas for Phase III at the end of 2009

NetVal over time. Data are arranged in three phases, corresponding to the three IP regimes. Phase I, before the 2001 Law: IPRs are granted to the university; phase II, between the 2001 and the 2005 Law: IPRs are granted to the inventor; phase III, after the 2005 Law: IPRs are granted to the inventor or to the university, depending on whether the research was exclusively financed by the university or received other funds.

After arranging the patent policies in chronological order, a preliminary analysis revealed some patterns of regularity, with various policies appearing almost identical, particularly among the oldest ones (i.e., those issued before 2001). Then, hand-made textual analysis was performed. More specifically, to assess the degree of similarity among the policies, we built two synthetic indicators: the formal equality index (FoEI) and the functional equality index (FuEI). The former refers to the paragraphs (percentage) reported in the policy that are “word-for-word” carbon copies of a prototype regulation. The latter, instead, is defined as the paragraphs (percentage) reported in the policy that have been “substantially” copied by the prototype (i.e., although they used different words, the policies prescribed the same practices<sup>12</sup>). The next section illustrates how patent policies diffused among Italian universities.

<sup>12</sup> Similarity was independently assessed by two coders. In the very few cases of discrepancies, the intervention of a third coder solved the case until a unanimous decision was made.

## Organisational Change and the Diffusion of Patent Policies

### *Phase I: Before the 2001 Law*

First, we focus on policies issued in Phase I (before the 2001 Law was enforced), which cluster in three groups, as clearly emerged from the textual analysis. The policies issued by three institutions—the University of Bologna, the Polytechnic of Milan, and SSSUP St. Anne of Pisa—served as prototypes for the other institutions. In Table 3 we report, for each university issuing at least one policy in Phase I, the date of adoption, the name of the prototype on which the patent policy was modelled (if any), the FoEI, the FuEI, and a list of major differences with respect to the prototype.

During Phase I, twenty-two universities issued twenty-four patent policies, of which fifteen were inspired by the three prototypes (the remaining six were not related to any prototype). As Table 3 shows, the similarities among policies do not decrease monotonically over time. Despite formal differences, all of them are more or less similar in the way they work, with a FuEI significantly above 80% (with the only exception being the second patent policy by the University of Milan). Table 4 reports the distinguishing features of the three prototypes.

We argue that these developments are indicative of isomorphic behaviours enacted by Italian universities. Specifically, the diffusion of patent policies followed a mimetic isomorphic pattern (DiMaggio and Powell 1983), and emerged from standard responses to the uncertainties related to the new role of universities, and to their ability to effectively self-govern. After an initial phase between 1993 and 1996, during which some pioneers responded to the environmental changes by producing a first set of embryonic patent policies, the vast majority of organisations reacted slowly to the new legislative opportunities, and finally decided to model themselves on the institutions that they perceived to be highly visible and prestigious (see, e.g., Burns and Wholey 1993 about prestige triggering the diffusion of matrix management programmes within US hospitals).

Our interpretation of the isomorphic behaviour is corroborated by the qualitative evidence gathered from the key informants (quotations are presented in Table 5). As Prof. J candidly admitted, his institution decided to copy the patent policy issued by the most prestigious university located nearby. He stated that, at that time, he was the only<sup>13</sup> faculty member really interested in IP-related issues at his institution, and given the novelty of the subject, the most obvious and easiest thing to do was to copy the policy issued by a prestigious neighbour.

### *Phase II: Between the 2001 and 2005 Laws*

In 2001, the Italian government introduced the so-called “professor’s privilege”, thus granting the IPRs of public employees’ inventions to the inventor(s), with the

---

<sup>13</sup> It is not unusual that most of the academic IP-related activities are undertaken and endorsed by a handful of highly motivated employees (Rasmussen et al. 2006).

**Table 3** Similarities and dissimilarities during phase I (before 2001 Law)

Prototype	University	Date	FoEI	FuEI	Major differences if compared to prototype
None	U. of Catania	08/06/1996	–	–	–
None	U. of Udine	21/05/1998	–	–	–
None	U. of Catanzaro	29/01/1999	–	–	–
None	U. Rome Three	13/06/2000	–	–	–
U. of Bologna	U. of Bologna	29/02/1996	–	–	–
	SISSA of Trieste	16/06/1997	97%	97%	–
	U. of Ferrara	19/12/1997	97%	97%	–
	U. of Pavia	28/10/1999	37%	87%	Time limits to filing No special provisions
	U. of Sassari	11/04/2000	37%	82%	Both scientific and legal opinions No special provisions
Polytechnic of Milan	U. of Milan (2 <sup>nd</sup> )	19/06/2000	69%	73%	Detailed norms on sponsors
	U. of Genoa	17/02/2001	52%	95%	Consultative patent commission
	Polytechnic of Milan (1 <sup>st</sup> )	07/07/1998	–	–	–
	Polytechnic of Milan (2 <sup>nd</sup> )	08/02/1999	100%	100%	–
	U. of Rome “La Sapienza” (1 <sup>st</sup> )	13/12/1999	67%	84%	Procedure on extensions Evaluation of economic results
	U. of Trento	06/07/2000	100%	100%	–
	Polytechnic of Turin	29/03/2001	47%	85%	–
	U. of Rome “La Sapienza” (2 <sup>nd</sup> )	05/06/2001	67%	89%	Procedure on extensions Evaluation of economic results
	U. of Padua	09/10/2001	100%	100%	–
	SSSUP “St. Anne” of Pisa	SSSUP “St. Anne” of Pisa	15/03/2000	–	–
U. of Siena		13/09/2000	43%	95%	TTO Evaluation of economic results
U. of Turin (draft)		27/09/2001	42%	95%	TTO Evaluation of economic results
U. of Pisa		08/10/2001	23%	95%	Evaluation of economic results

Patent policies existing before 1996: U. of Florence (26/11/1993), U. of Milan (08/11/1994), U. of Camerino (09/06/1995), are excluded from the analysis

employer being rewarded with 30% to 50% of the revenues stemming from the commercial exploitation of the invention itself.

The first patent policy following the 2001 Law is the third policy issued by the Polytechnic of Milan on the 4th December 2001. This policy did not fully comply<sup>14</sup>

<sup>14</sup> A patent policy fully complies with the 2001 Law if IPRs on all patentable inventions (stemming from research that was carried out as part of an employee’s duty, and that used university facilities and/or financial resources) are granted to the employees, if not otherwise stated by norms or contracts. The

with the changed IP legislation, because it granted all IPRs stemming from sponsored research to the university. In the remaining cases (e.g., when the research received only public research grants), IPRs were owned by the inventors. Whatever the case, the inventor had to both disclose the invention to, and share the revenues with the belonging institution. What was more, a few months later, the universities of Lecce and of Calabria issued two patent policies granting IPRs to the employer, thus fully rejecting the new national IP legislation.

Because the 2001 Law directly challenged the existing norms and traditions, it was either dismissed or ignored for a long time, and only in very few and later cases it was received by academic institutions. Specifically, within the first year under the new IP regime, only four universities (Basilicata, Florence, Parma, and Rome Three) complied to it by issuing a new patent policy, two (Lecce and Calabria) adopted policies directly violating the 2001 Law, one (Polytechnic of Milan) produced an ambiguous policy in which the university was granted IPRs on inventions stemming from sponsored research while it granted IPRs on remaining inventions to the employee, and one (SSSUP “St. Anne” of Pisa) just updated its compensation scheme from the Italian currency to the new European one. Overall, only ten universities out of the twenty-two having a patent policy during Phase I then issued a new policy during Phase II, with only eight of them following the new IP regime. By the end of Phase II, twenty-one universities had a patent policy that complied with the 2001 Law, and sixteen did not. Figure 2 reports the described trend.

At the same time, all institutions that complied with the 2001 Law (with the exception of the University of Parma) signalled their commitment to university patenting activity by offering the inventor the chance to transfer IPRs to the belonging organisation, thus receiving financial and technical support for the exploitation of the invention. All complying policies, therefore, include extensive description of the steps and the university structures (in some cases, specifically created to manage IP matters) in charge of deciding whether to accept IPRs from the inventor, to pay the patent costs, and to promote the valorisation of the patented invention.

In November 2002, 29 universities founded NetVal, a network to raise awareness of, and support for patenting activity. The birth of the network is better understood after accounting for the specificities of the Italian case, in which university employees are public employees, and attracting IP professionals is not easy (employing a new person may take more than a year, and wages depend only on seniority and position). Soon NetVal became an easy-to-access and cheap source of knowledge for universities: in a few years, almost 120 academic administrative employees received training in the area of IPRs. Indeed, as demonstrated by extant research, professional networks provide norms that

---

Footnote 14 continued

definition of ‘employees’ does not include students, PhDs, post-docs, and other non-tenured positions (the reader should remember that both teaching and non-teaching positions are usually tenured in Italy). This provision, which was also approved by the academic management board, was made effective by a strong tradition of *esprit-de-corps*, which characterised the faculty of Polytechnic of Milan (we thank one of the reviewers for providing us with additional background information).

**Table 4** Characteristics of the three prototypes of patent policies

Name of the prototype	Distinguishing features
(1) U. of Bologna	<p>The university has the right to sell and to license the patent, to sell to the inventor the right to patent and to follow inventor's suggestions in searching potential licensees or buyers</p> <p>Definition of research activity performed in the university, of docent and technical employees, and appeal to DPR 3/1957</p> <p>Right for the inventor to signal a firm or to declare himself ready to acquire the right to patent, bearing its costs, and sharing revenues with the university</p> <p>If the university decides to suspend the payment of patent fees, it shall communicate this to the inventor in time and shall be available to transfer the patent to the inventor</p> <p>The university shall engage litigations on the patents if the licensee is not obliged to or does not accomplish such obligation</p> <p>Inventions stemming from sponsored research can be patented by the sponsor, by the university or jointly<sup>a</sup></p> <p>Special provisions: university non-employees (students, PhDs, research fellows, etc...) deserve a lump-sum, whereas inventions in collaborations with researchers from other institutions are regulated on a case-by-case basis<sup>a</sup></p>
(2) P. of Milan (1 <sup>st</sup> version)	<p>The university has the right to sell and to license the patent, to sell to the inventor the right to patent and to follow inventor's suggestions in searching potential licensees or buyers</p> <p>The inventor's department can file a patent if the university refuses to do so</p> <p>Inventions stemming from sponsored research can be patented by the sponsor, by the university or jointly<sup>a</sup></p> <p>The university is entitled to a reward for inventions stemming from sponsored research (i.e., ownership of IPRs, or additional compensation, or royalties)</p> <p>Consultative commission appointed by the Rector which gives a non-binding opinion on patentability in three months from the disclosure</p> <p>Non-employees (students, PhDs, research fellows, etc...) have the same rights and duties as employees have<sup>a</sup></p> <p>Non-employees (students, PhDs, research fellows, etc...) deserve a lump-sum<sup>a</sup></p> <p>Appeal to existing laws for topics not covered by the patent regulation</p>
(3) SSSUP "St. Anne" of Pisa	<p>Detailed description of the documents accompanying the disclosure</p> <p>Detailed description of the Patent Commission's duties, composition and mechanisms for appointment</p> <p>Office specifically created to support inventors in filling the disclosure report and the patent application correctly<sup>a</sup></p> <p>Fixed term to evaluate the results of the economic exploitation of the invention and to eventually suspend the payment of the patent fees<sup>a</sup></p> <p>Three-level compensation scheme</p>

<sup>a</sup> Optional

constrain the behaviour of their members (DiMaggio and Powell 1983), and strengthen the diffusion of organisational norms (Galaskiewicz 1985; Galaskiewicz and Burt 1991).

The reported evidence shows that about 45% of the Italian universities either avoided or showed reluctance in complying with the amended IP law. We advance

**Table 5** Key informants: selected quotations

Phase	Basic concept	Informant	Quotation
I	Reinforcement of mimetic pattern	Prof. J.	'I read the patent regulation issued by ... [one of the universities serving as a model located nearby] and I found it very interesting. I proposed it to the Rector and it was quite easy to get it issued'
II	Non-compliance: the Polytechnic of Milan	Mr. L.	'I know the regulation by the Polytechnic of Milan. This is only my personal opinion, but I believe it is illegitimate ... it is clearly against the true intent of Law 383... anyway, you know, with university self-administration any [university] is free to make its decisions... they took the responsibility to bear eventual consequences'
	Non-compliance: the case of the Polytechnic of Milan	Ms. K.	'To be very precise, the decision by the Polytechnic of Milan about sponsored research may appear illegal, but you can't find in Law 383 any specific provision on sponsored research... you know, results from sponsored research are traditionally owned by the sponsor who paid for the research; therefore, the university does not claim ownership on the inventor's rights, but rather on the sponsor's ones'
	Non-compliance: what to do	Mr. C.	'You know the situation of the Italian justice... it can take ten years for a civil trial to end.. and you never know which would be the final decision even if you are sure that you are in the right... you know, laws change frequently... and meantime, lawyers want their bills paid!!! I personally don't have money to waste with lawyers, nor does my university'
		Mr. F.	'If I was the inventor working with a non-complying university, I would not waste money to sue it... I would just avoid disclosing it to my administration... I would search for an interested firm, and sell it'
	Non-compliance: delay to act	Ms. A.	'You know... they [the politicians] change their minds every two or three months. You know that there is a proposal law pending to revert the effects of the 2001 law, don't you? We worked hard last year, we produced four drafts for the patent regulation, the last one was ready just a few days before the 2001 law was issued... and soon after the new law cancelled university patents. Now no one wants to work on this issue... We have no time to waste... when we are sure that the politicians have made a final decision, we will prepare a new draft and we try to get it approved'
		Prof. H.	'You know... it took several years to have self-administration, which is obvious for other universities all over the world... NetVal doesn't want to force its members to adopt the same managing method for IPRs...'

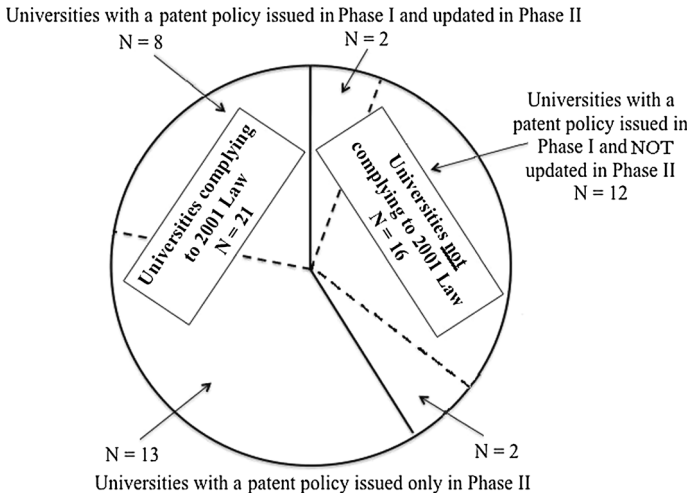


**Table 5** continued

Phase	Basic concept	Informant	Quotation
	Lobby against the 2001 Law	Mr. B.	'I took part at the ceremony for the creation of NetVal... it is not stated anywhere, but you know, the network has been created to speak with politicians with a more powerful voice... If they see us speaking with a single voice, maybe they will understand the disaster that they created with Law 383... maybe we can manage to have it abolished'
		Ms. E.	'It is clear that NetVal has two main goals, one [is] official, and one [is] implicit. To train administrative personnel in IP management... and to revert to the situation before Law 383'
		Mr. F.	'I hope that NetVal does convince the Government to amend the 2001 Law, and, if not to abolish it, at least to find a compromise so to make the patent world similar to that before the 2001 Law as much as possible'
III	Non-compliance: delay to act	Mr. D.	'Now that someone earned a substantial amount of money, not just for themselves but primarily for their research, the mirage of money diffused... and it is difficult to return to the university owing IPRs, because it [the university] is perceived as a slow and ineffective player'
	Failure to produce a common policy for NetVal members	Prof. H.	'You know, many research groups have members from different universities, with different patent regulations or even with no patent regulations at all... it would be very good not to waste time on each research project to negotiate what to do with the invention... we cannot force all universities to adopt the same rules'
		Ms. G.	'NetVal just provides some cheap training and different managing methods... anyone is free to adopt the one he prefers... obviously we would prefer that the patent regulations have similar provisions on the management of the results from collaborations...'

some potential explanations for this. First, universities perceived the 2001 Law as ambiguous, poorly crafted, and potentially unconstitutional.<sup>15</sup> Moreover, the normative scenario was not completely clear (as reported in footnote 10). Also, the 2001 Law

<sup>15</sup> According to the Italian Constitution, all persons are equal. Therefore, if inventions made by public employees are treated differently from those made by private ones, there is potential discrimination, and the provision should be declared by judges as ineffective.



**Fig. 2** STEM Universities with a patent policy by the end of Phase II

was perceived as an inappropriate breach of the university autonomy, thus justifying opposition to the reform. As both Mr. L and Ms. K stated, they were aware of the regulation by the Polytechnic of Milan. They perceived it as illegitimate, and clearly against the true intent of the 2001 Law, but they also recognised that the 1996 Law gave each academic institution the right to make autonomous decisions, and to bear the resulting consequences. Finally, despite all key informants agreed that NetVal was primarily created to share and legitimate organisational norms and routines in IP-related issues, some (Mr. B, Mr. F, and Ms. E) admitted that a clear secondary goal was to lobby in support of the original 1939 IP rule, and to convince the government to amend the 2001 Law, aiming for less disruptive effects on the current patenting activity at universities. Undeniably, NetVal did play a role in diffusing the culture of IP management and the patenting practices: having issued at least one patent regulation and being a member of NetVal community are related events ( $\chi^2(1) = 2.512$ ; not significant); in addition, NetVal members filed more patent applications than did non-members ( $t = 1.846$ ;  $p < .10$ ).

Second, both writing a new IP policy and amending an existing one are very time-consuming activities. As it frequently happens in Italy (Hine 1993), it takes prolonged negotiations and compromises to reach a final agreement, and the number of administrative bodies whose approval is required for a proposal to become an effective rule (the academic senate, the board, and the rector) further complicates the issue. Given the fuzziness of the Italian normative landscape, almost all of the key informants explained the reluctance of the belonging institution to take action on this issue, especially because a new law could be issued at any time, thus vanishing their efforts. Evidence from the patent policies further reinforces this argument. As an example, one university in central Italy took over six months to complete the issuing process from first approval to the enforcement date (dates for each approval stage are reported on the patent policy). In another case, a north-

western university prepared the fourth draft of its first patent policy during the year 2001 (as reported by Ms. A, too, please refer to Table 5 for full quotation): then, it took over a year and a half to issue the definitive version accounting for the change in the IP legislation.

Third, violation of the 2001 Law turned out to be very hard to prosecute. Universities, in fact, had no effective sanctioning systems, because of the high costs and difficulties in monitoring faculty members (Merton 1973). Moreover, because of the inefficiency of Italian civil courts, as well as because there were no monitoring or sanctioning systems for the 2001 Law, the prosecution of both non-complying universities and academics would have been extremely difficult, and high legal expenses were the only certain result. Again, the opinions provided by key informants help in interpreting the observed phenomenon. As Mr. C underscored, a trial is a lengthy process—it can take ten years to reach a non-appealable decision by Italian civil courts—with uncertain results, while ever-increasing lawyers' bills must be paid. Furthermore, Mr. F explained that a faculty inventor has no interest in suing the non-complying employer, because it is easier for him/her not to disclose the invention and to transfer it to third parties, in violation of the patent policy. Finally, both Ms. K and Mr. L declared that the decision by the Polytechnic of Milan about sponsored research was questionable, but it did not overtly violate any existing laws because IPRs granted to the university are those traditionally owned by the sponsor, and thus, in any case, they are not in the inventor's hands.

The evidence reported above shows how two isomorphic—and not mutually exclusive—behaviours seem to emerge. Twenty-one universities, as a result of the introduction of the 2001 Law, complied with it, thus enacting a coercive isomorphism. By contrast, sixteen of them refused to comply, actively opposing it. Alongside, some of both the complying and the non-complying universities created a professional network, shared norms and practices among its participants in an attempt to legitimise professional behaviour, and thereby enacted a normative response to the IP change. These trends are coherent with Oliver (1991), who shows that coercive and normative isomorphism usually compete to emerge as a result of legislative changes. Specifically, under conditions of strong regulatory regimes, in which penalties are strictly enforced, coercive isomorphism is more likely to emerge. By contrast,<sup>16</sup> if sanctioning is not a credible threat, normative isomorphism is more likely to emerge through the enactment of communities of practice. Notwithstanding the emergence of both isomorphic behaviours, the Italian evidence suggests that, overall, academia enacted normative isomorphism rather than a coercive one. Indeed, only eight of the STEM universities modified their existing policies to comply with the 2001 Law whereas sixteen of them decided to act against the governmental coercion. The argument for the prominence of the

---

<sup>16</sup> Edelman (1990) showed that a new law can exert changes independently of formal legal sanctions if it provides the public with new expectations or new bases for criticising organisations, or when the law enjoys considerable societal support. However, the public at large and the students in Italy are mostly unaware of the issues presented in this paper, and are mainly interested in the reforms of the primary and secondary education systems. Budget and teacher cuts are routinely lamented at the beginning of the school year each September.

normative isomorphism over the coercive one is also supported by the new IP Code that amended the rules on IPRs as in the patent policy from the promoter of NetVal and limited the disruptive effects of the previous governmental coercion.

Finally, it is interesting to note that all patent regulations that did not (fully) comply with the 2001 Law showed some similarities. Regulations from the Universities of Lecce and Calabria and Polytechnic of Milan stated that ‘among the university’s primary mission there is the promotion and management of research’, as well as ‘the provision of incentives to patent research results, to economically valorise them’, and to share with the researchers the benefits stemming from their economic exploitation. This can be interpreted as an attempt to legitimate the un-conforming behaviour. On the one hand, the 2001 Law provided a new regulatory scenario. On the other hand, universities, by referring to the autonomy in the promotion of research (i.e., one of the four ethos of science, see Merton 1973), presented the 2001 Law as the government’s illegitimate intrusion into university autonomy and self-regulation. Maintaining elaborate displays of confidence, satisfaction, and good faith, internally and externally, is a typical reaction for organisations facing a request of rigid conformity to institutionalised prescriptions that disrupt their activities (Meyer and Rowan 1977).

### *Phase III: After the 2005 Law*

Once the government realised that public inventors were largely uninterested in patents and in exploiting their inventions, a new IP code was issued, aiming to reform and to consistently reorganise IP-related matters. The new 2005 Law enacted a compromise: it partially reproduced the previous 2001 Law, but it also took some insights from the patent regulation issued by the Polytechnic of Milan (the first university to react to the 2001 Law without conforming to it, and also the promoter of the creation of NetVal) on 4th December 2001. IPRs on public employees’ inventions were therefore granted to employees themselves, *unless* inventions were privately funded (only a small part of the funds needed to be private for the law to apply) or stemmed from *specific* research projects funded by any public institution different from that of the inventor. In this latter case, IPRs were granted to the employers, while the inventors were entitled to between 50% and 70% of the revenues stemming from the exploitation of the IPRs. The solution eliminated some irrationality in the previous regime, in which research contracts were managed at the institutional level, yet IPRs on the potential inventions rested at the individual level.

The new IP code became effective on 5th March 2005, and thirty-nine regulations were issued by thirty-one universities in the five years that followed. At the beginning of 2010, forty-eight universities (75% of our sample) had a patent policy: five of them had patent policies dating back to Phase I, and eleven to Phase II. Figure 3 is intended to help the reader understand the rate of adoption of patent policies during the three phases.

The adaptation of existing regulations to the 2005 Law has been slower than it might be expected. Different potential explanations exist. Mr. D suggested that the

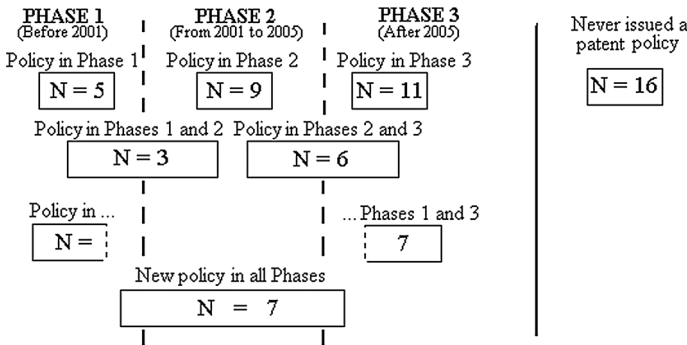


Fig. 3 Adoption of patent policies by the 64 Italian STEM universities

mirage of a substantial amount of money made it difficult for faculty to revert to the institutional control over IPRs because the university is perceived as a slow and ineffective player, taking a large share of the revenues but not providing a valuable service. Prof. H explained that Italian academia was quite jealous of the recently acquired autonomy (stemming from the 1996 Law), and the university seemed more interested in exercising its autonomy than in building a common framework to ease the management of IPRs stemming from inter-university research. Ms. G made clear that the goal of NetVal was not to create a shared patenting regulation but, rather, to provide knowledge and business methods, so that each university could be free to develop its own rules, and to autonomously operate in the area of IPRs.

However, data also show that NetVal members have been more proactive in IP management, being 1.32 times more likely to adopt a patent regulation after the introduction of the 2005 Law than non-members ( $\chi^2(1) = 6.630; p < .05$ ), while there were no differences between members and non-members after the introduction of the 2001 Law ( $\chi^2(1) = 2.291$ ; not significant). Moreover, since inception, NetVal members have issued, on average, 1.125 patent regulations, while non-members have issued only .375 ( $t = 2.148; p < .05$ ). Overall, the presented evidence suggests that the network primarily served to lobby for the 2005 Law, and to have administrative staff trained in the new IP area rather than to standardise rules and practices.

**Conclusions**

*Discussion and Contribution*

In this paper we looked at the diffusion of organisational mechanisms to support university patenting activity in Italy by using neo-institutionalism as an interpretative lens. More specifically, we focused on the national legislative changes in IP laws, and on how they were received and legitimated by universities and

subsequently transformed into organisation-level policies. The fully centralised academic public system as well as the non-existence of monitoring and sanctioning systems for faculty members created a unique setting for studying the institutionalisation of organisational practices on a population of academic institutions.

We started by recognising that, since 1989, Italian universities coped with an unprecedented series of legislative changes that fostered their autonomy, yet required a significant redefinition of internal practices and procedures. In analysing how universities coped with uncertainty, we characterised three phases. In Phase I, between 1996 and 2001, after for the first time Italian universities were granted a higher level of autonomy in several areas—including the management of IPRs—many institutions were uncertain as to what to do, and mimetically replicated the behaviours of the highest-profile organisations. When organisational technologies are poorly understood, and when goals are ambiguous—such as in the case of IP management at universities—practices are not based on efficiency calculations but, rather, on institutionalised rules (Meyer and Rowan 1977). In such situations, organisations may decide to emulate other organisations that they perceive to be more legitimate or successful (DiMaggio and Powell 1983). Indeed, institutionalisation of rules and practices is ultimately connected to shared beliefs, and to the quality of being taken-for-granted.

Phase II started in 2001, when the national government amended the IP law and transferred IPRs on faculty inventions from the institution to the inventors. We show that many universities refused to adapt their patent policies to the new IP regime. Moreover, as a result of an initiative by the Polytechnic of Milan, universities created the Network for the Valorisation of the University Research (NetVal), a community of practice where university officers in charge of IP management could improve their skills related to, and strengthen their commitment to, university patenting activity. Despite after the 2001 Law there were traces of two isomorphic behaviours—coercive and the normative isomorphism—the latter appeared to prevail. The explanation is twofold: the 2001 Law was poorly crafted, and its infringement was difficult to prosecute. As predicted by Oliver (1991), organisations are less likely to comply when the potential for external enforcement is low, or when internal objectives dramatically conflict with outer requirements. Moreover, the finding corroborates the idea that, where legal ambiguity and weak enforcement mechanisms leave the meaning of compliance open to organisational construction, organisations create visible symbols of their attention to law (Edelman 1992). A new patent policy complying with the 2001 Law can be such symbol of attention, so that the university manages to *appear* proper and adequate (DiMaggio and Powell 1983). This is no, however, *factual* compliance, as the university may be easily transferred IPRs from the inventor, and is fully prepared for such an event, thus reverting to the previous IP regime.

We finally showed that in Phase III, which started in 2005, the national government issued a new IP Code, and adopted the rules operated by the Polytechnic of Milan (i.e., the promoter of NetVal). The regulation stated that IPRs on faculty inventions are granted to the inventors unless inventions received some private funds or stemmed from specific research projects funded by any public institution different from that of the inventor (with the latter being the most common

case). The fact that national legislation emulated a university-level provision may suggest that the entrepreneurial activity is best spurred by pilot projects at the top universities, then diffused among other institutions. Following the importance of the Association of University Technology Managers to the US technology transfer success story (Allan 2001) and the role of the patent consortia financed by the Danish Government to develop the TTO staff competencies (Baldini 2008), diffusion of the entrepreneurial model may be facilitated through specific networks, where competencies and practices in patenting activities are passed from the frontrunners to the novices. Our findings also reiterate that when university autonomy is prized, purely top-down policies driving the entrepreneurial mission and other coercive practices are likely to fail or to produce very limited positive effects (e.g., Allan 2001; Geiger and Sa 2005; Goldfarb and Henrekson 2003; Kenney and Richard Goe 2004).

### *Limitations and Further Research*

Despite that the isomorphic patterns identified by DiMaggio and Powell (1983) offer an interesting framework to interpret the adoption of university-level patent policies, our detailed analysis of the content of such policies highlights some unexpected patterns, not entirely coherent with the neo-institutional framework. First, the neo-institutional approach predicts a homogenisation process towards only one practice, while in Phase I we found three models for a patent policy. Notwithstanding our analysis—differently from other neo-institutional papers—goes beyond the traditional dichotomy adoption versus non-adoption (of patent policies), we provided no explanations for clustering in three families. In this case, more theoretical and empirical evidence is required.

Second, neo-institutional theorists would notice that the clustering phase did not inhibit heterogeneity in the formulation of patent policies within each family over time. In each of the three groups, late adopters favoured institutional experimentation as well as the emergence of university-tailored solutions, idiosyncratic to the specific local necessities. In fact, only policies issued right after the prototype copied it almost verbatim, while later policies are more differentiated, at least formally (however, as reported in Table 3, substantial changes were rare and of minimal impact). The aforementioned idiosyncrasies emerged in other studies investigating the local implementation of community-wide university reforms and innovation policies (e.g., Wright et al. 2007).

Another surprising result is the evolutionary path between the three families of patent policies, which shows an increasing complexity in the tasks of the structure charged to manage the IP issues. In the first typology, the one led by the University of Bologna, there was no specific patent commission: the rector decides whether the invention is worth patenting. In the second typology, started two years later by the Polytechnic of Milan, a commission of experts appeared. This was meant to support the rector in his decisions about which inventions were worth patenting at the

university's expense, patents selling and licensing, as well as revenue sharing schemes (if not fixed by a contract). Finally, SSSUP "St. Anne" of Pisa for the first time created a formal organisational unit, named *technical patent commission*,<sup>17</sup> in charge of giving an opinion on the suitability of the invention to be patented at the university's expense. Such an evolutionary path showed that, as the Italian academia as a whole progressed in the knowledge of IP management, individual institutions learned that IPRs need new structures and new practices, different from those currently available to manage research and research contracts. Starting from 2000, all new patent policies prescribed the creation of a specific unit to properly manage IPRs, and ruled its composition and its tasks.

Although we underscored that the Italian universities are quite jealous of their recent autonomy, we provided no explanations for incomplete isomorphism in Phase III (in addition to that in Phase I)—i.e., for the failure to find one only patent policy developed by NetVal and then rapidly adopted by all its members—as it could be predicted by neo-institutional framework, and this result calls for further investigation. Moreover, we were unable to offer explanations for the lack of a formal patent policy in a quarter of the universities in our sample, as much as sixteen years after the first one ever issued by the University of Florence.

Like all studies focusing on a historical reconstruction of events and decisions, especially when organisations are considered the units of analysis, our work is characterised by specific limitations. First, there might be a relevant influence of our subjective evaluation on the sequence of the events, and on their associations with the behaviours related to the different forms of isomorphism. Moreover, we observed institutional decisions through the output included in formal acts and documents, but were not able to focus on the discussions and internal decision-making processes that generated such acts. In addition, we implicitly interpreted those decisions as driven by an intentionally rational decision-making process although, since the seminal work of Allison (1971), it has been well established that other interpretative models might apply. Finally, although we tried to carefully rely on multiple sources of information, combining both quantitative and qualitative evidence as well as different types of documents and data collection strategies, we cannot rule out the possibility of overstating some critical events and their consequences or overlooking other interpretative alternatives.

Notwithstanding these limitations, we believe that this paper can be particularly relevant for the field of technology policy in general, and for university-industry technology transfer in particular, that has been characterised in recent years by a strong convergence towards unified models replicating the landmark Bayh-Dole Act in the US. These initiatives have been criticised because they 'appear to be based on a misreading of the limited evidence concerning the effects of Bayh-Dole [...], and on a misunderstanding of the factors that have encouraged the long-standing and relatively close relationship between US universities and industrial innovation'

---

<sup>17</sup> The technical patent commission is entitled to market the patent, to search for potentially interested organisations, and select among them the candidate likely to obtain the best economic results. Three years from the filing date, the commission evaluates the results of the economic exploitation of the invention, and decides if it should continue or payments of the renewal fee should be suspended (please note that in the Italian patent system, the renewal fee for the first three years are due on the filing date).



(Mowery and Sampat 2005: 124). Many of these top-down attempts take for granted a complex set of institutional pre-conditions that are keys for explaining the success or failure of such policies, thus severely underscoring the difficulties posed by the introduction of reforms (see also Goldfarb and Henrekson 2003 and Jacob et al. 2003 on the Swedish case). In a recent and influential study, Lerner (2009) considered specific industrial policy measures as an ineffective way for governments to regulate the economy, and suggested an increased focus on general rule-setting and monitoring approaches. Although certainly opinionated, such conclusions impose the need to better identify all the sources of possible resistance to government intervention in the economy. We believe that our results offer a specific contribution to this debate which could be further elaborated by inter-institutional and inter-country comparisons of the dynamics modelled in this study. In particular, questions not tackled in this paper but worth asking include: how did the universities develop their patent policy, and which resources did they leverage? How do patent policies relate to the other policies put in place to support external engagement by academics, and to what extent do they affect faculty members' scientific and commercial performances?

## References

- Acworth, Edward B. 2008. University-industry engagement: The formation of the Knowledge Integration Community (KIC) model at the Cambridge-MIT Institute. *Research Policy* 37: 1241–1254.
- Allan, Michael F. 2001. A review of best practices in university technology licensing offices. *Journal of the Association of University Technology Managers* 13: 57–69.
- Allison, Graham T. 1971. *Essence of decision: Explaining the Cuban missile crisis*, 1st ed. Boston, MA: Little Brown.
- Argyres, Nicholas S., and Julia Porter Liebeskind. 1998. Privatising the intellectual commons: Universities and the commercialisation of biotechnology. *Journal of Economic Behaviour and Organisation* 35: 427–454.
- Azagra-Caro, Joaquín M., Nicolas Carayol, and Patrick Llerena. 2006. Patent production at a European research university: Exploratory evidence at the laboratory level. *Journal of Technology Transfer* 31: 257–268.
- Balconi, Margherita, Stefano Breschi, and Francesco Lissoni. 2003. Il trasferimento di conoscenze tecnologiche dall'università all'industria in Italia: Nuova evidenza sui brevetti di paternità dei docenti. In *Il sistema della ricerca pubblica in Italia*, ed. A. Bonaccorsi, 58–100. Milan: Franco Angeli.
- Baldini, Nicola. 2008. *Importing the Bayh-Dole: The Danish lesson*. Prepared for the International Engineering Management Conference 2008, Beijing, May 19–23.
- Baldini, Nicola, Rosa Grimaldi, and Maurizio Sobrero. 2006. Institutional changes and the commercialisation of academic knowledge: A study of Italian universities' patenting activities between 1965 and 2002. *Research Policy* 35: 518–532.
- Breschi, Stefano, Francesco Lissoni, and Francesco Montobbio. 2008. University patenting and scientific productivity: A quantitative study of Italian academic inventors. *European Management Review* 5: 91–109.
- Burns, Lawton R., and Douglas R. Wholey. 1993. Adoption and abandonment of matrix management programs: Effects of organisational characteristics and inter-organisational networks. *Academy of Management Journal* 36: 106–138.
- Calderini, Mario, Paolo Garrone, and Maurizio Sobrero. 2003. *Corporate governance, market structure and innovation*. Cheltenham, UK, and Northampton, MA: Edward Elgar.
- Capano, Giorgio. 2003. Administrative traditions and policy change: When policy paradigms matter. The case of Italian administrative reform during the 1990s. *Public Administration* 81: 781–801.

- Czarnitzki, Dirk, Wolfgang Glänzel, and Katrin Hussinger. 2007. Patent and publication activities of German professors: An empirical assessment of their co-activity. *Research Evaluation* 16: 311–319.
- DiMaggio, Paul J., and Walter W. Powell. 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organisational fields. *American Sociological Review* 48: 147–160.
- Edelman, Lauren B. 1990. Legal environments and organisational governance: The expansion of due process in the American workplace. *American Journal of Sociology* 95: 1401–1440.
- Edelman, Lauren B. 1992. Legal ambiguity and symbolic structures: Organisational mediation of Civil Rights Law. *American Journal of Sociology* 97: 1531–1576.
- Etzkowitz, Henry. 2002. *MIT and the rise of entrepreneurial science*. New York: Routledge.
- Etzkowitz, Henry, Andrew Webster, Christiane Gebhardt, and Branca Regina Cantisano Terra. 2000. The future of the university and the university of the future: Evolution of ivory tower to entrepreneurial paradigm. *Research Policy* 29: 313–330.
- Fini, Riccardo, Rosa Grimaldi, Simone Santoni, and Maurizio Sobrero. 2011. Complements or substitutes? The role of universities and local context in supporting the growth of academic spin-offs. *Research Policy* 40: 1113–1127.
- Fini, Riccardo, and Nicola Lacetera. 2010. Different yokes for different folks: Individual preferences, institutional logics, and the commercialization of academic research. In *Spanning boundaries and disciplines: University technology commercialization in the Idea Age (Advances in the study of entrepreneurship, innovation and economic growth)*, Volume 21, ed. Marie Thursby, 1–25. Emerald Group Publishing Limited.
- Fisher, Lawrence M. 1998. The innovation incubator: Technology transfer at Stanford University. *Strategy & Business* 13: 76–85.
- Frumkin, Peter, and Joseph Galaskiewicz. 2004. Institutional isomorphism and public sector organisations. *Journal of Public Administration Research and Theory* 14: 283–307.
- Galaskiewicz, Joseph. 1985. Professional networks and the institutionalization of a single mind set. *American Sociological Review* 50: 639–658.
- Galaskiewicz, Joseph, and Robert S. Burt. 1991. Interorganization contagion in corporate philanthropy. *Administrative Science Quarterly* 36: 88–105.
- Geiger, Roger L., and Creso Sa. 2005. Beyond technology transfer: US state policies to harness university research for economic development. *Minerva* 43: 1–21.
- Geuna, Aldo. 2001. The changing rationale for European university research funding: Are there negative unintended consequences? *Journal of Economic Issue* 35: 607–632.
- Geuna, Aldo. 2003. *The economics of knowledge production. Funding and the structure of university research*. Cheltenham, UK, and Northampton, MA: Edward Elgar.
- Geuna, Aldo, and Ben Martin. 2003. University research evaluation and funding: An international comparison. *Minerva* 41: 277–304.
- Giuri, Paola, et al. 2007. Inventors and invention processes in Europe. Results from the PatVal-EU survey. *Research Policy* 36: 1107–1127.
- Goldfarb, Brent, and Magnus Henrekson. 2003. Bottom-up versus top-down policies towards the commercialization of university intellectual property. *Research Policy* 32: 639–658.
- Gulbrandsen, Magnus, and Liv Langfeldt. 2004. In search of Mode 2: The nature of knowledge production in Norway. *Minerva* 42: 237–250.
- Henrekson, Magnus, and Nathan Rosenberg. 2001. Designing efficient institutions for science-based entrepreneurship: Lessons from the US and Sweden. *Journal of Technology Transfer* 26: 207–231.
- Hine, David. 1993. *Governing Italy*. Oxford: Clarendon Press.
- Iversen, Eric J., Magnus Gulbrandsen, and Antje Klitkou. 2007. A baseline for the impact of academic patenting legislation in Norway. *Scientometrics* 70: 393–414.
- Jacob, Merle, Mats Lundqvist, and Hans Hellsmark. 2003. Entrepreneurial transformations in the Swedish University system: The case of Chalmers University of Technology. *Research Policy* 32: 1555–1568.
- Kenney, Martin, and W. Richard Goe. 2004. The role of social embeddedness in professorial entrepreneurship: A comparison of electrical engineering and computer science at UC Berkeley and Stanford. *Research Policy* 33: 691–707.
- Kenney, Martin, and Donald Patton. 2011. Does inventor ownership encourage university research-derived entrepreneurship? A six university comparison. *Research Policy* 40: 1100–1112.
- Lerner, Josh. 2009. *Boulevard of broken dreams: Why public efforts to boost entrepreneurship and venture capital have failed—and what to do about it*. Princeton, CA: Princeton University Press.

- Lindgren, Lena. 2001. The non-profit sector meets the performance management movement. *Research Evaluation* 7: 285–303.
- Lissoni, Francesco, Michele Pezzoni, Bianca Potì, and Sandra Romagnosi. 2012. *University autonomy, IP legislation and academic patenting: Italy, 1996–2006*. Mimeo.
- Lissoni, Francesco, Patrick Llerena, Maureen McKelvey, and Bulat Sanditov. 2008. Academic patenting in Europe: New evidence from the KEINS database. *Research Evaluation* 17: 87–102.
- Marques, João Paulo, João M.G. Carac, and Henrique Diz. 2006. How can university-industry-government interactions change the innovation scenario in Portugal? The case of the University of Coimbra. *Technovation* 26: 534–542.
- Mazzoleni, Roberto, and Richard R. Nelson. 1998. The benefit and costs of strong patent protection: A contribution to the current debate. *Research Policy* 27: 273–284.
- Merton, Robert K. 1973. *The sociology of science*. Chicago: University of Chicago Press.
- Meyer, John W., and Brian Rowan. 1977. Institutional organisations: Formal structure as myth and ceremony. *American Journal of Sociology* 83: 340–363.
- Meyer, Martin S. 2003. Academic patents as an indicator of useful research? A new approach to measure academic inventiveness. *Research Evaluation* 12: 17–27.
- Meyer, Martin S., Mariette Du Plessis, Tanja Tukeva, and Jan-Timm Utecht. 2005. Inventive output of academic research: A comparison of two science systems. *Scientometrics* 63: 145–161.
- MIUR Ministero dell'Istruzione, dell'Università e della Ricerca ([www.miur.it](http://www.miur.it)). Accessed 30 June 2010.
- Moscato, Roberto, Marino Regini, and Michele Rostan. 2010. *Torri d'avorio in frantumi? Dove vanno le università europee*. Bologna: Il Mulino.
- Moscato, Roberto, and Massimiliano Vaira. 2008. *L'università di fronte al cambiamento. Realizzazioni, problemi, prospettive*. Bologna: Il Mulino.
- Mowery, David C., and Bhaven N. Sampat. 2005. The Bayh-Dole Act of 1980 and university-industry technology transfer: A model for other OECD governments? *Journal of Technology Transfer* 30: 115–127.
- National Science Foundation ([www.nsf.gov](http://www.nsf.gov)). Accessed 14 April 2010.
- NetVal—Network per la valorizzazione della ricerca universitaria ([www.netval.it](http://www.netval.it)). Accessed 30 June 2010.
- Oliver, Christine. 1991. Strategic responses to institutional processes. *Academy of Management Review* 16: 145–179.
- Pedersen, Lene Holm. 2006. Transfer and transformation in processes of Europeanization. *European Journal of Political Research* 45: 985–1021.
- Perkmann, Markus, et al. 2013. Universities and the third mission: A systematic review of research on external engagement by academic researchers. *Research Policy* 42: 423–442.
- Rasmussen, Einar, Øystein Moen, and Magnus Gulbrandsen. 2006. Initiatives to promote commercialization of university knowledge. *Technovation* 26: 518–533.
- Sahariadis, Nikolaos. 2005. Policy networks, elections, and State subsidies. *Review of Policy Research* 22: 115–131.
- Tolbert, Pamela S., and Lynne G. Zucker. 1983. Institutional sources of change in the formal structure of organizations: The diffusion of civil service reform, 1880–1935. *Administrative Science Quarterly* 28: 22–39.
- Thursby, Jerry G., and Marie C. Thursby. 2002. Who is selling to the ivory tower? Sources of growth in university licensing. *Management Science* 48: 90–104.
- Valentin, Finn, and Rasmus Lund Jensen. 2007. Effects on academia-industry collaboration of extending university property rights. *Journal of Technology Transfer* 32: 251–276.
- Woolf, Stuart. 2003. On university reform in Italy: Contradictions and power relations in structure and function. *Minerva* 41: 347–363.
- Wright, Mike, Bart Clarysse, Philippe Mustar, and Andy Lockett. 2007. *Academic entrepreneurship in Europe*. Cheltenham: Edward Elgar.
- Zomer, Arend H., Ben W.A. Jongbloed, and Jürgen Enders. 2010. Do spin-offs make the academics' heads spin? *Minerva* 48(3): 331–353.