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All that Glitters is Not Gold: the Surrogate Use of University Spin-Offs. Insights from Italy

This is a pre print version of the following article:

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1690854> since 2021-03-10T17:29:12Z

Published version:

DOI:10.1057/s41307-017-0079-z

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Paper: **All that glitters is not gold the surrogate use of University Spin-Offs.**
Insights from Italy

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All that glitters is not gold: the surrogate use of University Spin-Offs. Insights from Italy

1. Introduction

Universities' Third Mission (UTM) is usually defined as all outreach activities in which professors and researchers engage in the society differently from what they typically do as lecturers or as members of the scientific communities (Gulbrandsen and Slipersæter, 2007). UTM is then broadly concerned with the generation and application of knowledge outside the academic environment (Laredo, 2007; Molas-Gallart et al., 2012) aimed at fostering economic development (Chatterton and Goddard, 2000; Etzkowitz and Leydesdorff, 2000; Lazzeroni and Piccaluga, 2003) or simply at engaging with local communities (Neave, 2000; Breznitz and Feldman, 2012). Therefore, the range of UTM activities is wide and, furthermore, it continues to encompass ever more numerous aspects of academic life. Although earlier studies focused mainly on academic patenting and entrepreneurship¹, scholars have recently introduced the concept of 'academic engagement', that in Perkmann and colleagues' view (2013) means all knowledge-related collaboration between faculty and non-academic actors (both individuals and organizations) or, in other words, the processes of informal knowledge transfer. The popularization of the 'public engagement' issue – namely the activities of communication, consultation and participation of an academic in the public sphere (Rowe and Frewer 2005) – has further stretched the UTM concept. The most relevant distinction within this blurring conceptual extension could now be between for-profit activities (such as creation of new firms or contract-research) on one hand and non-profit undertakings (i.e. dissemination of scientific results, policy development, community

1 service, etc.) on the other (Schoen and Theves, 2006). This article specifically addresses the theme
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4 of for-profit engagement and pays attention to activities undertaken by professors and researchers
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6 in the economic sphere of life, with specific regard to the activation of University Spin-Offs
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8 (USOs)². In Italy, academic entrepreneurship is widespread, even if its distribution among
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10 universities is uneven. As for USOs' economic performance, new data on their revenues (see
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12 section 3) show the coexistence of a group of successful companies with a majority of firms that,
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14 even after many years, are inactive or present very poor results. This article aims to explain the
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16 latter phenomenon, namely the large degree of unsuccess of Italian USOs. In particular, after
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18 reviewing the main determinants that the literature associates with USOs' poor performance, we
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20 focus on what we consider a decisive factor that has so far received little attention: the non-official
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22 reasons that push academics to start new ventures. The argument we propose is that there is a
23
24 wide discrepancy between the officially declared objectives adopted by the academic institution
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26 at the central level and its actual use at the peripheral level of any academic department.
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28 According to this perspective, our goal is to contribute to understanding why the official declared
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30 for-profit goals of UTM policies are not actually achieved, shedding light on other non-official
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32 reasons underlying the surrogate use of the USOs.
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36 Results here discussed are referred to three Italian universities – Turin, Florence, and Cagliari –
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38 and are based on qualitative empirical research carried out within a broader project supported by
39
40 a national grant from the Italian Ministry of Education, University and Research³.
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43
44 The article is organized as follows. In the second section we introduce the general issue regarding
45
46 the ways in which universities contribute to economic development at the local and national level
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48 and, more specifically, on what the literature has already achieved on the UTM hindering factors.
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52 The third section is dedicated to an overview of the Italian context, in which we underscore the
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1 main factors usually called into question to explain the low performance and ineffectiveness of
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3 UTM activities in this country. The fourth section presents the research questions addressed in
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5 the article and provides details about methods and cases investigated. In the fifth section, we
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7 present the analysis of interviews carried out with both academic and non-academic key players,
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9 focused on the unofficial reasons behind the engagement in a USO. Finally, on this basis, in the
10
11 conclusion we try to summarize, and account for the reasons why, at least in Italy, university
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13 governance institutions abstain to tackle the surrogate use of USOs..
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21 **2. Theoretical background and context**

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26 Sound research results have revealed that universities play a relevant role in economic
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28 development at the national and regional level (European Commission, 2002; OECD, 2002;
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30 Lambert, 2003; Shane, 2004; O'Shea et al., 2008). Specifically, a recent study finds robust
31
32 evidence that 'increases in university presence are positively associated with faster subsequent
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34 economic growth', and that 'doubling the number of universities is associated with over 4%
35
36 higher GDP per capita in a region' (Valero and Van Reenen, 2016, 33).
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41 The contribution of universities to economic growth comes from different leverages (Drucker
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43 and Goldstein, 2007), which have both short-term and long-term effects (Florax, 1992; Stokes
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45 and Coornes, 1998). The former is seen in the impact of a campus on the local economy with
46
47 regard to faculty and clerks' salaries as well as students' daily expenditures and rents (Garrido-
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49 Yserte and Gallo-Rivera, 2010; Schubert and Kroll, 2014). Conversely, long-term effects refer to
50
51 the contribution of tertiary education to the knowledge economy in terms of upgrading human
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53 capital (Benhabib and Spiegel, 1992; Faggian and McCann, 2009; Lucas, 1998), especially in
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1 advanced economic sectors much closer to the technological frontier (Vandenbussche et al.,
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4 2006). Universities also have a large indirect impact on innovation due to knowledge spill-overs
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6 (Anselin et al., 1997; Breschi and Lissoni, 2001; Jaffe, 1989; Andersson et al., 2004; Ponds et al.,
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8
9 2010; Wennberg et al., 2011), particularly regarding science-based industries.

10
11 Following the work of Murray and Kolev (2015), understanding how much universities can
12
13 contribute to the economy requires distinguishing between three interrelated groups of factors:
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15 national, local and individual factors. At the national level, it is important to emphasise the role
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17 of public innovation policies. In the last 30 years, governments adopted many strategies to bolster
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19 the impact of universities on economies (Wright et al., 2007). Clear examples of the public
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21 attempt to promote spill-over effects are well known. One of the most popular is the Bayh-Dole
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23 Act which, after its enforcement in 1980, changed the United States' system of technology
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25 transfer by enabling universities to retain the title to inventions and take the lead in patenting
26
27 and licensing public and privately funded research results (Mowery et al., 2004). Another widely
28
29 used innovation policy concerns the promotion of high-tech clusters, which are geographic
30
31 concentrations of companies, universities and other research organizations all engaged in joint
32
33 activities⁴. By adopting a typical *triple helix* approach (Etzkowitz and Leydesdorff, 2000), cluster
34
35 policies aim to provoke local knowledge spill-overs and to set up institutional governance of
36
37 innovation systems. Moreover, each country adopted its own range of policies (Wright et al.,
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39 2007). In some cases, national governments have bet on USOs' dedicated finance, providing
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41 dedicated financing, such-as seed-capital funds (the Netherlands, the UK, Germany, France). In
42
43 others, they have facilitated collaborative relationships between universities and businesses,
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45 encouraging common investment in R&D (USA, Germany). Furthermore, some countries
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47 invested massively in incubation schemes (Sweden, Finland, Denmark).
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1 At the local level, the success of UTM depends mostly on the organizational engagement of
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3 universities in knowledge-transfer activities and on their agency capabilities to implement them
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6 (Phan and Siegel, 2006; Rasmussen and Wright, 2015; Rolfo and Finardi, 2014). In particular,
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8 empirical findings on American (Siegel et al., 2003) and European (Debackere and Veugelers,
9
10 2005) technology transfer offices (TTOs) show that the quality of staff and organizational
11
12 practices are important to explain performance in commercialization of scientific results.
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14 Likewise, in the case of USOs promotion, the success rate relies upon many organizational
15
16 factors: the degree of selectivity at the entrance of incubator activities, the provision of incubation
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18 advanced services and the presence of strong ties with venture capital industry (Clarysse et al.,
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20 2005; Lockett and Wright, 2005; Powers and McDougall, 2005).

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26 The diffusion of UTM is also grounded on actor-centred features (the individual level). Since
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28 scientists usually feel it is risky to deviate from the social norm of conducting for-profit
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30 entrepreneurial activities instead of conducting academic research (Bercovitz and Feldman,
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32 2003), academic entrepreneurship may present in specific circumstances: when faculty are less
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34 embedded in academic culture (Lockett et al., 2003; Clarysse and Morey, 2004), in departments
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36 where the culture of commercialization is most widespread (Rasmussen et al., 2014), or at a later
37
38 stage of their career when they have already built their reputation (Audretsch, 2000; Shane,
39
40 2004). On the other hand, such activities can be performed by ambidextrous academics, namely
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42 researchers seeking to pursue commercial outcomes while also continuing to produce academic
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44 ones (Ambos et al., 2008). According to Lam (2011), the latter are *hybrid scientists*, who act
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46 strategically by incorporating commercial practices into their repertoire of behaviour. Especially
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48 in those cases, the goal of UTMs' commitment is not strictly the profit, but to further research
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50 activities (D'Este and Perkman, 2011) or to provide alternative job opportunities for early career
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1 researchers (Lam, 2007). Academic entrepreneurs can also follow other unofficial reasons such
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4 as achieving autonomy from the academic organization (Roberts and Wainer, 1971), receiving
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6 alternative recognition by peers (Stuart and Ding, 2006) or overcoming dissatisfaction with their
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8 current role in the university (Roberts, 1991). Very often the academic entrepreneur is therefore
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10 a quasi-entrepreneur or, on in Meyer's words (2003) an 'entrepreneurial academic'. This
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12 ambiguity of entrepreneurial motives can have significant adverse effects on the performance of
13
14 USOs, especially if added to the shortage of business skills among academic entrepreneurs
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16 (Clarysse and Moray, 2004; Colombo and Piva, 2008; Shane, 2002).
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21 In summary, we assume that the role of the university in economic development is both
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23 institutionally rooted and dependent on the organizational agency of the universities. At the same
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25 time, we suppose that individual motivation of the academic entrepreneur could affect the UTM
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27 performance. As a consequence, to comprehend the very impact of universities on development
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29 according to their third mission it is necessary to look at the configurations of institutional,
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31 organizational and actor-centred features. In the next section we apply this approach to the Italian
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33 case.
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42 **3. Poor and ineffective. The dark side of the Italian UTM.**

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47 Although the Italian universities present many good practices in terms of UTM activities, the
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49 relationships between universities and business are basically lagging behind. The rate of
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51 universities' patent filing is among the lowest across European countries, and about one third of
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53 the OECD-country average (OECD, 2014). According to the evaluation of Italian public research
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1 performed by ANVUR⁵, only 28.2% of Italian university-owned patents have been licensed (or
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4 sold).

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6 Conversely, academic entrepreneurship is widespread: in 2013, about eight universities out of
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8 ten count at least one USO. However, the distribution of such academic firms is uneven: few
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10 universities have generated many, and many have generated a few. One fifth of the companies
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12 stemming from Italian university research is concentrated in only four universities. As far as the
13
14 USOs' performance is concerned, consistent with research results regarding other countries
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16 (Mustar et al., 2008; Degroof and Rooberts, 2004; Wennberg et al., 2011; Zahra et al., 2007),
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18 Italian USOs tend to remain small and with few prospects of growth (Salvador, 2006; Lazzeri and
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20 Piccaluga, 2014). Furthermore, revenues are limited on average, even though USOs' survival rate
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22 is paradoxically better than those of non-academic start-ups (Bolzani et al., 2014).
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29 This scenario of *sustainable survival* (Migliori 2015) is confirmed by our analysis of USOs' annual
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31 financial statements (Tab. 1)⁶. Our findings show that 15.0% of USOs are inactive, 45.1% have
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33 a revenue lower than 100,000 euros, while only 4.3% can be considered well-established
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35 companies, showing over 1 million euros of revenue from sales. The result is the same even if we
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37 split USOs between start-ups and longer-term businesses⁷. The average income of the latter
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39 (350,000 euros) is surely higher than that of the former (94,000 euros), but a large number of
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41 USOs (13.9%) remain inactive, one third have turnouts lower than 100.000 euros and only some
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43 of them (7.6%) have results that match the expectations for innovative firms.
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1 As we have already pointed out in the previous section, the reasons for weak and less-effective
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3 results in the Italian UTM activities, depend on the configuration of national institutions, of
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5 local organizational elements and on actor-centred factors.
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8 Concerning the institutional aspect, the universities' autonomy to formally adopt (or not) this
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10 new mission dates back only to 1989, when Law 168 entitled Italian universities to change their
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12 organizational structure (statutory autonomy) and gave them greater freedom to allocate the funds
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14 they received (financial autonomy). What before had been subject to Italian red tape then became
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16 organizations allowed to diversify their funding channels, including contracts and agreements
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18 with non-academic subjects, or to take up a specific development strategy, sometimes in
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20 agreement with local governments (Moscati and Vaira, 2008).
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26 The second factor, which influenced a late emergence of the UTM in Italy, is about the national
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28 legislation, but refers specifically to the discipline of technology transfer. On one hand, it was not
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30 until the end of the 1990s that academics could legally start up their firm. On the other hand,
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32 changes in intellectual property code aimed to promote a greater role for research in economic
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34 development was modified only in 2001⁸.
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39 Another element which can explain the many hurdles in the growth of UTM activity is related
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41 to public policies. In the 1980s and 1990s, the Italian government mainly adopted interventions
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43 intended to promote industrial and pre-competitive research through incentives to firms (i.e. Law
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45 488/1992, Law 196/1997). More direct promotion of university-industry relationships, such as
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47 tax credit and research grants, was only introduced from 2000 onwards (i.e. law 106/2011). In
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49 the same years, national and regional governments launched more 'systemic' policies by financing
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51 science and technology parks, centres of excellence, technological districts, technology transfer
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53 offices (TTOs) and business incubation services (Bertamino et al. 2016; Miceli, 2010). In any
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1 case, the limits of Italian innovation policies are well known. According to the European
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3 Commission, Italian innovation policies have certainly increased in consistency, but the
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5 persistent lack of resources, the fragmentation into various sectoral strands, the discontinuities
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7 in time and the absence of an ex-post evaluation of interventions have produced policies that are
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9 redundant, inefficient and confusing for potential beneficiaries (European Commission, 2008).

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11 The lack of public funding and the ‘water-can’ style of Italian innovation policies have gone hand
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13 in hand with the private sector’s more general poor expenditure in R&D. A further ingredient
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15 of the Italian universities low effectiveness in the economic development concerns their role in
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17 the socio-economic sphere. On one hand, Italy has one of the lowest degrees of tertiary
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19 educational attainment among economically developed countries (OECD, 2014). On the other
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21 hand, Italian firms invest only 0.7% of GDP in R&D activities, whereas in countries such
22
23 Germany and Sweden private businesses invest more than 2% of their GDP (*ibidem*). The
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25 combination of low private R&D expenditure and inadequately qualified human capital denotes,
26
27 therefore, an economic growth model where Italian universities play a quite marginal role
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29 (Gherardini, 2015).

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31 Despite the lack of an innovative ecosystem, Italian universities have been able to generate quite
32
33 a high number of USOs, even if a in few cases have become fast-growing firms (Baldini et al.,
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35 2015, Lazzeri and Piccaluga, 2014). These successes rely rather on individual factors, such as the
36
37 entrepreneurial skills of the team leading the company (Vohora et al., 2004), the appropriate
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39 combination of skills in the founding team composition (Chelt and Pittino, 2014), and their
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41 ability to use their social capital as leverage (Masiello et al., 2015). In other words, the lack of a
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43 national competitive advantage is overcome by some companies and entrepreneurs which can act
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1 strategically as creators of their own ecosystems via networking activities (Visintin and Pittino,
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4 2016).

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6 The intervention of some external players - such as venture capitalists, TTOs or incubators - also
7
8 helped some USOs to overcome, at least, the early obstacles (Fini et al., 2009). However, in the
9
10 Italian case, a great part of these organizations is unable to produce the skills, networks and
11
12 advanced services the USOs would need (Cesaroni and Piccaluga, 2016). First, the venture capital
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14 industry is underdeveloped (Vacca, 2013) and mainly focused on non-academic start-ups (VeM,
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16 2014). Second, it is a matter of how TTOs and incubators support the technology transfer
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18 activities. Research findings on the Italian case show that TTOs are usually organized as small
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20 teams of mainly unskilled employees, and a low-selective model of USO incubating is widespread
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22 (Gherardini 2012, 2015).
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29 A further element that helps to explain the limited success of UTM tools in Italy, including the
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31 poor economic performance of a great number of the USOs, is the frequent mismatch between
32
33 the purposes of academic entrepreneurs and the aims of their university (Chiesa and Piccaluga,
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35 2000; Fini et al., 2009; Shane, 2004). In general terms, it should be assumed that academic
36
37 entrepreneurs establish their business to make a profit - which may also be different than
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39 personal income - and that, likewise, the university promotes USOs to gain some economic
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41 benefits, which can derive from the exploitation of a university-owned patent licenced to the firm,
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43 or from a potential sale of the firm's shares on the market, or eventually to promote regional
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45 development. This assumption does not find, however, wide confirmation in the Italian case.
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51 Fini et al. (2009) argued that Italian 'academics' involvement in creating new ventures does not
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53 seem to be driven by entrepreneurial attitude but rather by their expectation of generating results
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55 that will enhance their academic position. Furthermore, qualitative research results led Rizzo
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1 (2015) to assess that unofficial reasons are one of the main drivers of USOs' genesis. In particular,
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3 he highlights that USOs represent relevant employment opportunities for young post-doc
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5 researchers whose careers are blocked by the reduction of public research funding and, at the
6
7 same time, by a weak labour market for private R&D jobs. In other words, a new firm, even if a
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9 consultancy or a laboratory which offers basic tests, could be the source of valuable job
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11 opportunities, and furthermore, a chance to remain in a knowledge-intensive research
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13 environment (Rizzo, 2015).
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21 **4. Research questions and methodology**

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26 As stated above, the weak performance of Italian universities' in third mission activities can be
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28 explained by taking into account a series of factors and the specific combination they assume in
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30 relation to the particular situation of each university. Even considering the differences among
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32 Italian universities and among the socio-economic contexts in which they are embedded
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34 (Ramaciotti and Daniele, 2015; ANVUR, 2016), it is relevant to note that unsatisfying results in
35
36 UTM can be identified as a common feature, at least in part as an effect of national legislation
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38 and policies on matters of technology transfer and university-industry relationships. In addition,
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40 other organizational and individual factors related to the capabilities and strategies of the actors
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42 involved can also influence the success of UTM activities. In this article, we intend to contribute
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44 to this debate by introducing and developing a further argument: the low economic success of
45
46 some USOs may be understandable if we refer to the surrogate use through which professors and
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48 researchers exploit this kind of UTM tool. Commonly, USOs are seen as typical business-oriented
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50 activities. In fact, their contribution to innovation, growth, development and revenues is the
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1 official and expected goal behind the creation of a USO company from the public research base.
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4 However, in contrast, a USO can also be redirected to different and alternative goals (see section
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6 3). In this view, our approach puts more emphasis on the actual reasons behind the
7
8 implementation of USOs, assuming a possible discrepancy between the officially declared
9
10 objectives adopted by the academic institution at the central level to promote this tool – that, as
11
12 mentioned earlier, is to gain economic benefits or support technology development/transfer –
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14 and its actual use at the peripheral level of any academic department. We expect that unofficial
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16 goals would be intertwined with, rather than replace, official ones: because the discrepancy is a
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18 matter of degree, we presume that a USO can be steered far from its original mission and
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20 redirected towards other non-profit goals. From this perspective, our goal is to contribute to
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22 understanding *why the official declared for-profit goals of UTM policies are not actually achieved*
23
24 *shedding light on other reasons underlying the surrogate use of a typical UTM tool such as the USO.*

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31 In an attempt to answer these specific questions, we use some insights from a wider investigation
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33 on the spread of UTM activities across 12 Italian universities and on their contribution to the
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35 development of regional economies (see note 3 for more details) that has been carried out
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37 through a case-study approach. This research method seemed the most appropriate to us because
38
39 it allows us to explore a phenomenon – such as the actual reasons at the basis of the use of USOs
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41 – in the context in which it is generated and reproduced, providing in-depth understandings of
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43 its characteristics (Yin 2003). In particular, among 12 cases investigated we take into account
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45 those referring to three Italian universities similar in classification by size but with some
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47 differences relating to the socio-economic context in which they are rooted: the University of
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49 Turin, the University of Florence and the University of Cagliari. Italy is well known as a country
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51 characterized by historical territorial differences with regard to models of economic development
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1 (Bagnasco, 1977) and still today the dynamism of the northern, central and southern regional
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3 economies is significantly differentiated from the point of view of investment in research and
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5 innovation (Eurostat, 2017). Furthermore, a recent study on the conditions of Italian academic
6
7 institutions has revealed a new general trend of increasing inequalities between northern and
8
9 southern universities of the country (Viesti, 2016). Therefore, we have selected three *large*⁹
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11 universities placed respectively in the North (Turin), in the Centre (Florence) and in the South
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13 of Italy (Cagliari). All three universities rank first in their regional territory for registered students
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15 and number of departments, show an adequate number of active USOs and have put a growing
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17 emphasis on UTM as a strategic asset in recent years (University of Turin, 2016, 2017; University
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19 of Cagliari 2009; University of Florence 2006). That said, as shown in Table 2, the organizational
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21 configurations of the three universities reveal profiles that only partially overlap (see number of
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23 researchers and professors, research centres, kinds of courses) and, with respect to some UTM
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25 activities, their performances also appear quite different (see structure of TTO, patents and
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27 subcontracting).
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39 TABLE 2 HERE
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44 The qualitative analysis from which the insights presented here emerge was conducted through
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46 around 20 semi-structured interviews (see Appendix) at each university from September 2015 to
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48 December 2016. These interviews were addressed both to academic (vice-rector, department
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50 director, TTO staff and manager, professors, researchers) and to extra-academic key players
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52 (entrepreneurs, politicians, key informants) who, for various reasons, have relations and maintain
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54 exchanges with university. According to the main project design, we have taken into account four
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1 departments particularly active in the UTM for each university (two related to STEM disciplines
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3 and two to SSH ones) – on the basis of specific indicators (no. of patents, no. of USOs,
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5 subcontracting value, etc.) and information coming from TTO’s director and other key
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7 informants. In particular, the empirical insights discussed in the following paragraph are mainly
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9 reconstructed through interviews with directors, professors and researchers belonging to
10
11 departments from each of the three universities¹⁰.
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19 **5. Which unofficial reasons are behind the use of UTM tools?**

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24 In this section, we aim to develop our discourse along with the main goal of underlining some of
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26 the unofficial reasons behind a surrogate use of USOs. In order to do so we take into account
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28 motivations expressed by both academic and non-academic actors. We agree that the choice to
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30 shoulder the costs of starting a USO depends on various factors and - as indicated above -
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32 unofficial reasons are intertwined with official ones, especially when activities are carried out by
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34 a large research team. As is easy to understand, choices are influenced by the conditions and the
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36 constraints of the organizational contexts in which actors are embedded as well as individual
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38 strategies with which researchers and professors try to take advantage of UTM activities in order
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40 to improve their career opportunities. Therefore, our analytical and interpretative framework
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42 keeps together the original mission of USOs – based on the purposes for which they were
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44 introduced in the academic system – with their surrogate use at the micro level, paying particular
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46 attention to some key dimensions: degree of discretion and autonomy in their activation;
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48 availability and allocation schemes of resources and research funds; and opportunity structure
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50 and conditions under which research activities are implemented.
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1 Because this article addresses the issue of low effectiveness of USOs and aims to introduce the
2
3 question of their surrogate use as a possible explanation factor, we present some key points
4
5 referring to the motivations underlying a USO activation. Observing actual use of USO allows
6
7 us to immediately balance their spread with the limited success these kinds of firms often meet
8
9 in the marketplace. First of all, as clearly underlined by a venture capitalist talking about UTM
10
11 activities at the University of Cagliari, USOs are hardly innovative start-ups:
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19 *Even the most successful university spin-offs are not start-ups, but they are often consulting firms. In my*
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21 *mind a start-up is a company with strong growth chance. That is, that the first year it earns one hundred*
22
23 *thousand euros, the second year five thousand, the third one million, the fourth five million and then it*
24
25 *aims for ten million. [Spin-offs] are often consulting firms that, in the best cases, have fifteen/twenty*
26
27 *employees, who do research projects funded by the Region. [Int_11_Cagliari].*
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34 In the following, we draw attention to four points which emerged from the analysis of empirical
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36 documentation and which are related to the current literature on the alternative motivations of
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38 an academic entrepreneur (see sections 2-3). We provide a brief description of each point
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40 introducing some comments from the interviews in order to shed light on the actual reasons
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42 behind the choice to run a USO.
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47 First, in some situations, USOs are means to let professors and researchers work with fewer
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49 constraints: in this sense, a USO far from being exclusively a strategy of for-profit engagement
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51 and for entrepreneurship - can become a possible remedy to bureaucratic rigidity and can provide
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53 more organizational flexibility. These reasons have been clearly revealed in several conversations.
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1 Here, a respondent argues that the strategies through which academics try to achieve greater
2
3 organizational flexibility can actually result in an economic loss for their academic institution:
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9 *To get an idea, even a temporary work collaboration has to pass the audit of Corte dei Conti in Rome.*

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11 *It is non-sense that in the past was not there. It is a huge bureaucratic constraint to everything [...] There*
12
13 *are research groups in the department that would earn significantly [from external contracts], but when*
14
15 *they can they move their business, all those who can, to university consortia, rather than to other similar*
16
17 *organizations, which are very flexible on these things. I think that our department, the university in*
18
19 *general, is losing millions of euros because people naturally look for more flexible way to do things*
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24 *[Int_9_Cagliari].*

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29 In another comment, a professor, founder of a USO and of a research centre with managerial
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31 autonomy, highlights the importance of being *small* and *slim* in order to operate according to the
32
33 tight deadlines and fast speed of the marketplace. What is important here, in a sense close to that
34
35 of Roberts and Wainer (1971), is again the need for greater flexibility and autonomy, guaranteed
36
37 by the *agility* of a tool as a USO:
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44 *This means a certain speed from the administrative point of view [...] Being small and with several*
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46 *resources we have a certain speed. We were very fast in the past and today in spite of this centralization,*
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48 *due to extreme and exaggerated bureaucracy, we are still able to be fast. [Int_8_Turin].*
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54 Yet, in short, another similar interpretation on this point reveals that the benefit of this tool is
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56 in a sort of competitive advantage: *"The spin-off is not in the rigid cage of the university bureaucracy. It*
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1 has a faster administration, we are able to reply in real time while the administration needs 12 months to
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3
4 do that" [Int_17_Florence].
5

6 A second possible surrogate use occurs when the actual purpose is to use the USO to hire young
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8 precarious researchers. As already well-emphasised by other scholars (Lam, 2007; Rizzo, 2015), in
9
10 this perspective an important reason to activate a USO is to find an (alternative) solution to
11
12 overcome the precarious employment of younger colleagues, given the well-known recruitment
13
14 problems and the weak turnover afflicting Italian universities.
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21 *Our spin-off is not even a year old, but it has passed the first stage of incubation [...] Labs provided money,*
22
23 *people working in the spin-off are ones who collaborated with us in the past. Young colleagues who have*
24
25 *decided they will not be hired by a company have asked me and I have given them financial resources*
26
27 *and scientific supervision. However, the spin-off has an obligation to reinvest in a fund to be allocated to*
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29 *research grants in the lab each year.* [Int_17_Florence].
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37 Even more honest is the response offered by another professor from the same university who
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39 gives reason to Fini et al. (2009) for whom a USO is not usually driven by entrepreneurial
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41 attitude.: *"For what reason would I have done it? Not because at a certain point in my life I wanted to*
42
43 *convert myself into an entrepreneur but because I had the opportunity to keep people at work"*
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45 [Int_15_Florence]. In other words, he was giving young researchers a chance in a context
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47 providing few opportunities due to the dramatic weakness of public and private investments in
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49 the higher education sector:
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1 We wanted to give the many good, young, talented graduates a chance to prove their worth and [...] an
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4 opportunity to work under permanent employment contracts. Everything is born from our experience as
5
6 professors at the University of Cagliari, where unfortunately we cannot guarantee stability of employment
7
8 to many talented precarious workers who want to do research. [Int_9_Cagliari].
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14 As we have already pointed out, official and unofficial goals sometimes coexist in the decision to
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16 launch a USO. In the case presented below, according to Lam's ideal type (2011) of the strategic
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18 hybrid scientist, a USO is seen as a profitable option in order to meet the marketplace but, at the
19
20 same time, also as an opportunity to create job positions for young researchers:
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27 *The spin-off was an activity already carried out within the department but without a business model, so*
28
29 *the idea was to create a business and make a certain number of research fellows work there [...] That's*
30
31 *why there are market opportunities and then there is a need to place people who carry out research*
32
33 *activities in the departments, so the logic is to satisfy the people who work by giving them a for-profit*
34
35 *activity. [Int_12_Turin].*
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42 Third, looking at how mechanisms for accessing funds for research projects tend to be thought
43
44 and set, having a USO as member of a network becomes useful thanks to the possibility of
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46 presenting it as a firm partner in designing research projects and calling for proposals. In fact,
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48 some calls for funding explicitly require the presence of a company partner or such a company
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50 can otherwise represent an advantage in terms of opportunities for being selected and receiving
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52 financial support for research activities. This aspect is becoming ever more relevant because it
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1 links individual strategies to continuous retrenchments and cuts in public spending for university
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4 research both at the national and at local level:
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7 *You probably do it because of your entrepreneurial spirit, to earn something. But also because it helps to*
8
9 *simplify the management of some activities [...]; meaning that I can hire a person for three months on the*
10
11 *fly and I do not have to wait [...]* Or they can be the mandatory enterprise-partner in a research project,
12
13 *[...] an instrumental actions adopted because, maybe, you need three companies and instead of inventing*
14
15 *a third one you take the spin-off and solve the problem. [Int_4_Cagliari].*
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22 The fact that in practice this reason can prevail over the official objectives and over the original
23
24 profit orientation is also confirmed by a professor from another university:
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30 *There are spin-offs that are born with good intentions and win the market because the idea was good;*
31
32 *and spin-offs that are born with either good intentions or with the intention of making a legitimate tool*
33
34 *for participating in projects. It would require a monitoring process. [Int_5_Florence].*
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40 Lastly, the fourth point is in part closely related to the first one. A USO can also be a strategy to
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42 sustain networks feeding relationships with other non-academic partners, located both in the
43
44 local context and in other countries. For example, also referring to the intuitions of D'Este and
45
46 Perkman (2011), keeping in touch with the R&D division of a company in terms of developing
47
48 research lines, sharing labs and scientific equipment, exchanging knowledge and transferring
49
50 technology may be easier for a USO which, as mentioned above, usually has a streamlined
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52 structure (with greater flexibility and faster response times) compared to that of a university
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54 department. In this perspective, a USO lets researchers and professors have a basis for profitable
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1 exchanges and a tool for being operative in the marketplace and pursuing strategies by following
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4 a profit logic:
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7 *We went to China in 1999, first we did technology transfer then gradually we moved to demonstration*
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9 *projects and applied research and today we are continuing with broad European projects with Chinese*
10
11 *[non-academic] partners. [...] We have ambassadors all around the world in key positions with whom we*
12
13 *continue to work and collaborate. We usually say "it's a system that is working very well" [Int_8_Turin].*
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19 The four elements we point out may help us in understanding the misuse of a typical UTM tool
20
21 such as the USO and its practical translation into a tool for making and supporting other
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23 activities compared to its original for profit mission. Observing unofficial reasons does not mean
24
25 that in different situations the USO tool is used improperly and that there are no good practices
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27 concerning its activation. However, the spread of its surrogate use reveals some problematic
28
29 aspects of everyday academic life to which professors and researchers try to find a solution. By
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31 introducing UTM tools - a fact that is legitimated and supported through the increasing emphasis
32
33 and rhetoric placed on the UTM by policies of all three universities examined - academics can
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35 become more competitive in terms of personal careers, finding resources for research and in
36
37 general improving the conditions in which they perform their daily academic work. From this
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39 point of view, a surrogate use of USOs is implemented because it appears to improve personal
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41 working conditions and to provide better opportunities for research. At the same time it is a
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43 factor, among others, that contributes to explaining why so few USOs succeed at significant
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45 development and growth on the marketplace.
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6. Conclusion

Over the last two decades, emphasis on UTM and, more generally, on the engagement of researchers in the socio-economic sphere of life has seen a fast rise. Looking at the Italian case, we described a scenario of progressive institutionalization of such new functions which, nevertheless, demonstrates many weaknesses, ineffectiveness and a feeble impact on innovation and local economic development. In the article, first we have identified a number of factors that together can contribute to understanding the situation of scarce effectiveness of UTM outcomes in Italy; second, we have focused on the surrogate use of USOs, which we consider, among other factors, to be relevant in explaining this poor performance.

Our argument has started from the discrepancy between the officially declared objectives adopted by the academic institution at the central level and the USO's actual use at the peripheral level of any academic department. We have taken into account different factors in order to explain *why the official declared goals of UTM policies are not actually achieved* and, in particular, the article aimed to contribute to this debate shedding light on *unofficial reasons at the basis of the use of USOs*. Paying attention to their actual use, we observed that academics do not always seem to be interested in the economic success of USOs. Besides the appropriate start-up of new ventures, an alternative way of using them emerges as rather widespread. This surrogate use of USOs seems to be connected to the need to find better conditions for conducting research activity and overcoming old problems and constraints afflicting everyday academic life. According to the main insights from other studies (see section 2-3), we have seen that professors and researchers can thus attempt to solve problems related to the recruitment of young colleagues, and to the management of research activities and networks. We also highlight a further motivation that, as far as we know,

1 is not yet present in the literature and that can be related to the well-known bureaucratic rigidity
2
3 of Italian institutions: we refer to the need for more streamlined and efficient
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5 bureaucratic/administrative procedures. Another implication is that we have uncovered a
6
7 surrogate use of USOs by examining three different universities (Turin, Florence, Cagliari), which
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9 have each developed policies for supporting the UTM by assuming a proactive attitude over time,
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11 and yet they are rooted in local contexts with a dissimilar economic dynamism and with a
12
13 disparate intensity of public expenditure in the academic sector.
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18 It is, however, appropriate to ask whether this common occurrence in our three case studies is
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20 entirely because of the opportunism of some researchers pursuing their specific interest within a
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22 framework of loose rules or if this proliferation of the surrogate use of USOs is due to the features
23
24 of the governance of universities. That the budgets of many of the USOs are not impressive is
25
26 certainly not a secret, it is a publicly available information, well known to the leadership of the
27
28 universities. Accordingly, the proliferation of such surrogate activities could be readily tackled by
29
30 rectors or vice-rectors, which could, for instance, introduce restrictive criteria for the recognition
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32 of USOs. But, why did that not happen? Why did it not occur in our case studies? The most likely
33
34 reason is that neither the rector nor the other university bodies have the will or the influence to
35
36 bring the usage of academic enterprise back to its rightful function. First, within a higher
37
38 education system ruled by a 'steering from a distance' mechanism (Neave and Van Vught, 1991)
39
40 - which governs and funds the universities from the centre by monitoring their performances -
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42 the will to counter the flourishing of the surrogate use of USOs is dampened by the need to show
43
44 a high degree of activism on UTM, at least formally.
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54 Second, the effort to create a system that effectively selects the best academic enterprises is
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56 difficult to pursue without the technical skills and expertise that the rectors or their vices often
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1 have, and, above all, within a strict administrative system and continually shrinking resources.
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3 Moreover, the low innovativeness of the Italian economic systems makes the effort of creating
4
5 fast-growing entrepreneurial initiatives harder. Therefore, it is unrealistic to think that in a
6
7 context such as the Italian one, where universities are peripheral to the production system and
8
9 where private investment in R&S is poor, the sole establishment of an incubator or a TTO can
10
11 be sufficient to increase the contribution of universities to economic development. In most cases,
12
13 the decision to promote USO incubators is, so far, a choice to create a 'voodoo institution'
14
15 (Harrison and Leitch, 2010) on which universities irrationally pin their hopes in order to cope
16
17 with isomorphic pushes towards the establishment of a more open and commercially oriented
18
19 university. Last, even if the university leaders wanted to reduce the discrepancy between the
20
21 declared UTM's goals and actual achievements, they would probably lack the influence to do so.
22
23 Although the governance of European, and Italian, universities has undergone a strong pattern
24
25 of 'corporatization' which consisted of concentrating decision-making on the top levels
26
27 meanwhile reducing the role of self-government structures, the latter has shown a high degree of
28
29 resilience (Capano et al., 2016). Since main decisions are still subject to compromise among
30
31 academics, the choice to side against vested interests, such as those of some academic
32
33 entrepreneurs, may not be simple.

34
35 In conclusion, whereas in recent years the Italian higher education system has increased its
36
37 contribution to economic development, interventions to promote academic entrepreneurship
38
39 layered in a highly institutionalized context, and unintended consequence emerged. Together
40
41 with the promotion of successful academic businesses, UTM policies encouraged the emergence
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43 of hybrid organizations, which straddle both traditional research activities and a commercial
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45 mission. As revealed by the analysis of the three Italian universities we have investigated, the
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1 relevance of unofficial reasons is crucial in motivating academics to engage in UTM initiatives
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3 that should meet for-profit goals. Given the particular features of the Italian context, an
4
5 interesting research direction to be developed in the future could be to verify whether these
6
7 unofficial reasons are also present in countries characterized by a more flourishing national
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9 system of innovation. In addition, it would be worth exploring if the presence / absence of
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11 unofficial reasons can be associated with different institutional regulation at the national and
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13 local level, regardless of the innovative dynamism of the external context.
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¹ For a systematic review of the literature on different for-profit UTM activities see, among others contributes, Agrawal (2001), Rothaermel et al. (2007), Djokovic and Souitaris (2008), Geuna and Muscio (2009), Teixeira and Mota (2012), Bozeman et al. (2013), Gherardini and Nucciotti (2017).

² Despite the fact that no agreed-upon definition of a USO emerges from the literature (Algieri et al. 2013), it is still possible to rely on the clarifying work of Pirnay and colleagues (2004) which considers academic spin-offs to be new companies created by faculties to exploit the knowledge produced by academic activities in a profit-making perspective.

³ The Research Project of National Interest (PRIN) ‘University, Innovation and Regional Economies’ aimed to examine the spread of UTM activities across Italian regions, namely the contribution of the academic institutions to innovation and the development of local and regional economies. The project involved four research units (from Univ. of Florence, Univ. of Milan, Univ. of Pavia and Univ. of Turin) in a broad three-year research agenda (2013-2016).

⁴ The best-known examples are *VINNÄXT* in Sweden, *Launchpad* in the UK, *Brainport* in the Netherlands, the *Cluster of Excellence* in Germany and, of course, the *Pôles de compétitivité* in France.

⁵ The National Agency for the Evaluation of Universities and Research Institutes (ANVUR) periodically evaluates both research and UTM activities. Data in the text refer to the first evaluation of research quality (2004-2010). For more details see www.anvur.org.

⁶ Data on USOs that are presented in this section refer to 981 USOs listed in the ANVUR census of 2013 that stemmed from 59 public universities. We excluded non-state universities, online universities and universities which do not provide graduate or undergraduate courses. The census refers to all companies officially recognized by universities as USOs between 2004 to 2013. The annual financial statements have been collected through the AIDA - Bureau Van Dijk archive. Searching for 2013 or 2014 budget sheets, we found 806 entries. However, the total number of firms we included in our elaboration is 706 because we excluded 46 firms which went into liquidation.

⁷ By adopting the Italian Business Register definition of innovative start-ups (Law no. 221/2012), we consider USOs to be start-up companies if were four or fewer years old in the year we collected the financial statement.

⁸ The Italian reform of the intellectual property (IP) code was paradoxically radically different from what was introduced in other countries (except for Sweden) to assure universities the ownership of intellectual property resulting from public research (i.e. the Bayh-Dole Act). In Italy, the ownership of invention stemming from public research is mainly in the hands of the researchers, although the IP code was partially changed in 2005 (Granieri, 2010).

⁹ Italian universities are ranked into four groups according to the number of students enrolled: up to 15,000 *small*; from 15,000 to 40,000 *mid*; over 40,000 *large*. The three universities are all classified as *large* although the University of Cagliari is smaller than the other two (ANVUR, 2016). Moreover, despite the peculiarity of being on the Sardinian island, this university has expanded UTM activities both in strengthening technology transfer on its territory at the local level and in developing synergies with other Italian universities.

1
2 ¹⁰ Regarding the three universities examined in this article, the investigation was conducted in the departments listed
3 here: *University of Turin*: Dept. of Molecular Biotechnology and Health Sciences; Dept. of Agricultural, Forest and
4 Food Sciences; Dept. of Psychology; Dept. of Management. *University of Florence*: Dept. of Chemistry; Dept. of
5 Information Engineering; Dept. of Architecture (Design); Dept. of Education and Psychology. *University of Cagliari*:
6 Dept. of Electrical and Electronic Engineering; Dept. of Environmental and Life Science; Dept. of Economic and
7 Business Science; Dept. of History, Cultural and Territorial Heritage.
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18 APPENDIX HERE

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23 References

- 24
25 Agrawal, A. (2001) 'University-to-industry knowledge transfer: Literature review and unanswered
26 questions', *International Journal of Management Reviews*, 3(4): 285–302.
27
28 Andersson, R., Quigley, J. M. and Wilhelmson, M. (2004) 'University decentralization as regional
29 policy: the Swedish experiment', *Journal of Economic Geography*, 4(4): 371-388.
30
31 Ambos, T. C., Mäkelä, K., Birkinshaw, J. and D'Este, P. (2008), 'When does university research
32 get commercialized? Creating ambidexterity in research institutions', *Journal of Management*
33 *Studies*, 45(8): 1424-1447.
34
35 Anselin, L., Varga, A. and Acs, Z. (1997) 'Local geographic spillovers between university research
36 and high technology innovations', *Journal of urban economics*, 42(3): 422-448.
37
38 ANVUR (2016) Rapporto biennale sullo stato del sistema universitario e della ricerca, ANVUR
39 - Agenzia Nazionale di Valutazione del sistema Universitario e della Ricerca, Roma.
40
41 Audretsch, D. (2000), *Is University Entrepreneurship Different?*, Mimeo, Indiana University.
42
43 Bagnasco, A. (1977) *Tre Italie. La problematica etrritoriale dello sviluppo italiano*, Bologna: il
44 Mulino.
45
46 Baldini, N., Grimaldi, R. and Sobrero, M. (2006), 'Institutional changes and the
47 commercialization of academic knowledge: A study of Italian universities' patenting activities
48 between 1965 and 2002', *Research policy*, 35(4): 518-532.
49
50 Baldini, N., Fini, R. and Grimaldi, R. (2015), 'The Transition toward Entrepreneurial
51 Universities. An assessment of academic entrepreneurship in Italy', in A.N. Link, S.S. Siegel
52 and M. Wright (eds). *The Chicago Handbook of University Technology Transfer and*
53 *Academic Entrepreneurship*, Chicago: The University of Chicago Press: 97-137.
54
55 Benhabib, J. and Spiegel, M. (1992) 'The Role of Human Capital in Economic Development:
56 Evidence form Aggregate Cross-Country Regional US Data', *CV Starr Center for Applied*
57 *Economics*, New York University Working Papers, 92-46.
58
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62
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- 1
2 Bercovitz, J. and Feldman, M. (2003), 'Technology transfer and the academic department: who
3 participates and why?', Working Paper, DRUID summer conference.
4
- 5 Bertamino, F., Bronzini, R., De Maggio and M., Revelli, D. (2016), 'Local policies for innovation:
6 The case of technology districts in Italy', *Questioni di Economia e Finanza (Occasional Papers)*,
7 313.
8
- 9 Bolzani, D., Fini, R., Grimaldi, R. and Sobrero, M. (2014), 'University spin-offs and their impact:
10 Longitudinal evidence from Italy', *Economia e politica industriale*, 4: 237-263.
11
- 12 Bozeman, B., Fay, D. and Slade, C. P. (2013), 'Research collaboration in universities and
13 academic entrepreneurship: the-state-of-the-art', *The Journal of Technology Transfer*, 38(1): 1-
14 67.
15
- 16 Breschi, S. and Lissoni, F. (2001), 'Localised knowledge spillovers vs. innovative milieux:
17 Knowledge “tacitness” reconsidered', *Papers in regional science*, 80(3): 255-273.
18
- 19 Breznitz, S. M. and Feldman, M. P. (2012) 'The engaged university', *The Journal of Technology
20 Transfer*, 37(2): 139-157.
21
- 22 Capano, G., Regini M. and Turri, M., (2016) *Changing Governance in Universities: Italian
23 Higher Education in Comparative Perspective*, London: Palgrave Macmillan.
24
- 25 Cesaroni, F. and Piccaluga, A. (2016), 'The activities of university knowledge transfer offices:
26 towards the third mission in Italy', *The Journal of Technology Transfer*, 41(4): 753-777.
27
- 28 Chatterton, P. and Goddard, J. (2000) 'The response of higher education institutions to regional
29 needs', *European Journal of Education*, 35(4): 475-496.
30
- 31 Chiesa, V. and Piccaluga, A., (2000) 'Exploitation and diffusion of public research: the case of
32 academic spin-off companies in Italy', *R&D Management*, 30(4): 329-339.
33
- 34 Clarysse, B. and Moray, N. (2004), 'A process study of entrepreneurial team formation: the case
35 of a research-based spin-off', *Journal of Business Venturing*, 19(1): 55-79.
36
- 37 Clarysse, B., Wright, M., Lockett, A., Van de Velde, E. and Vohora, A. (2005) 'Spinning out new
38 ventures: a typology of incubation strategies from European research institutions', *Journal of
39 Business venturing*, 20(2): 183-216.
40
- 41 Debackere, K. and Veugelers, R. (2005), 'The role of academic technology transfer organizations
42 in improving industry science links', *Research policy*, 34(3): 321-342.
43
- 44 Degroof, J. J. and Roberts, E. B. (2004), 'Overcoming weak entrepreneurial infrastructures for
45 academic spin-off ventures', *The Journal of Technology Transfer*, 29(3): 327-352.
46
- 47 D'Este, P. and Perkmann, M. (2011), 'Why do academics engage with industry? The
48 entrepreneurial university and individual motivations', *Journal of technology Transfer*, 36(3):
49 316-339.
50
- 51 Djokovic, D. and Souitaris, V. (2008), 'Spinouts from academic institutions: A literature review
52 with suggestions for further research', *The Journal of Technology Transfer*, 33(3): 225-247.
53
- 54 Drucker, J. and Goldstein, H. A. (2007), 'Assessing the regional economic development impacts
55 of universities: a review of current approaches', *International Regional Science Review*, 30(1):
56 20-46.
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62
63
64
65
- Etzkowitz, H. and Leydesdorff, L. (2000), 'The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university-industry-government relations', *Research policy*, 29(2): 109-123.
- European Commission (2002) *Benchmarking National Research Policies: The Impact of RTD on Competitiveness and Employment* (IRCE), Brussels.
- European Commission (2008) *Inno-policy TrendChart – Policy trend and appraisal report – Italy 2007*, <http://www.proinno-europe.eu>.
- Eurostat (2017) *Eurostat regional yearbook 2017*, http://ec.europa.eu/eurostat/statistics-explained/index.php/Eurostat_regional_yearbook
- Faggian, A. and McCann, P. (2009), 'Universities, Agglomerations and Graduate Human Capital Mobility', *Journal of Economic and Social Geography*, 100 (2): 210-223.
- Fini, R., Grimaldi, R. and Sobrero, M. (2009) 'Factors fostering academic to start up new ventures: an assessment of Italian founders' incentives', *The Journal of Technology Transfer*, 34(4): 380-402.
- Florax, R. (1992), *The university: A regional booster? Economic impacts of academic knowledge infrastructure*, Aldershot: Avebury.
- Garrido-Yserte, R. and Gallo-Rivera, M. T. (2010), 'The impact of the university upon local economy: Three methods to estimate demand-side effects', *The Annals of Regional Science*, 44: 39-67.
- Geuna, A. and Muscio, A. (2009), 'The governance of university knowledge transfer: A critical review of the literature', *Minerva*, 47(1):93-114.
- Gherardini, A. (2012) 'Andante ma non troppo. L'apertura delle università italiane alle imprese', *Stato e Mercato*, 96(3): 465-501.
- Gherardini, A. (2015) *Squarci nell'avorio. Le università italiane e l'innovazione economica*, Firenze: Firenze University Press.
- Gherardini, A. and Nucciotti, A. (2017), 'Yesterday's giants and invisible colleges of today. A study on the 'knowledge transfer' scientific domain', *Scientometrics*, 112(1):255-271.
- Granieri, M. (2010) *La gestione della proprietà intellettuale nella ricerca universitaria. Invenzioni accademiche e trasferimento tecnologico*, Bologna: il Mulino.
- Gulbrandsen, M. and Slipersæter, S. (2007) 'The third mission and the entrepreneurial university model', Bonaccorsi, A., Daraio, C. (eds.) *Universities and strategic knowledge creation*, Cheltenham: Edward Elgar, 112-143.
- Harrison, R. T. and Leitch, C. (2010) 'Voodoo institution or entrepreneurial university? Spin-off companies, the entrepreneurial system and regional development in the UK', *Regional Studies*, 44(9): 1241-1262.
- Jaffe, A. B. (1989) 'Real effects of academic research', *The American Economic Review*, 79(5): 957-970.

-
- 1
2 Lambert, R. (2003) 'Lambert review of business-university collaboration: Final report', University
3 of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical
4 Research Reference in Entrepreneurship.
5
6 Laredo, P. (2007) 'Revisiting the third mission of universities: Toward a renewed categorization
7 of university activities?', *Higher education policy*, 20(4): 441-456.
8
9 Lam, A. (2007), 'Knowledge networks and careers: academic scientists in industry-university
10 links', *Journal of Management Studies*, 44(6): 993-1016.
11
12 Lam, A. (2011), 'What motivates academic scientists to engage in research
13 commercialization: 'Gold', 'ribbon' or 'puzzle'?', *Research policy*, 40(10): 1354-1368.
14
15 Lazzeri, F. and Piccaluga, A. (2014), 'Le imprese spin-off della ricerca pubblica in Italia: cosa fare
16 dopo le prime mille?', *Sinergie*, 17: 47-66.
17
18 Lazzeroni, M. and Piccaluga, A. (2003) 'Towards the entrepreneurial university', *Local Economy*,
19 18(1): 38-48.
20
21 Lockett, A. and Wright, M. (2005) 'Resources, capabilities, risk capital and the creation of
22 university spin-out companies', *Research policy*, 34(7): 1043-1057.
23
24 Lucas, R. E. (1998) 'On the mechanics of economic development', *Econometric Society
25 Monographs*, 29: 61-70.
26
27 Masiello, B., Izzo, F. and Canoro, C. (2015), 'The structural, relational and cognitive
28 configuration of innovation networks between SMEs and public research organisations',
29 *International small business journal*, 33(2): 169-193.
30
31 Meyer, M. (2003) 'Academic entrepreneurs or entrepreneurial academics? Research-based
32 ventures and public support mechanisms', *R&D Management*, 33(2): 107-115.
33
34 Miceli, V. (2010), 'Technological Districts: Policy Criteria and Regional Industrial Features in
35 Italy', *Economia politica*, 27(1): 147-174.
36
37 Migliori, S. (2016), *Gli spin-off universitari nella loro dimensione di mercato*, Milano:
38 FrancoAngeli.
39
40 Molas-Gallart, J., Salter, A., Patel, P., Scott, A. and Duran, X. (2002) *Measuring third stream
41 activities. Final report to the Russell Group of Universities*, Brighton: SPRU, University of
42 Sussex.
43
44 Moscati, R. and Vaira, M. (eds.) (2008) *L'università di fronte al cambiamento. Realizzazioni,
45 problemi, prospettive*, Bologna: il Mulino.
46
47 Mowery, D., Nelson, R., Sampat, B. and Ziedonis, A. (2004) *Ivory tower and industrial
48 innovation: University-industry technology transfer before and after the Bayh-Dole Act*,
49 Stanford: Stanford University Press.
50
51 Murray, F. and Kolev, J. (2015), 'An Entrepreneur's Guide to the University', in A. N. Link,, S.S.
52 Siegel and M. Wright. *The Chicago Handbook of University Technology Transfer and
53 Academic Entrepreneurship*, Chicago: The University of Chicago Press: 97-137.
54
55 Mustar, P., Wright, M. and Clarysse, B. (2008), 'University spin-off firms: lessons from ten years
56 of experience in Europe', *Science and Public Policy*, 35(2): 67-80.
57
58
59
60
61
62
63
64
65

-
- 1
2 Neave, G. (2000) *The Universities' Responsibilities to Society: International Perspectives. Issues*
3 *in Higher Education Series*, Oxford: Elsevier Science.
4
- 5 Neave, G. and Van Vught, F. (1991), *Prometheus bound: the changing relationship between*
6 *government and higher education in Western Europe*, Oxford: Pergamon Press.
7
- 8 OECD (2002) *Benchmarking industry-science relations*, OECD, Paris.
9
- 10 OECD (2014) *OECD Science, Technology and Industry Outlook 2014*, Paris: OECD
11 Publishing. http://dx.doi.org/10.1787/sti_outlook-2014-en
12
- 13 O'Shea, R. P., Chugh, H. and Allen, T. J. (2008) 'Determinants and consequences of university
14 spinoff activity: a conceptual framework', *Journal of Technology Transfer*, 33(6): 653-666.
15
- 16 Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R. Geuna,
17 A., Hughes A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A. and Sobrero, M., S.
18 (2013) 'Academic engagement and commercialisation: A review of the literature on university-
19 industry relations', *Research Policy*, 42(2): 423-442.
20
- 21 Phan, P. H. and Siegel, D. S. (2006), 'The effectiveness of university technology transfer',
22 *Foundations and Trends in Entrepreneurship*, 2(2): 77-114.
23
- 24 Ponds, R., Oort, F. V. and Frenken, K. (2009), 'Innovation, spillovers and university-industry
25 collaboration: an extended knowledge production function approach', *Journal of Economic*
26 *Geography*, 10(2): 231-255.
27
- 28 Powers, J. B. and McDougall, P. P. (2005), 'University start-up formation and technology licensing
29 with firms that go public: a resource-based view of academic entrepreneurship', *Journal of*
30 *Business Venturing*, 20(3): 291-311.
31
- 32 Ramaciotti, L. and Daniele, C. (eds.) (2015) *Protagonisti dell'ecosistema dell'innovazione? XII*
33 *rapport Netval sulla valorizzazione della Ricerca Pubblica Italiana*, Netval - Network per la
34 *Valorizzazione della Ricerca Universitaria*, Pavia.
35
- 36 Rasmussen, E., Mosey, S. and Wright, M. (2014), 'The influence of university departments on
37 the evolution of entrepreneurial competencies in spin-off ventures', *Research Policy*, 43(1): 92-
38 106.
39
- 40 Rasmussen, E. and Wright, M. (2015), 'How can universities facilitate academic spin-offs? An
41 entrepreneurial competency perspective', *Journal of Technology Transfer*, 40(5): 782-799.
42
- 43 Rizzo, U. (2015) 'Why do scientists create academic spin-offs? The influence of the context', *The*
44 *Journal of Technology Transfer*, 40(2): 198-226.
45
- 46 Roberts, E. B. (1991) *Entrepreneurs in high technology: Lessons from MIT and beyond*, Oxford:
47 Oxford University Press.
48
- 49 Roberts, E. B. and Wainer, H. A. (1971), 'Some characteristics of technical entrepreneurs', *IEEE*
50 *Transactions on Engineering Management*, 3: 100-109.
51
- 52 Rolfo, S. and Finardi, U. (2014), 'University Third mission in Italy: organization, faculty attitude
53 and academic specialization', *The Journal of Technology Transfer*, 39(3), 472-486.
54
- 55 Rothaermel, F. T., Agung, S. D. and Jiang, L. (2007), 'University entrepreneurship: a taxonomy
56 of the literature', *Industrial and Corporate Change*, 16(4): 691-791.
57
58
59
60
61
62
63
64
65

-
- 1
2 Rowe, G. and Frewer, L. J. (2005) 'A typology of public engagement mechanisms', *Science,*
3 *technology & human values*, 30(2): 251-290.
4
- 5 Salvador, E. (2006), 'Il finanziamento delle imprese Spin-off. Un confronto tra Italia e Regno
6 Unito', *Ceris-Cnr, WP*, 12: 3-29.
7
- 8 Shane, S. (2002), 'Selling university technology: patterns from MIT', *Management Science*, 48(1),
9 122-37.
10
- 11 Shane, S. A. (2004) *Academic entrepreneurship: University spinoffs and wealth creation*,
12 Cheltenham: Edward Elgar Publishing.
13
- 14 Schoen, A. and Theves, J. (2006) *Strategic management of University research activities.*
15 *Methodological guide.* Lugano: Prime-OEU Observatory of the European University.
16
- 17 Schubert, T. and Kroll, H. (2016), 'Universities' effects on regional GDP and unemployment:
18 The case of Germany', *Papers in Regional Science*, 95(3): 467-489.
19
- 20 Siegel, D. S., Waldman, D. and Link, A. (2003), 'Assessing the impact of organizational practices
21 on the relative productivity of university technology transfer offices: an exploratory study',
22 *Research policy*, 32(1): 27-48.
23
- 24 Stokes K. and Coornes P. (1998), 'The local economic impact of higher education: An overview
25 of methods and practice', *AIR Professional File*, 67: 1-16.
26
- 27 Stuart, T. E. and Ding, W. W. (2006) 'The Social Structural Determinants of Academic
28 Entrepreneurship: An Analysis of University Scientists' Participation in Commercial
29 Ventures', *American Journal of Sociology*, 112(1): 97-144.
30
- 31 Teixeira, A. A. C. and Mota, L. (2012), 'A bibliometric portrait of the evolution, scientific roots
32 and influence of the literature on university-industry links', *Scientometrics*, 93(3): 719-743.
33
- 34 University of Cagliari (2009), *Creatività, innovazione e trasferimento tecnologico*, Atti del
35 convegno del 15.12.2008, mimeo, <http://veprints.unica.it/398/1/innovazione.pdf> .
36
- 37 University of Florence (2006), *Il Bilancio Sociale dell'università degli Studi di Firenze 2006*,
38 mimeo, https://www.unifi.it/upload/sub/bilancio/bilancio_sociale_fup_2006.pdf .
39
- 40 University of Turin (2016), *Rapporto di sostenibilità 2015/2016*, Torino,
41 https://www.unito.it/sites/default/files/rapporto_sostenibilita_2015_2016.pdf
42
- 43 University of Turin (2017), *Unito Focus 2017*, [http://politichediateneounito.it/wp-](http://politichediateneounito.it/wp-content/uploads/2017/02/unito_FOCUS_web.pdf)
44 [content/uploads/2017/02/unito_FOCUS_web.pdf](http://politichediateneounito.it/wp-content/uploads/2017/02/unito_FOCUS_web.pdf)
45
- 46 Vacca, V. P. (2013), 'Financing innovation in Italy: an analysis of venture capital and private
47 equity investments', *Questioni di Economia e Finanza (Occasional papers)*, 209.
48
- 49 Valero, A. and Van Reenen, J. (2016) 'The economic impact of universities: Evidence from across
50 the globe', No 22501, NBER Working Paper from National Bureau of Economic Research,
51 Inc.
52
- 53 Vandebussche, J., Aghion, P. and Meghir, C. (2006) 'Growth, distance to frontier and
54 composition of human capital', *Journal of economic growth*, 11(2): 97-127.
55
- 56 VeM - Venture Capital Monitor (2014), *Rapporto Italia 2014*,
57 http://www.privateequitymonitor.it/attach/vem_2014.pdf.
58
59
60
61
62
63
64
65

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- 1
2 Viesti, G. (ed.) (2016) *Università in declino. Un'indagine sugli atenei da Nord a Sud*, Roma:
3 Donzelli.
4
- 5 Visintin, F. and Pittino, D. (2014), 'Founding team composition and early performance of
6 university-Based spin-off companies', *Technovation*, 34(1): 31-43.
7
- 8 Visintin, F. and Pittino, D. (Eds.) (2016) *Fast Growing Firms in a Slow Growth Economy:
9 Institutional Conditions for Innovation*, Cheltenham: Edward Elgar.
10
- 11 Vohora, A., Wright, M. and Lockett, A. (2004) 'Critical junctures in the development of
12 university high-tech spinout companies', *Research policy*, 33(1): 147-175.
13
- 14 Wennberg, K., Wiklund, J. and Wright, M. (2011), 'The effectiveness of university knowledge
15 spillovers: Performance differences between university spinoffs and corporate spinoffs',
16 *Research Policy*, 40(8): 1128-1143.
17
- 18 Wright, M., Clarysse, B., Mustar, P. and Lockett, A. (2007), *Academic entrepreneurship in
19 Europe*, Cheltenham: Edward Elgar.
20
- 21 Yin, R.K. (2003), *Case Study Research: Design and Methods*, Thousand Oaks, CA: Sage.
22
- 23 Zahra, S. A., Van de Velde, E. and Larraneta, B. (2007), 'Knowledge conversion capability and
24 the performance of corporate and university spin-offs', *Industrial and Corporate Change*,
25 16(4): 569-608.
26
27
28
29
30
31
32
33
34
35
36
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Tables

TABLE 1. Yearly sale revenues of Italian USOs (2013 or last year available)

Sale revenues*	% USOs (total, n = 760)	% start-up USOs (≤ 4-years, n = 351)	% elder USOs (> 4-years, n= 409)
0	15,0	16,2	13,9
1-100.000	45,1	58,1	34,0
100.001-500.000	29,5	22,8	35,2
500.001-1.000.000	6,1	2,3	9,3
1.000.001-2.000.000	2,5	0,3	4,4
> 2.000.000	1,8	0,3	3,2
Total	100,0	100,0	100,0

Source: Our elaboration on AIDA - Bureau Van Dijck dataset.

TABLE 2. A profile of the three academic institutions examined.

	University of Turin	University of Florence	University of Cagliari
Dimension	Large	Large	Large
Territorial area	North	Centre	South
No. enrolled students (2014/5)	10,621	8,208	3,399
No. professors/researchers (2016)	1,921	1,653	971
No. Dept. (2016)	27	24	16
Engineering Dept. (2016)	No	Yes	Yes
Degree offer	Generalist	Generalist	Generalist
No. Research Centres (2016)	34	77	12
TTO (year)	2001	2003	2005
Budget TTO (€)	50,000	371,806	0
Staff TTO (2016)	3	10,5	6
No. Incubators (year)	1 (2003)	1 (2011)	0
No. patents (2011-13)	72	53	20
No. spin-offs (2013)	31	22	20
Subcontracting value (2013, €)	90,018,157	16,195,974	7,806,361
Emphasis on Third Mission	High	Medium	Medium

Source: Our elaboration on MIUR (Ministry of Education, University and Research - Italy) and ANVUR (Italian National Agency for the Evaluation of the University and Research) databases.

APPENDIX. List of interviewed for each case study.

Case	Interview code	Role	Actor
University of Turin	Int_1_Turin	Vice-Rector for research	academic
	Int_2_Turin	Vice-Rector for internal and external communication	academic
	Int_3_Turin	Vice-Rector for applied research	academic
	Int_4_Turin	TTO Director	academic staff
	Int_5_Turin	Director, Research and International Relations Office	academic
	Int_6_Turin	Director, University Spin-off and Technology Transfer Incubator	academic staff
	Int_7_Turin	Director, Dept. of Agriculture, Forest and Food Science	academic
	Int_8_Turin	Professor, Dept. of Agriculture, Forest and Food Science	academic
	Int_9_Turin	Vice-Director, Dept. of Molecular Biotechnology and Health Sc.	academic
	Int_10_Turin	Professor, Dept. of Molecular Biotechnology and Health Sc.	academic
	Int_11_Turin	Director, Dept. of Management	academic
	Int_12_Turin	Professor, Dept. of Management	academic
	Int_13_Turin	Vice-Director, Dept. of Psychology	academic
	Int_14_Turin	Professor, Dept. of Psychology	academic
	Int_15_Turin	Staff, University and Enterprises Office	academic staff
	Int_16_Turin	Director, Public-private technology transfer organization	no academic
	Int_17_Turin	Director, Public-private technology transfer organization	no academic
	Int_18_Turin	Staff, Agency for technological innovation and research	no academic
	Int_19_Turin	Staff, Agency for technological innovation and research	no academic
	Int_20_Turin	Member of Regional Government for productive activities	no academic
University of Florence	Int_1_Florence	Director, University Job placement office	academic staff
	Int_2_Florence	Director, University Research and Technology Transfer services	academic staff
	Int_3_Florence	Vice-Rector for Technology Transfer and local affairs	academic
	Int_4_Florence	Director, University spin-off incubator	academic staff
	Int_5_Florence	Director, Dept. of Chemistry	academic
	Int_6_Florence	Director, Dept. of Education and Psychology	academic
	Int_7_Florence	Director, Dept. of Architecture	academic
	Int_8_Florence	Director, Dept. of Industrial Engineering	academic
	Int_9_Florence	President, Chamber of Commerce	no academic
	Int_10_Florence	Staff, Private start-up incubator	no academic
	Int_11_Florence	Director, Public start-up incubator	no academic
	Int_12_Florence	Director, Public-private technology transfer organization	no academic
	Int_13_Florence	Key informant on regional innovation policies	no academic
	Int_14_Florence	Entrepreneur, local firm (ICT)	no academic
	Int_15_Florence	Professor, Dept. of Chemistry	academic
	Int_16_Florence	Professor, Dept. of Education and Psychology	academic
	Int_17_Florence	Professor, Dept. of Architecture	academic
	Int_18_Florence	Professor, Dept. of Industrial Engineering	academic
	Int_19_Florence	Entrepreneur, local firm (jewellery)	no academic
	Int_20_Florence	Entrepreneur, local firm (archaeology)	no academic
University of Cagliari	Int_1_Cagliari	Professor, Dept. of Economics	academic
	Int_2_Cagliari	Director, Dept. of Life and Environmental Sciences	academic
	Int_3_Cagliari	President of private technology transfer consortium	no academic
	Int_4_Cagliari	Director, Dept. of Electrical and Electronic Engineering	academic
	Int_5_Cagliari	Vice-Rector for innovation and local affairs	academic
	Int_6_Cagliari	Director, University Industrial Liaison Office	academic staff
	Int_7_Cagliari	Director, Dept. of History, cultural heritage, geographic science	academic
	Int_8_Cagliari	Staff., Public technology transfer consortium	no academic
	Int_9_Cagliari	Professor, Dept. of Electrical and Electronic Engineering	academic
	Int_10_Cagliari	Director, Private start-up incubator	no academic
	Int_11_Cagliari	Director, Private start-up incubator and venture capitalist	no academic
	Int_12_Cagliari	Director, University Job placement office	academic staff
	Int_13_Cagliari	Staff, University Industrial Liaison Office	academic staff
	Int_14_Cagliari	Professor, Dept. of Life and Environmental Sciences	academic
	Int_15_Cagliari	Professor, Dept. of History, cultural heritage, geographic science	academic
	Int_16_Cagliari	Professor, Dept. of Economics, TTO's advisor	academic

Int_17_Cagliari	Professor, Dept. of Economics	academic
Int_18_Cagliari	Entrepreneur, local start-up (aerospace)	no academic
Int_19_Cagliari	Entrepreneur, local firm (agriculture)	no academic
Int_20_Cagliari	Entrepreneur, local start-up (credit)	no academic