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SPINOFF DIFFUSION

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ABSTRACT

Using data on the population of English and Scottish universities and their spinoff firms over a period of 15 years, we show how differential coercive and normative state powers can affect the diffusion of innovations among public organizations. Our work has implications for institutional and diffusion theories as results indicate that when state-mandates are not backed by specific monitoring and sanctioning mechanisms, public organizations are left exposed to fashion setters and mimetic behaviors that dictate the process of adoption. The paper has also implications for fashion theories as it illustrates that previously proposed country-level norms of rationality are insignificant predictors of fashion diffusion. Instead, we show that industry- or field-level norms, even when these are controlled by the state, can be used to prevent fashions from spreading.

INTRODUCTION

This paper draws inspiration from the empirical context of academic entrepreneurship (Etzkowitz, 2003; Shane, 2004) to unfold the complexity of diffusion processes among public organizations. In contrast to traditional theoretical explanations which assume the presence of explicit government regulations and norms that guide the diffusion process of new practices, we argue that ambiguity over or absence of field-level norms force public organizations towards fashion-style adoption of state-mandated practices and towards transition over different diffusion processes until the institutionalization of the new practices is finally achieved.

Diffusion of new activities among public organizations has been the focus of organization theorists for decades (e.g. Rogers, 2003; Wejnert, 2002). Among them, institutional theorists have convincingly argued that compliance to state regulatory and normative demands is controlled through coercive methods, and that these coercive methods are responsible for the rapid, unconditional adoption of state-mandated practices (DiMaggio & Powell, 1983; Ruef & Scott, 1998; Scott, 1981). However, their conclusions have been based on the assumption that the state regulatory and normative demands are explicit. It is analytically and empirically unclear how the diffusion of practices among public organizations occurs when there is absence of state norms. How will organizations respond to triggers of change in view of long-term ambiguity and uncertainty over the exact demands placed upon them, and which is the most likely diffusion process?

An alternative but less explored theoretical perspective on diffusion has been proposed by management fashion theorists (Abrahamson, 1991; 1996; Nelson, Peterhansl & Sampat, 2004). Their research aims to explain the diffusion of non-beneficial practices and the rejection of beneficial ones. Here, the diffusion of practices happens due to various fashion-setters promoting their own irrational, non-validated practices as efficient management techniques in a field. The main assumption is that country-level norms of rationality will moderate the diffusion of these fashions, so that rational nations will experience only short-lived fashions as the latter are quickly unmasked (Abrahamson, 1991, 1996). However, this stream of research neglects to include field-level constructs that might affect the speed and scope of the diffusion process. Even within a

rational society, how do specific environmental demands imposed by the state impact the adoption of new practices among organizations in public sectors? How are new organizational practices adopted when the state's actions challenge the country's norms of rationality?

In this study, we emphasize the importance of uncertainty that stems from the absence of governmental regulation and norms on the adoption of new practices among public organizations. We draw a distinction between early government legislation as a "trigger of change" (Strang & Sine, 2002:507) and regulations/norms that define and monitor organizational action. We argue that early state legislation creates niches for the adoption of new practices but that absence of coercive and normative control mechanisms dramatically increases the importance of mimetic pressures as well as the bargaining power of fashion setters, thus leading to the spread of practices in a fashion style (Abrahamson, 1991, 1996). We therefore challenge previous assumptions that state mandates or requirements are quickly and unconditionally adopted by public organizations (Tolbert & Zucker, 1983; Rowan, 1982) by claiming that compliance to these demands is moderated by specific state actions that define differential behaviors, sanctions and rewards. Further, we add to common assumptions made among fashion theorists that fashions emerge as a result of action from mimicry or the influence of external interest groups such as media (Abrahamson, 1996) by emphasizing the moderating role of government regulation and monitoring in a specific field.

The United Kingdom university spinoff industry that we study here is an ideal context for this (Lockett & Wright, 2005; Shane, 2004). Spinoffs are private corporations based on university intellectual property that emanates from school laboratories, and are often controlled by universities through equity stakes. Intensive government mandates for UK university technology transfer and spinoff formation were left unmonitored for years, leaving universities unsure as to how the spinoff industry should be regulated and how spinoffs could enhance university resources relative to other alternatives such as licensing. The uncertainty from the lack of sanctions, rewards and regulations not only left universities susceptible to cognitive pressures for mimicry among each other as to how spinoff activities should look like, but also left them exposed to fashion setters such as the media. Thus, we are able to show that when coercive pressures are weak, the diffusion of innovations among public organizations can take an uncommon fashion trajectory even in a "rational nation" (Abrahamson, 1996).

DUFFUSION THEORY

Activities that spread go through three distinct phases. The first involves institution building, where new activities are mandated, defined and rationalized by legislators and various agencies (DiMaggio & Powell, 1983; Rowan, 1982; Scott, 1981). In public organizations, compliance to these mandates is controlled through coercive methods and sanctioning mechanisms run by the state. In the second stage, emerging activities gain legitimacy through professional bodies and associations, and are eventually seen as useful within a field. Here, the government defines technical standards through these associations and specifies which behaviors are appropriate. This process of "professionalization" makes organizations easier to observe in a field because assigning organizations to certain groups makes them easier to observe and more legitimate (Zuckerman, 1999). In the final stage, the newly created activities are constantly administrated and if balance is achieved among audiences and users (Rowan, 1982), the diffusion takes permanent status, otherwise declines or is abandoned (DiMaggio & Powell, 1983; Scott, 1981). Thus, in the final stage, cognitive agreement on the usefulness of the new activities is achieved, often through mimicry among social players.

In public organization settings, institutional theorists have rarely attributed the diffusion of new practices to mimetic pressures. Mimicry is seen as resulting from state regulatory and normative uncertainty as conflicting norms force organizations to imitate each other towards a state of isomorphism (DiMaggio & Powell, 1983; Henizs & Delios, 2001). Institutional theorists claim that isomorphism through mimicry is rare among public organizations because the state apparatus is assumed to have clear rules and sanctioning mechanisms that regulate their conduct (Meyer & Rowan, 1977). Because of their dependence upon the state, public organizations will therefore rush to adopt the changes, lest they are seen as illegitimate. For example, Tolbert & Zucker (1983) have examined how the adoption of civil service reforms begun due to state regulatory requirements and attributed the rapid diffusion of the reforms to institutional compliance of city administrators towards state mandates (cf. Edelman, 1990, 1992) The coercive powers of the state have therefore been stronger in explaining the adoption of new practices requested by the government and all public entities need to do is follow the government's clear guidelines.

Fashion theorists contend that fashions tend to be frequent but short-lived in countries were norms of rationality and efficiency are clearly specified (Abrahamson, 1996:263). Also, popular practices that have been state-mandated may lose their appeal if the government withdraws its mandate (Abrahamson, 1996:256). Yet, these theorists have not examined how industry-specific norms can mediate the speed and duration of fashions. We argue that government regulation targeted at certain fields within state jurisdiction (e.g. the higher education industry) may not exist from the outset, thus leaving the field open to external influences. Such external influences can be powerful fashion setters (e.g. the media, lobbyists, consultants) that affect public opinions and influence the adoption of practices through their deceitful portrayal as beneficial to public educational organizations. We thus argue that while fashions diffuse in a field through demand and supply forces (Abrahamson, 1996), government regulatory controls through associations, public bodies and professional agencies in specific fields can differentially affect the speed with and the extent to which the fashion spreads. This is also true among private organizations because trade associations can presumably prevent the dissemination of fashions among their members through discourse and rational analysis.

Our main assumption is that, in most diffusion studies, authors misattribute the adoption of practices to institutional compliance and coercive pressures for two reasons (Greenwood *et al*, 2008). First, they assume that the state has rationally examined clear benefits for the adopting institutions before mandating the new practices or that it has formalized its monitoring mechanisms with regards to how adopting and non-adopting entities are rewarded and punished. In this instance, mimetic behaviors are excluded from the analysis as the taken-for grandedness of the new activities is given by state approval and cognitive definitions of what must be done through mimicry are not necessary. Second, in organizational studies, coercive and normative pressures are difficult to operationalize and authors have often examined mimetic processes without detailing the regulative or normative environments at all. Few have satisfactorily operationalized all three pillars in a single study (Mizruchi & Fein, 1999) and in some cases institutional theorists have deliberately blended coercive and normative elements to form a composite "institutional profile" (Greenwood *et al*, 2008: 16) that supposedly affects diffusion. This has led researchers to commonly attribute the diffusion of practices to some unspecified "institutional dynamics" that they designate at will.

In this paper, we detail the natural history of the adoption of a practice among public educational organizations to uncover the full diffusion process. We show that when clear norms and standards are not there, organizations adopt practices not because they feel threatened by coercive and normative state pressures but because of mimetic behaviors and the influence of

external environmental forces that reign in their field with fashionable solutions. Lack of coherence and agreement over which specific new activities are mandated and how they are validated is particularly important in educational markets (Rowan, 1982; Clark, 1968). Formalized educational markets with clear regulations, associations, organized communities, bodies and groups of interests are important in guiding the process of accrediting newly diffused practices (Meyer, Scott & Strang, 1987; Scott, 1981). Institutional theorists have placed little emphasis on how the differential ability of these coercive and normative control mechanism can affect the diffusion of practices in educational markets. In this study, we detail how the absence of rational rules and standards can lead to educational innovations spreading as fashions.

ENGLISH AND SCOTTISH SPINOFFS

We define spinoffs as new ventures that are dependent upon licensing or assignment of a university's intellectual property for initiation (Lockett & Wright, 2005:1044). Our definition distinguishes spinoffs from other university startups that are established by students, graduates or researchers that are not affiliated with research conducted on university intellectual property. Spinoffs are complex organizations that rely on some form of patent or invention and seed funding from private investors to be set up and grow. They were historically seen as a rare route for knowledge commercialization since other forms of technology transfer such as licensing had been prevalent for decades (Shane, 2004).

The origins of the United Kingdom spinoff industry can be traced back in 1977 when the then Patents' Act gave inventors the right to share financial benefits from their research with their employer. In 1986, the UK government abolished the British Telecom Group's monopoly in telecommunications and further privatizations throughout the 1980's incentivized research and development among private companies that sought to enter industries now open to competition. A lot of these companies looked at universities to provide them with technology expertise through patenting and licensing. In 1993, a government White Paper designated universities as key to the realization of the UK's research potential and suggested policies to increase university-industry collaboration (HM Treasury, 1993). In response, university Technology Transfer Offices spread in the early 1990's and there was heated debate among universities over strategies for the most efficient route to commercialize technology as mandated by the government. Although spinoff firms had been formed for many years prior to 1993, their numbers were characteristically low and their emergence could be described as naturalistic. Our data show that between 1963 (when the first spinoff was registered) and 1993, only 103 spinoffs had been incorporated for an average of 3/year among 113 universities. In contrast, by the late 1990's, most English and Scottish universities had incorporated at least one spinoff within their facilities.

Lack of State Rules and Norms

Despite incentives favoring university commercial activities and seemingly high university technology transfer up to 2001, the UK government never monitored or regulated the spinoff industry. In 1996, the first major university "Research Assessment Exercise" (RAE) took place. RAEs are conducted every 5-7 years by the higher education authorities and incorporate performance assessments of university teaching and research collapsed into numerical scores. RAE scores are extremely important because they guide university funding for the years until the next RAE. The 1996 assessment did not make any explicit mention to technology transfer, nor it produce scores for commercial activities. In 2001, the second RAE took place, with the assessment process this time including only minor, random technology transfer criteria for the

evaluation of research at engineering and medical departments. The test only referred to aspects of research that had "immediate commercial applications" in the UK industry.

Contrary to teaching and research activities, the government had not established any association that would exclusively oversee spinoff activities. The most relevant such watchdog, UNICO, was established in 1994 by university managers to coordinate technology exploitation within Technology Transfer Offices (TTO). Other agencies, such as HEFCE, that are responsible for the allocation of university funds were also left uninvolved. The lack of such professional bodies that could regulate and oversee spinoff activities prior to 2001 was in contrast to mainstream diffusion explanations, particularly in higher education where state monitoring is important for the professionalization and institutionalization of novel practices (Meyer & Rowan, 1977; Scott, 1981). Yet, spinoff numbers continued to rise steadily for many years until 2001. The government had also not collected any form of official data on spinoff activities until 2002 when the first "Higher Education Business Interaction survey" took place. The survey, which has been running annually ever since, wished to identify university strategies for the exploitation of intellectual property by collecting quantitative information from individual institutions across the UK. The stated aim was to provide "invaluable intelligence for knowledge exchange practitioners and policy makers" (HEBCI, 2008).

By 2001, following the last research assessment exercise, government suggestions to halt the acceleration of spinoff formation among universities were loudly voiced for the first time. Reflecting world-wide evidence on the spinoff industry, a major review by the UK government concluded that the number of spinoff firms being formed was hard to sustain unless a radical shift towards spinoff performance in the universities' general incubation model was urgently implemented (HM Treasury, 2003). Indentifying key performance indicators of university commercial activities became a policy priority. Further, to promote successful technology transfer strategies, in 2000 the government established a £50million University Challenge venture capital fund and sponsored several Science Enterprise Centers based in universities (Lockett & Wright, 2005). The next year it extended invitations at universities to apply for special funding targeted at commercial activities and by 2002 the first substantial public funds dedicated to technology transfer were distributed to universities by the English and Scottish authorities (HEIF funds).

As with sanctioning, the government had not established rewarding schemes for technology transfer prior to 2001. In the early years, the assumption supported by state discourse was that spinoff production would be financially self-rewarding for universities. State expectations were that spinoffs would directly compensate universities through equity investments that, when liquidated, would result in cash flowing into the schools and their individual inventors (Feldman, Feller, Bercovitz & Burton, 2002). There was also expectation that commercial agreements with external industry financiers linked to spinoffs (e.g. venture capitalists) would bring investments into university laboratories and other facilities.

The Spinoff Diffusion

Our data on the English and Scottish spinoff industry show that firm foundings concentrated around the years 1996 and 2001 when the two research assessment exercises took place, indicating elements of compliance to state mandates (figure 1). However, after 2001, not only did spinoff foundings decline, but spinoff deaths also increased sharply. We attribute the collapse of the spinoff population post-2001 to a fashion-style diffusion process. According to Abrahamson (1996:256), fashions exhibit a bell-shaped pattern of diffusion similar to the one observed in the UK spinoff industry.

Scholars in the United States and Europe who have looked for answers as to why spinoffs spread so quickly have offered efficiency-based explanations of how university strategies and initiatives as well as general economic conditions favored the diffusion of these firms (DiGregorio & Shane, 2003; Lockett & Wright, 2005; O'Shea, Allen, Chevalier & Roche, 2005). Researchers have implicitly assumed that more spinoffs were better for national economies and universities, without considering the prospects of survival and growth of these companies or the actual benefits that they brought back to universities. Abrahamson (1991) has claimed that this dominant perspective in the diffusion literature is indicative of the pro-innovation bias which suggests that diffused innovations will benefit the adopters, despite lack of such evidence. He and other theorists have proposed that lack of evidence is a predictor of fashion diffusion processes (Abrahamson, 1991; Nelson *et al*, 2004) because the resulting ambiguity forces organizations to accept practices that are not beneficial or financial sustainable within their structure.

Below, we formulate hypotheses based on two periods that differentiate between fashion (1993-2001) and rational (2002-2007) diffusion processes that are moderated by lack of state norms and regulations. As we explained earlier, we treat 2001 as the turning point in our analysis for several reasons. First, it was the year of the last Research Assessment Exercise. Second, it was the year that the government introduced special spinoff funds accompanied by specific demands and guidelines for growth-oriented venturing. These and other regulatory and normative changes were implemented as a result of the government starting forming clear impressions on the spinoff industry based on the Higher Education Business Interaction survey.

Association Membership. In the early years of the spinoff industry, the void caused by lack of governmental rules and monitoring was left to be filled by universities. Institutional theorists argue that uncertainty breads mimetic behaviors among organizations as the latter attempt to define what constitutes acceptable behavior versus not (DiMaggio & Powell, 1983; Ruef & Scott, 1998). Emerging activities and practices are defined by professional bodies, training organizations and other industry associations that confer legitimacy to those espousing the practice (Rowan, 1982). To participate or be monitored as a member of such a group or association makes organizations legitimate players that abide by newly defined professional standards (Zuckerman, 1999). In 1994, English and Scottish universities founded their own body, the University Companies Association (UNICO) as a natural reaction to the lack of rules and guidelines on spinoff formation. The Association was focused on exchanging best practice and training universities technology transfer personnel. Membership into UNICO increased rapidly as its members were attempting to design university strategies and structures that would increase spinoff venturing. Although other authors have offered rational explanations (e.g. O'Shea *et al*, 2005) and institutional and diffusion theorists focus on coercive state powers, we believe that university participation into UNICO during the early years was a university act that sought legitimacy and a sense of belonging into a group of pioneering universities that abided to governmental discourse for reform. Membership into UNICO could therefore explain the intention of universities to generate spinoffs early in the 1990's. It was a symbolic university gesture towards convergence to a specific business incubation model that UNICO members defined themselves in view of absence of regulatory norms. Later, as the spinoff industry was redefined and regulated based on new evidence and government action (Abrahamson 1996; Oliver, 1992), UNICO may have lost its importance in predicting university spinoff formation. We hypothesize:

H1a. There is a positive relationship between UNICO membership and a university's decision to adopt spinoffs.

H1b. The effect of UNICO membership on a university's decision to adopt spinoffs was stronger when norms and regulations were absent than when they were present.

Mimicry. As universities were trying to designate behavioral norms (DiMaggio & Powell, 1983), the spread of spinoffs depended upon schools mimicking each other in order to appear modern in their field. The imitation process took place without universities being truly concerned with successful spinoff formation. Elements of a cognitive legitimization process that substituted the absence of coercive or normative demands (DiMaggio & Powell, 1983; Rowan, 1982) were evident in many cases. Imitation led most universities to restructure commercial activities around almost identical Technology Transfer Offices around the same time, although other arrangements such as outsourcing spinoff activities could have taken place, and did take place after 2001. We propose that since mimetic forces were in place, prior diffusion of spinoff activities in a local region would have further predicted the adoption of spinoffs by those schools that had not done so. This practice perhaps lost its impact after 2001, when government evidence and discourse on the spinoff industry emphasized that few spinoffs had accomplished the potential envisaged by the government (HM Treasury, 2003) and a more rational, evidence-based restructuring of the spinoff industry was needed. We therefore propose:

H2a. There is a positive relationship between spinoff local diffusion and a university's decision to adopt spinoffs.

H2b. The effect of spinoff local diffusion on a university's decision to adopt spinoffs was stronger when norms and regulations were absent than when they were present.

Media coverage. Despite lack of balance among audiences in the educational community (Rowan, 1982) as to whether spinoffs were the appropriate commercialization route and fears that they would negatively affected the traditional mission of the university (Bok, 2003; Slaughter & Leslie, 1997), spinoff popularity increased rapidly. Media coverage of spinoff events gathered pace from the early 1990's with spinoffs attracting almost 500 press articles by 2000 (figure 2). The average number of media reports per spinoff also increased from 1.12 in 1995 to 2.74 in 1998 and 3.76 in 2000. Typical mentions in the press hailed spinoffs as taking research methods "from the laboratory bench to the hospital ward" (*Observer*, 2000) and as "building the new knowledge-driven economy" (*M2 Presswire*, 1998). One university was seen as planning to form "80 spinoffs in only three years", highlighting excessive hopes on the "role that spinoffs would play in the national economy" (*Sheffield Star*, 2002).

The influence of media coverage is central to the diffusion of innovations and fashion literatures (Abrahamson, 1991; Rogers, 2003), however, research on university spinoffs has ignored it focusing instead on efficiency-based explanations (Lockett & Wright, 2005; O'Shea *et al*, 2005). Media coverage has not been used in higher education settings but we argue that similar to other non-profit organizational settings (Holden, 1986; Myers, 2000) it played an important role in how innovative practices spread among universities. We argue that the UK media magnified spinoff events granting them legitimacy and respectability (Deephouse, 2000) even among audiences negatively positioned towards spinoffs. This may have attracted other institutions to follow by forming spinoffs in a rapid mimetic process. We therefore propose:

H3a. There is a positive relationship between spinoff media coverage and a university's decision to adopt spinoffs.

H3b. The effect of spinoff media coverage on a university's decision to adopt spinoffs was stronger when norms and regulations were absent than when they were present.

Prior spinoff growth. By collecting information and setting norms and standards for financial rewards, the government made steps towards rationalizing the spinoff industry. Few universities had formed spinoffs with clear growth prospects since 1993 since most had seen high spinoff numbers as necessary or sufficient. Had the spinoff practice diffused based only on rational criteria as authors have suggested (DiGregorio & Shane, 2003; Lockett & Wright, 2005), there would have been no major differences in spinoff productivity in the industry's history. Figure 1 indicates that post-2001, not only did spinoff numbers decrease but spinoff deaths increased markedly. We contend that, following new evidence and new governmental guidelines, universities that did not consider the production of potentially successful spinoffs as feasible within their capabilities and resources would abandon the practice. In contrast, those few that had prior experience in successful spinoff formation would continue after the government had regulated the industry. We hypothesize:

H4a. There is a positive relationship between prior spinoff growth and a university's decision to adopt spinoffs.

H4b. The effect of prior spinoff growth on a university's decision to adopt spinoffs was weaker when norms and regulations were absent than when they were present.

METHODOLOGY

We gathered panel data on the population of universities (113) and spinoffs firms (1409) in England and Scotland covering a period of 15 years between 1993 to 2007. We located most data in publication outlets such the Higher Education Statistics Authority (HESA) and supplemented it with information from primary sources and direct contacts with universities and Technology Transfer Offices.

Dependent variables. We defined two dependent variables in our study. First, a binary variable measuring whether a university founded any spinoff in a given year (0=no, 1=yes) and second, a positive integer capturing the total number of spinoffs founded each year by a university.

Independent variables. *Membership* into the universities' spinoff association UNICO was measured as years since joining. As some universities left the association earlier than others, we used a decreasing ratio of 0.80 to capture the slowly-fading effect of a UNICO membership over the years. The reason for this is that having left UNICO did not automatically erase the cumulative UNICO experience of a university that participated in the union for years. *Local diffusion* was measured as the percentage of universities in a UK region that had formed at least one spinoff in a year. We used the UK's classification of 9 geographic regions (Government Office regions) plus Scotland to assign universities in each of these. We then counted the number of universities that had formed a spinoff in each region and divided the figure by the total number of universities located in that region. *Media coverage* of spinoffs was assessed by counting the number of UK press clippings that related to a university and its spinoff firms in a single article. We searched the LexisNexis database for articles with the name of a university and each of its spinoff firms as keywords and marked such articles in our 15 year period. We recorded a total of 8866 articles linked to 1409 spinoffs and their parent universities. Content analysis of this type has been used in various other settings in organizational studies (e.g. Holden, 1986; Myers, 2000). *Prior spinoff growth* was measured as the logarithm of a university's prior spinoffs' total assets. Theoretically,

we expected that past spinoff growth would affect the decision to form spinoffs in the future (yes/no) or the number of spinoffs generated in the future (Deephouse, 1996). Assets are frequently used as firm size indicators and can capture common endowments at the time of a spinoff founding such as patents, office space and personnel granted to them by universities.

Control variables. We controlled for a number of university-level and environmental factors that may affect the diffusion of spinoffs, specifically: *university performance* (number of publications); *industry funding* and university *endowments; university reputation* (university rankings); *university status* (number of Nobel Prizes); *prior experience* in spinoff formation; *Technology Transfer Office experience*; *university age*; *university size; Scottish universities* vs. English; *regional GDP;* and re*gional R&D* intensity.

As we saw, we defined the dependent variable in two ways: first, as the university decision to form spinoffs each year (yes/no) and second, as the number of spinoffs formed each year. In the first case, we employed discrete-time event history analysis estimating maximum likelihood logistic regression (Alison, 1984). In the second case, and as a robustness test, we estimated negative binomial regression models as we were concerned with count variables that take small positive values. Results of the negative binomial regressions are not reported here but are available at request from the authors. All independent and control variables in the models were lagged by one year to allow for their effects on the dependent variable to unfold smoothly.

RESULTS & DISCUSSION

Most correlations in our analyses ranged from small to moderate, however, to examine possible problems with multicollinearity we computed variance inflation factors (VIF). In both periods and with both event history and negative binomial analyses, we found that all variables had VIF well below the usual warning level of 10, with the highest VIF not exceeding 6.5 and the mean VIF always below 3 (Gujarati, 2003). Tables 1 and 2 show results of event history analysis on the decision to form spinoffs (yes/no). Overall, we find support for hypotheses 1a, 2a, 3a and 4a once more, as the four variables increase X^2 and decrease the log likelihood in all models except 10. Model 12 shows that media coverage cannot explain spinoff productivity in the second period, a fact that further supports hypothesis 3b (model 6 shows that media coverage is significant in the non-regulated period pre-2001). Results also support hypothesis 2b and 4b as local diffusion was less important and prior spinoff growth was more important when government regulatory and normative action intensified. However, we did not find support that early membership into UNICO (1b) was more important than after 2001. We found similar overall supporting evidence using negative binomial models.

Our paper has important implications for the diffusion (Rogers, 2003) and fashion (Abrahamson, 1991; Nelson *et al*, 2004) theories for a number of reasons. First, we move towards a theory of more dynamic diffusion processes rather than static diffusion explanations. The implicit assumption among diffusion studies, particularly when dealing with public, non-profit organizations, is that there exist clear government guidelines that organizations follow in order to appear legitimate (Casile & Davis-Blake, 2002; D'Aunno *et al*, 1991; Davis, 1991; Greve, 1996). This sensitivity for compliance is extremely high among educational institutions because changes in their mission or structure are not evaluated in "technical terms" unless they have first been evaluated in terms of conformity to the state requirements (Rowan, 1982; Scott, 1981). We do not deny the role of coercive and normative powers in the diffusion of innovations but we argue that these powers have been strangely misrepresented to describe the cognitive aspects of neoinstitutional theory, thus replacing mimicry. Because coercive state pressures are seen as

extremely important, particularly in non-profit fields, authors have assumed that organizations adopt practices automatically (Mizruchi & Fein, 1999). Instead, we suggest that state powers are not so rigid and suffer from inertia (Hannan & Freeman, 1984), therefore mimetic and fashion attributes can explain the socially constructed nature of practice diffusion. This conceptualization brings us closer to the true cognitive aspects of organizational change that lie at the heart of neoinstitutional theory. We believe that future research should incorporate measurements of relative state control to avoid attributing the diffusion of practices to some "unspecified institutional" or coercive mechanisms.

Second, our research has implications for management fashion theories. Despite Abrahamson's call (1996:274) there has been limited operationalization of fashion diffusion trajectories. Apart from compliance to normative or coercive pressures, the other dominant perspective among diffusion studies has been efficiency. Diffusion processes are often seen as starting from one of these states only to be followed by the other: either compliance first then technical efficiency, or technical efficiency first then compliance. Here, we show that given a country's norms of rationality, fashion theories are unable to explain the infiltration of fashion setters such as media into public organizations settings. We believe that a more fine-tuned process of measuring the normative environment and its codes of rationality is necessary if we are to understand the fashion market with its suppliers and buyers. This is critical for both public and private organizations that wish to avoid fashions within their fields. How can field- or industry-level norms, associations and standards work to prevent the spread of fashions among an industry's members? How can state policies and regulations contribute to or coordinate this process?

The paper has also important managerial and public policy implications. It shows how public money and efforts can be wasted when "compliance" and "conformity" to government pressures are left as the only driving forces behind public administration and restructuring. After the initial legislation of the 1980's, there were plenty of opportunities for the government to design specific policies for the spinoff industry including the accreditation of Technology Transfer Offices, the formation or endorsement of a spinoff association such as UNICO or other measures towards spinoff regulation. Such timely intervention would have been beneficial not least because alternative routes for the commercialization of university intellectual property existed prior to the spinoff growth and could have been better unitized instead of spinoffs. The existence of alternatives such as these is a major reason why detailed monitoring and accreditation standards must be enforced to secure the avoidance of public organization management fashions.

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Figure 1: Spinoff births and deaths in England and Scotland, 1993-2007

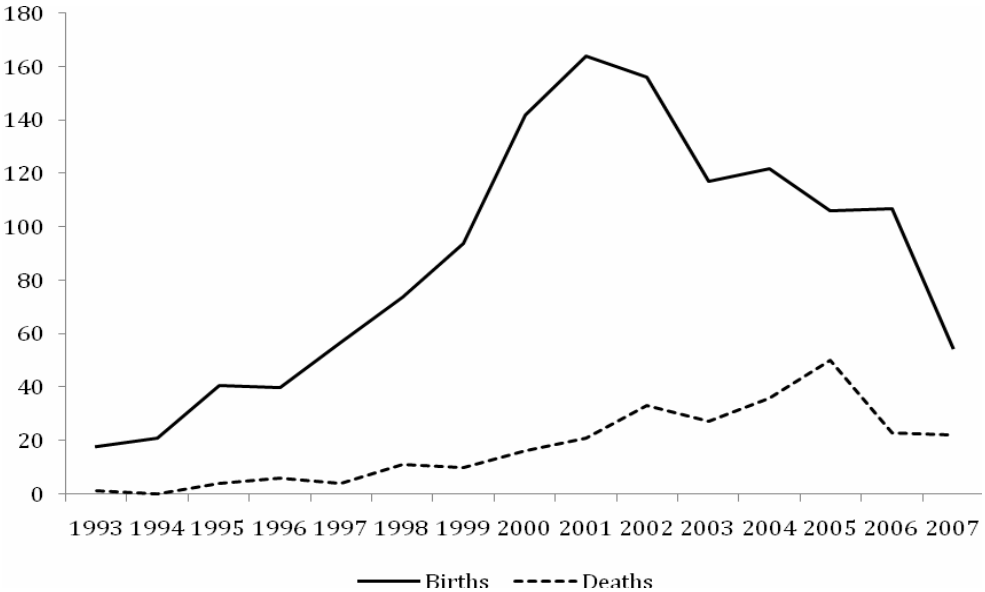

Figure 2: Media coverage of English and Scottish spinoffs, 1993-2007 (*average* on right axis)

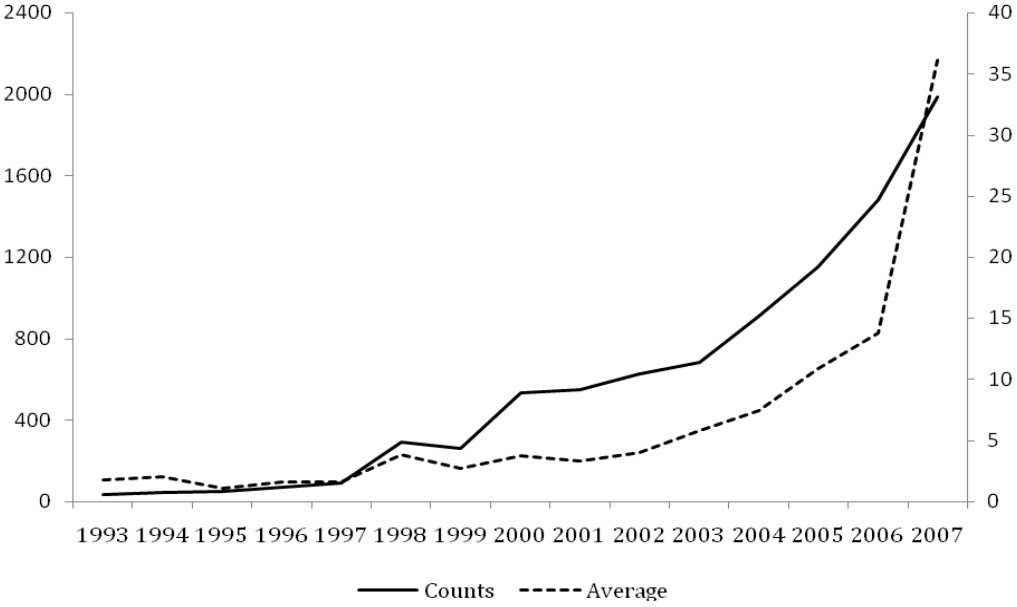

Table 1: Event history analysis on the decision to form spinoffs by year: 1993-2001

Publication output	1.00	(0.00)	1.00	(0.00)	1.00†	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Industry funding	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Endowments	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Reputation	-0.97***	(0.01)	-0.97***	(0.01)	-0.97***	(0.01)	-0.97***	(0.01)	-0.97***	(0.01)	-0.97***	(0.00)
Status	0.98	(0.09)	1.02	(0.09)	1.03	(0.09)	1.00	(0.09)	1.00	(0.09)	1.06	(0.10)
Prior experience	1.51†	(0.35)	1.89**	(0.46)	1.86*	(0.46)	1.74*	(0.42)	1.20	(0.30)	1.87*	(0.51)
TTO age	1.11***	(0.02)	1.08***	(0.02)	1.08**	(0.03)	1.08***	(0.02)	1.10***	(0.02)	1.06**	(0.02)
Age	-0.99	(0.00)	-0.99	(0.00)	-0.99	(0.00)	-0.99	(0.00)	-0.99	(0.00)	-0.99	(0.00)
Size	1.00***	(0.00)	1.00**	(0.00)	1.00*	(0.00)	1.00*	(0.00)	1.00**	(0.00)	1.00	(0.00)
Scotland	2.95**	(1.02)	3.36***	(1.16)	-0.50	(0.24)	2.70**	(0.93)	2.52**	(0.89)	-0.64	(0.32)
Local GDP	1.00**	(0.00)	1.00**	(0.00)	-0.99*	(0.00)	1.00	(0.00)	1.00**	(0.00)	-0.99*	(0.00)
Local R&D	1.00*	(0.00)	1.00*	(0.00)	1.00*	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Membership			**1.18****	**(0.06)**							**1.06**	**(0.05)**
Local diffusion					**1.35*****	**(0.08)**					**1.27*****	**(0.07)**
Media coverage							**1.00*****	**(0.00)**			**1.00****	**(0.00)**
Prior spinoff growth									**1.05****	**(0.02)**	**1.02**	**(0.01)**
X^2	333.75***		344.46***		365.97***		358.93***		343.58***		381.91***	
Log likelihood	-341.06		-336.05		-325.30		-328.82		-336.14		-316.98	
df	12		13		13		13		13		16	

N=835; ***p<0.001, **p<0.01, *p<0.05, †p<0.10

Table 2: Event history analysis on the decision to form spinoffs by year: 2002-2007

Variables	Model 7	s.e.	Model 8	s.e.	Model 9	s.e.	Model 10	s.e.	Model 11	s.e.	Model 12	s.e.
Publication output	1.00	(0.00)	1.00	(0.00)	-0.99	(0.00)	-0.99	(0.00)	1.00	(0.00)	-0.99	(0.00)
Industry funding	1.00	(0.00)	1.00	(0.00)	1.00†	(0.00)	1.00†	(0.00)	1.00	(0.00)	1.00	(0.00)
Endowments	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00†	(0.00)	1.00	(0.00)	1.00	(0.00)
Reputation	-0.98***	(0.00)	-0.98***	(0.00)	-0.97***	(0.00)	-0.97***	(0.00)	-0.98***	(0.00)	-0.97***	(0.00)
Status	3.45*	(1.70)	3.42*	(1.69)	3.96**	(1.99)	3.55*	(1.75)	3.16*	(1.56)	3.43*	(1.73)
Prior experience	1.93*	(0.52)	2.22**	(0.62)	1.84*	(0.52)	1.77*	(0.49)	1.67†	(0.47)	1.83*	(0.54)
TTO age	1.07***	(0.02)	1.05**	(0.02)	1.11***	(0.03)	1.11***	(0.02)	1.07***	(0.02)	1.09***	(0.02)
Age	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)	1.00	(0.00)
Size	1.00*	(0.00)	1.00	(0.00)	1.00*	(0.00)	1.00**	(0.00)	1.00†	(0.00)	1.00*	(0.00)
Scotland	1.00	(0.42)	1.18	(0.49)	-0.14**	(0.09)	1.05	(0.45)	-0.90	(0.37)	-0.59	(0.45)
Local GDP	1.00	(0.00)	-0.99	(0.00)	-0.99***	(0.00)	1.00	(0.00)	-0.99	(0.00)	-0.99	(0.00)
Local R&D	-0.99***	(0.00)	-0.99***	(0.00)	1.00	(0.00)	-0.99***	(0.00)	-0.99***	(0.00)	-0.99	(0.00)
Membership			**1.05***	**(0.03)**							**1.07***	**(0.03)**
Local diffusion					**1.39*****	**(0.12)**					**1.12**	**(0.11)**
Media coverage							**-0.99*****	**(0.00)**			**-0.99*****	**(0.00)**
Prior spinoff growth									**1.04***	**(0.02)**	**1.03**†	**(0.02)**
X^2	331.36***		335.84***		348.27***		350.95***		335.09***		363.78***	
Log likelihood	-261.51		-259.27		-253.05		-251.71		-259.05		-244.71	
df	12		13		13		13		13		16	

N=618; ***p<0.001, **p<0.01, *p<0.05, †p<0.10