



Paper to be presented at the DRUID 2011

on

INNOVATION, STRATEGY, and STRUCTURE -
Organizations, Institutions, Systems and Regions

at

Copenhagen Business School, Denmark, June 15-17, 2011

Reaching Across Institutional Logics: Arbitrage Vs. Contamination

Markus Perkmann

m.perkmann@imperial.ac.uk

Ammon Salter

a.salter@imperial.ac.uk

Valentina Tartari

Business School
v.tartari@imperial.ac.uk

Abstract

While previous research has explored organizations responses to multiple institutional logics, less attention has been paid to how actors hybridize logics. In this paper, we explore what kind of actors within a field are most likely to reach out to alternative logics, and what consequence this hybridization has for their standing in their field. We present a framework predicting hybridization behavior by individuals who represent an important locus of agency within institutional processes. Via testable hypotheses, we postulate that hybridization is pursued by individuals with high status within their field as well as individuals with high status in their organizations. However, we argue that their approach to hybridization differs. Actors with high field-wide status pursue ?arbitrage? in the sense that they exploit

hybridization to reinforce their original logic. By contrast, actors who merely control organizational resources become 'contaminated', in the sense that they embrace the ends associated with an alternative logic. We test this framework by using unique multiple-source data on UK academic scientists' engagement with industry. We discuss implications for the debate on multiple logics, practice variation, and the micro-foundations of institutional theory.

**REACHING ACROSS INSTITUTIONAL LOGICS:
ARBITRAGE VS. CONTAMINATION**

INTRODUCTION

Institutional logics are symbolic systems that allow actors to order reality and render their experience meaningful (Friedland & Alford, 1991). They are taken-for-granted master principles that structure cognition, guide decision-making and behaviors and provide success criteria in a field (Thornton, 2004; Lounsbury, 2007; Greenwood, Diaz, Li, & Lorente, 2010). Previous research has shown that the transformation of organizational fields is often grounded in a shift from one logic to another (Scott, Ruef, Mendel, & Caronna, 2000; Rao, Monin, & Durand, 2003; Thornton, 2002; Glynn & Lounsbury, 2005; Reay & Hinings, 2005).

More recent work has turned attention to logics combination. In many fields, multiple institutional logics co-exist, generating heterogeneity amongst actors and communities by imbuing them with different worldviews and organizing principles (Dunn & Jones, 2010; Purdy & Gray, 2009). In such institutionally complex environments, organizations respond heterogeneously depending on their exposure to particular logics (Greenwood et al., 2010; D'Aunno, Sutton, & Price, 1991). A related stream of research has started to look inside organizations to investigate how they confront exposure to multiple logics. Diverging logics can generate tensions within organizations as they confer power to different, potentially competing individuals and groups within organizations (Reay & Hinings, 2005; Meyer & Hammerschmid, 2006; Heimer, 1999). Institutional complexity also provides opportunities for actors to build hybrid organizations that mix and match elements from different logics to achieve novel kinds of organizational goals (Battilana & Dorado, 2010; Pache & Santos, 2010). This work has emphasized logics hybridization not just as a mere source of tension and contradiction but also as an opportunity for actors. Institutionally complex conditions may generate benefits for those actors that choose to exert strategic choice (Oliver, 1991; Pache & Santos, 2010). The potentially high value of hybridization is demonstrated by examples ranging from software firms' engagement with open-source communities, banks' adoption of

microfinance and charitable organizations' and symphony orchestras' use of for-profit practices (Glynn & Lounsbury, 2005; Battilana & Dorado, 2010; Pache & Santos, 2010; O'Mahony & Ferraro, 2007; Powell & Colyvas, 2008).

Once hybridization becomes a matter of relative strategic discretion rather than isomorphic exposure, new questions arise. Who are the actors in a field that are best situated to engage in practices oriented upon an alternative logic? Core actors are likely to be more highly wedded to a logic prevailing in a field (Greenwood & Suddaby, 2006) but they may also possess the legitimacy and power required to go against mainstream practices. Furthermore, as Greenwood et al (2010: 536) ask, do 'logics reinforce or contradict each other'? Can actors instrumentally mix and match logics without compromising their attachment to specific logics, or does this involve compromise and contamination? While extant conceptual work has made important inroads into multilogics engagement by actors (Pache & Santos, 2010; Kraatz & Block, 2008), we lack empirical studies addressing these questions.

In this paper, we address this gap by investigating how individuals embedded within a field engage with alternative logics. Previous work has suggested that individuals represent an important locus of agency within institutional processes such as institutional entrepreneurship (Maguire, Hardy, & Lawrence, 2004), institutional work (Lawrence & Suddaby, 2006) and divergent organizational change (Battilana, forthcoming). As institutional logics are imprinted in and carried by individuals (Powell & Colyvas, 2008: 277), organizational responses to institutional logics are likely to emerge through a gradual process driven by individuals, rather than discretionary decisions by top management. Individuals therefore represent an ideal site for studying dynamics of logics hybridization.

To explore hybridization, we investigate academics scientists' engagement with industry using a unique dataset on a large sample of UK academic researchers from the

physical and engineering sciences. While academic scientists work in a professional system oriented upon an *academic* logic, for-profit firms tend to adhere to a *commercial* logic. Our findings are twofold. First, hybridization, i.e. engagement with industry, is pursued by two types of individuals: those who occupy high status positions within the field of science, and those who occupy high- status positions within their organizations. Somewhat surprisingly, this means engagement with alternative logics is driven by core actors rather than peripheral players. Second, we distinguish between two different hybridization modes. Actors who have high field-wide status exercise ‘arbitrage’, meaning they engage with alternative logics without compromising their own logic. We use the term ‘arbitrage’ to denote a strategy that allows actors to exploit differences which in this case applies to differences between logics. By contrast, actors who are central in their organizations, experience ‘contamination’ as engagement with alternative logics leads them to compromise their original logic and acquiesce to the alternative logic.

Our study contributes to four streams of work. First, we add to the literature on multiple institutional logics where recent work has explored organizations’ responses to complex institutional influences (Greenwood et al., 2010: 536; Kraatz & Block, 2008; Pache & Santos, 2010; Battilana & Dorado, 2010). We explore the relationship between actors’ social position and their involvement with alternative logics and identify the nuanced way in which hybridization occurs.

Second, we contribute to the literature on practice variation (Lounsbury, 2001; Lounsbury, 2007; Ansari, Fiss, & Zajac, 2010). This literature has suggested that when adopting certain practices, organizations vary with respect to the degree to which they decouple from original practice (Zajac & Westphal, 2004). Hybridization is a process whereby actors adopt practices that stem from domains with different institutional logics. Our two hybridization modes, then, represent different degrees to which decoupling occurs. Via

arbitrage, actors adopt elements from an alternative logics without however compromising on their own logic, indicating decoupling. By contrast, contamination means that actors more genuinely adopt the ends and means associated with other logics.

Third, we respond to the call to pay more attention to the micro-foundations of institutional theory (DiMaggio & Powell, 1991; Barley & Tolbert, 1997; Powell & Colyvas, 2008; Thornton & Ocasio, 2008). Most previous work has focused mainly on the macro-processes associated with institutionalization. Recent work on institutional entrepreneurship has emphasized the role of individuals in institutional processes including institutional change (Fligstein, 1997; Maguire et al., 2004) and divergent organizational change (Battilana, forthcoming). Complementing these efforts, our work investigates individuals' behavior and offers insights into the conditions that enable them overcome legitimacy challenges specific to their organizational context.

Fourth, we contribute to the multi-disciplinary literature on university-industry relations (Louis, Blumenthal, Gluck, & Stoto, 1989; Stuart & Ding, 2006; Bercovitz & Feldman, 2008; Huang & Murray, 2009) by using a broad measure of industry involvement whereas past research has tended to focus on single aspects of academic entrepreneurship. We also cover a broader segment of the population of academic researchers compared to many previous studies that have focused on segments such as biotechnology or the medical disciplines.

The paper is structured as follows. We first generate a theoretical framework explaining academics' industry involvement by proposing detailed hypotheses. After providing details on our data and methodology, we present results and conclude with a discussion of the implications of our research for theory and practice.

THEORY BACKGROUND

Social position and institutional processes

Organizational fields are stratified social arenas where central actors interact with more peripheral actors (DiMaggio & Powell, 1983; Battilana, 2006). Central actors enjoy high status which can be defined as the ‘amount of honor or esteem accorded to a person’ or organization (Phillips & Zuckerman, 2001). Differences between core and periphery play an important role in institutional processes. Central actors are dominant within a social structure and will seek to preserve institutional logics that favor their interests (Shils, 1975; Meyer & Scott, 1983). As a consequence, their values, norms and taken-for-granted cultural categories become closely aligned with the prevailing logic, rendering them more resistant to change. For instance, institutional change often originates at the fringes of a field as peripheral actors tend to be less attached to the prevailing logic of a field, and can more easily draw on alternative influences to enact change (Leblebici, Salancik, Copay, & King, 1991). Similarly, institutionally divergent organizational change is often initiated by peripheral actors (Battilana, forthcoming). By analogy, one may similarly view logics hybridization as a fringe phenomenon. Marginal actors are less vested in the taken-for-granted routines of a field, and hence face less cognitive-cultural resistance when adopting a different logic (Tushman & Anderson, 1986). Furthermore, fringe players actors may span the interstices across fields, and hence be more effective in bridging different logics (Maguire et al., 2004; Castel & Friedberg, 2010).

However, as Greenwood and Suddaby’s (2006) research on institutional entrepreneurship has shown, central actors can escape their institutional embeddedness if they become aware of alternative courses of action, open up to embrace them and become motivated to adopt them. In this paper, we argue that a similar line of argument applies to hybridization. The intuition underpinning our argument is actors reach out to alternative

logics from a position of strength, rather than being forced to do so by a position of marginality. Central actors dominate resource flows within a field and are therefore likely to command pragmatic legitimacy, given that it may be in other actors' self interest to perceive the central actors's activities as desirable and proper (Suchman, 1995). They may also be seen as morally legitimate as others judge their actions as the 'right thing to do' (Suchman, 1995). For these reasons, central actors may continue to be seen as legitimate even though they deviate in their actions from the institutional logic prevailing in their field, provided they are aware of alternative logics and it suits their interests to do so.

To add nuance to our understanding of hybridization, we distinguish between actors who are central in their field and actors who are central in their organizations (Kraatz & Moore, 2002; Battilana, forthcoming). While actors enjoying high status within the field may have the legitimacy and power to engage with alternative logics, they are likely to do so particularly if no great damage is done to their commitment to the original logic of the field in which they are central. For these actors, reaching across logics may therefore remain subordinated to the logic of their own field. By contrast, actors merely occupying central organizational positions also have the power to engage with different logics but in addition they may experience greater freedom even to the degree that their own home logic becomes compromised. In other words, they are more likely to be 'contaminated' by another logic.

Logics hybridization in science

The prime organizational objectives of most universities are to educate students and to conduct research (Etzkowitz, Webster, Gebhardt, & Terra, 2000). These goals are reflected in the universities' incoming resource flows which tend to be dominated by student-related fees or transfers, and research income (Geuna, 2001). In terms of institutional logic, university researchers are predominantly oriented towards the system of science (Merton, 1973). The distinctive *academic* logic underpinning the scientific system has been extensively analyzed

by authors such as Merton (1973) and Polanyi (2000 [1962]). Science, mostly publicly funded, represents a social system in which investigators aim to develop novel scientific and technological insights which are then openly shared. Merton (1973) characterized the norms underlying science as universalism, communalism, disinterestedness and organized skepticism.

Even though this idealized image may not always hold in reality, academic science is nevertheless ruled by specific norms and conventions that are distinct from the *commercial* logic governing knowledge production within for-profit firms. For instance, academic researchers achieve reputation, and hence social status, by pre-empting others in publishing novel insights (Dasgupta & David, 1994). Publishing determines the distribution of resources and the fate of both individual careers and universities' organizational performance in a way that is distinct from the norms for distributing rewards prevailing in the commercial sector. Within firms, the exploitation of knowledge for new technology and products is rewarded rather than the originality of new knowledge (Murray & O'Mahony, 2007). Academic scientists voluntarily forego financial rewards and accept lower wages, in return for professional autonomy and the symbolic rewards available in public science (Stern, 2004). Furthermore, whilst in academia participants seek to disseminate their findings as widely as possible (Dasgupta & David, 1994), commercial firms typically seek secrecy or other types of intellectual property protection in their attempt to appropriate the benefits from original knowledge (Cohen, Nelson, & Walsh, 2000). In table 1, we summarize the main characteristics that distinguish academic and commercial logics, respectively.

Insert Table 1 about here

In light of these differences, one might expect academic researchers to experience certain challenges when interacting with their counterparts in the commercial sector (Ambos, Mäkelä, Birkinshaw, & D'Este, 2008). These challenges have received much attention in a contemporary context where governments seek to induce universities to engage in commercialization and technology transfer (Owen-Smith & Powell, 2001b).

The above context makes university-industry relations a suitable setting for the present study. For academics, interacting with industry means, if not actively endorsing, at least acquiescing to the commercial principles and norms practiced within firms. Such activity is likely to face a key obstacle: lack of legitimacy. Working with actors guided by a different logic means that academics have to stretch the boundaries of what is considered legitimate and appropriate both within their university and within academic science more generally speaking. For instance, engaging with industry may lead academics to violate taken-for-granted routines such as the mandate of open disclosure, or for rewards to be distributed on the basis of academic outputs rather than commercial success or personal financial gain. These taken-for-granted routines are reflected in academics' distinct identities that may be challenged during engagement with the commercial realm (Jain & George, 2007). Previous research has shown that legitimacy pressures can lead some academics to engage commercially in a symbolical rather than substantive way, pretending to support engagement while personally viewing such engagement as cumbersome and of low value to their scientific agenda (Bercovitz & Feldman, 2008). Given that reaching across institutional logics may be hampered by the above legitimacy challenges, the question is what enables academics to break free from these legitimacy constraints and embrace different logics.

HYPOTHESES

A first factor that may shape individuals' propensity to engage with industry is their status within the field. Status confers a source of power to the status holder (Weber, 1968).

Status tends to be claimed and assigned relative to social groups or wider social groupings, implying the presence of status stratification. Having high social status means that individuals enjoy attention and high regard from others. Their actions and instructions are likely to be seen as more legitimate in their social environment than those by low-status individuals. This is partly due to the self-fulfilling process through which other individuals choose to pay high regard to high-status individuals in the expectation that this will in turn provide advantages to them. In this way, high status may translate into increased resource flows towards individuals if they choose to exert the power inherent in their position (Podolny, 1993).

Because status confers power and enable the acquisition of resources, it represents a type of capital (Bourdieu, 1986). Specifically, status in the science system represents cultural capital which is rooted in the educational system and of which star scientist status represents an extreme form. Because different types of capital can be converted into each other (Bourdieu, 1986), high status as a scientist does not only generate benefits within a confined professional community but may also be recognized in other fields. For instance, the annual Nobel Prize awards are covered by the mainstream media. Nobel Prize winners' cultural capital is recognized beyond their professional communities, enabling them to attract resources on the basis of the same process of self-fulfilling reinforcement in place within their narrow social contexts. This means that compared to lower-status colleagues high status scientists may find it easier to interact with organizations that operate on the basis of different logics, such as for-profit firms. Because the scientists' status reverberates beyond their immediate professional context, firms are likely to find it more attractive to work with high status researchers, which in turn may result in increased resource flow towards these researchers.

Apart from increased resource flow, and possibly as a result of it, high status individuals are also less constrained by prevailing norms and conventions. Research on the

relationship between status and conformity has long suggested that middle-status individuals tend to be more conformist than individuals with both high and low status (Blau, 1960; Dittes & Kelley, 1956). This effect is rooted in social-psychological mechanisms that revolve around group identification and security (Phillips & Zuckerman, 2001). In particular, high-status individuals identify highly with their group which is usually a source of conformity with the group's norms and values. Simultaneously, high status individuals are – precisely because they are conferred honor and esteem by other group participants – so secure in their sense of belonging to the group that they can 'afford' to deviate from the prevailing norms (Phillips & Zuckerman, 2001).

It is well documented that a small group of highly successful, high status researchers play a disproportionate role within scientific communities (Zucker & Darby, 1996). These 'star scientists' are highly talented and highly motivated individuals and it is therefore likely that their success is to a large extent determined by individual characteristics. However, through self-reinforcing 'Matthew effects' they also gain high status within their epistemic communities (Merton, 1968). Their status provides them with higher visibility which in turn augments their ability to acquire resources (Merton, 1968; Allison & Stewart, 1974), gaining in social significance within their profession (Abbott, 1981). The above insights on the relationship between status and conformity therefore apply to the behavior of star scientists within their academic communities, and specifically their engagement with industry. Engaging with commercial entities will involve some role and identity conflicts that academics will likely resolve by resorting to their professionally central, academic norms and values (Jain, George, & Maltarich, 2009; Bercovitz & Feldman, 2008; Festinger, 1954). High-status individuals, however, can draw on their heightened sense of security in breaking out from the academic logics and embrace commercial norms and values.

H1. The higher individuals' status within the academic field, the more likely they are to engage with industry.

A second factor likely to influence individuals' propensity to engage with industry is their organizational status. Their position within organizations is likely to influence individuals' propensity to engage with an alternative logics in two ways which we discuss in turn.

First, organizational status will impact on the conformance pressure individuals face within their professional context. Professional communities are characterized by strong normative systems that specify professional objectives and appropriate behaviors (Leicht & Fennell, 2008; Abbott, 1988). Rewards are distributed on the basis of compliance with the prevailing principles and specified criteria of quality and performance. Members of the profession will therefore seek to comply with the accepted behavioral norms in order to reap rewards, such as professional progression. This pressure will be especially pronounced for the junior professionals who seek to establish themselves in the status system prevailing in the community. Within professional systems, the senior members are almost always themselves professionals and have undergone the same process of training and socialization as they expect their junior colleagues to complete. In this situation, junior members in particular are likely to comply with the norms prevailing in the profession. Social-psychological research suggests, for instance, that for gang leaders, the boundaries of acceptable behavior are wider than for lower status gang members (Sherif & Sherif, 1964). Peripheral or lower-status members of groups are under considerably more pressure to conform to prevailing ideologies and norms compared to established members (Levine & Moreland, 1990). More senior members, by contrast, enjoy more discretion in choosing to conform to prevailing norms (Menzel, 1960).

A second influence of seniority relates to the nature of professional bureaucracies (Hind, Dornbusch, & Scott, 1974). In this context, relatively autonomous professionals carry out their work within large-scale, bureaucratic organizations (Litwak, 1961). In professional bureaucracies, when professionals become more senior they assume more managerial tasks while their engagement in the technical core tasks of the profession diminishes.

Organizational members' bureaucratic orientation increases with seniority while their professional orientation decreases (Sorensen & Sorensen, 1974). As professionals become preoccupied with general organizational strategies, they are likely to be more exposed to various other organizations within their own as well as other organizational fields. Facing resource dependence, organizations will attempt to reduce this dependence by diversifying their resource bases. Universities, for instance, may attempt to reduce their dependence on government by addressing firms as potential partners or appealing to donors. This means that organizations' more senior members of staff will develop skills and experience that enable them to deal with institutional diversity more successfully compared to their junior colleagues who are preoccupied with building their professional career and hence experience less exposure to other organizational contexts. We postulate:

H2. The higher the status of individuals within their organizations, the more likely they are to engage with industry.

Above we argued that cross-field engagement is likely to be driven by core actors, including those enjoying high field-wide status and those occupying senior positions within field organizations. We now turn to theorizing the factors that moderate these actors' engagement with another logic.

We first consider the rationales informing engagement with a different logic. Given the potential complications actors face when reaching across logics, it is pertinent to ask what

benefit they may draw from such diversion. Specifically, we propose to focus on the distinction between means and ends (Simon, 1957; March & Simon, 1958).

For actors, a key difference lies in whether the engagement with another field constitutes a means for reaching ends within one's own field, or whether it represents an end for itself, i.e. its acceptance as intrinsically valuable and worthwhile. When actors choose certain actions to achieve desirable ends, these actions constitute tools that they may choose in a relatively opportunistic, instrumental manner. By contrast, when actions are taken because they constitute ends in themselves within a given field environment, actors have less discretion over their course of action. Within organizational fields, actors tend to be oriented upon certain taken-for-granted practices and associated logics that constitute the cornerstone of organizational action (Scott, 2008). Because the practices are taken-for-granted, they may become decoupled from the technical rationales that may have previously underpinned them, and they are pursued as legitimate goals in themselves (Rowan, 1982).

However, means – as opposed to ends – are likely to be less amenable to institutional pressure. Organizational actors are likely to have more discretion over the various means by which they are seen to be pursuing the core goals prevailing within an organizational field. Under certain circumstances, actors are able to use the power of institutionalized practices to promote their own goals by imaginatively deploying institutional available resources and adapting definitions and standards (Meyer & Rowan, 1977; DiMaggio, 1988). Specifically, they may be able to defend the adoption of seemingly 'improper' practices if they are able to argue that they will eventually contribute to the generally shared organizational goals reflecting a certain institutional logic. By presenting one practice as a means to pursue generally shared organizational ends, organizational actors are able to justify the simultaneous use of seemingly contradictory practices via a compromising tactic (Oliver, 1991).

Within the academic environment, the core organizational goals are constituted by the pursuit of scientific inquiry, leading to publication in academic journals, and the ongoing reproduction of the organizational infrastructure underpinning this activity. Engaging with industry may represent a means of achieving these goals, for instance by attracting financial resources for research projects, or accessing data or equipment. Because high status members of the academic field are the ones that are highly committed to the practices and underpinning values of public science, they will be particularly keen to work with industry if this furthers their academic objectives. By contrast, if the rationale for engaging with industry is misaligned with the academic logic, we would expect particularly the high status academics to show less interest in working with industry. This means high status members' propensity to engage within industry is likely to decline to more this engagement is informed by commercial (pecuniary) rationales, i.e. the espousal of the ends prevailing in the alternative logic. We therefore postulate that the positive relationship between academics' field status and industry engagement weakens the more such engagement acquiesces to the commercial ends of the industrial field.

H3. The positive impact of individuals' field status on their engagement with industry is negatively moderated by the extent of their commercial motivation.

In the above scenario, actors reach across logics in order to pursue ends conforming to the logic prevailing within their focal field, and hence without having to compromise. We call this kind of hybridization 'arbitrage' as this strategy allows actors with high status in their field to exploit the institutional differences between their focal field and another field to achieve ends that remain consistent with their focal field. The term 'institutional arbitrage' is commonly used in the international business literature to refer to the practice of arranging activities in different national contexts to benefit from differences in legal and regulatory systems (Kogut, 1983). Our usage of 'arbitrage' here is inspired by its use in international

business but connotes a broader process by which actors exploit differences between institutional logics to their own advantage. In our case, academic scientists exploit alternative logics – working on industry-focused projects – for the purpose of pursuing benefits that are in line with their own focal (academic) logic.

In contrast to arbitrage, we can also imagine actors' engagement with a different field leading to 'contamination' in the sense that they start pursuing ends that are consistent with the non-focal field. One may expect such contamination to be most likely at the fringes of a field and hence pertain to actors who are relatively marginal and have relatively little stake in the field. However, actors need to command a certain amount of resources and enjoy some degree of legitimacy to be able to cross the boundaries of their field while maintaining membership within their own field.

We argue, therefore, that rather actors with high field status, it will be the actors with high organizational status who will be most likely subject to contamination. Above, we have already argued that we expect engagement with alternative logics to be positively related to actor's organizational status. We now provide arguments for why their engagement – in contrast to their colleagues with high field status – is more likely to result in contamination rather than arbitrage.

We proceed in two steps. First, we consider how individuals' organizational status interacts with the status of the organization with which they are affiliated. Organizational fields are stratified, with a core of high status organizations shaping norms and practices and controlling a large share of field resources (Podolny, 1993). Central organizations also provide important reference points for other actors, and their practices and policies are emulated throughout the field (DiMaggio & Powell, 1983). By playing these roles within the field, central organizations become highly invested in a field's values and norms. In other words, these organizations are highly embedded within the field which renders them less able

and willing to deviate from the prevailing logic and its associated practices (Greenwood & Suddaby, 2006).

The guardians of such attachment to a logic within these organizations will be those individuals who hold important decision-making powers. Individuals with powerful positions in an organization are likely to be highly personally invested with its general strategy and direction (Pfeffer & Salancik, 1978). For instance, as senior managers work together over time they develop certain stable beliefs regarding the basic elements of an organization's strategy and its environment (Prahalad & Bettis, 1986). Simultaneously, they will also be constrained in their ongoing decision-making by the relative inertia of the organizational context they are embedded in (Tripsas & Gavetti, 2000). Applied to the academic field, senior members of high status universities are likely to show a higher degree of attachment to the academic logic compared to their colleagues at universities with lower status.

If it is correct that actors with high organizational status engage with different logics in contamination mode, rather for arbitrage, then for the above reasons individuals at higher status organizations will find experience more barriers to such engagement. Therefore, the higher the status of their university in the academic field, the less the individuals with high status in these universities will be inclined to work with industrial partners:

H4. The positive impact of individuals' organizational status on their engagement with industry is negatively moderated by their organization's field-wide status.

Figure 1 illustrates our hypothesized framework.

Insert Figure 1 about here

DATA AND METHODOLOGY

Data

To test our hypotheses, we employ a unique dataset covering a large population of academic researchers in the United Kingdom. The dataset includes data from five sources to alleviate common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

First, we accessed the records of a large UK government research funding body. The selected population is composed of principal investigators and co-investigators who received grants from the Engineering and Physical Sciences Research Council (EPSRC), in the period 1992-2006. The EPSRC is the largest UK research funding body and distributed over £790m in 2009 for research across all fields of engineering, mathematics, chemistry, and physics. The overarching majority of UK academics in these fields will have at some point received grants from the EPSRC. Funding decisions are based on peer review, and the EPSRC encourages partnerships between researchers and third parties but there is no formal requirement to have an industrial partner in order to obtain a grant.

Second, we conducted an Internet-based survey amongst the 6200 active academics present in the EPSRC records. The questionnaire built on and extended previous surveys of academics: in particular, we employ questionnaire items based on surveys conducted by D'Este and Patel (2007) and the US Research Value Mapping Program (Bozeman & Gaughan, 2007). The questionnaire covered various aspects of researchers' collaboration with industry, including individual's attitudes towards engagement and entrepreneurship. After testing the questionnaire with a pilot population, we administered it between April and September 2009, supported by a cover letter signed by the EPSRC Chief Executive Officer. An email containing a personalized link to the survey was sent few days later, followed by two emails and a telephone reminder to non-respondents. We obtained a total of 2,194 completed questionnaires, corresponding to a response rate of 36%.

Third, to capture details on respondents' lifetime scientific productivity, we collected rich bibliographic information from ISI Web of Science, including the number of individuals' journal articles, number of citations, names of the journals and their associated disciplines.

Fourth, we matched details on the respondents with the population of academics included in the Research Assessment Exercise (RAE) conducted in 2008 (HEFCE, 2009). The RAE is a government-mandated program to assess the quality of research of all universities and colleges and it is used as the basis for determining the allocation of research funding to universities that is not allocated via competitive bidding. RAE submissions contain rich information about departments, including their size, and the amount and nature of funding they received in each of the previous seven years.

Finally, we matched the universities included in our sample with data derived from the government's Higher Education-Business and Community Interaction Survey (HE-BCI) conducted in 2008 and covering the years 2005-2007 (HEFCE, 2008). This annual survey collects financial and output data at university level on a range of knowledge-exchange activities, such as commercialization of new knowledge, delivery of professional training and community-oriented activities, among others. After having matched all our datasets, we were left with 1525 usable individual records.

Dependent variable

To test our hypotheses, we used a dependent variable which captures academics' overall industry engagement behavior. We built an individual industrial engagement index by adapting an index developed by Bozeman and Gaughan (2007). For each academic, the index weights different types of engagement according to their difficulty or rarity. Rare types of engagement are given a larger weight than more frequent ones to ensure that justice is done to activities that are more difficult to accomplish.

The index is constructed as follows. The survey data contains information on the types and frequencies of different types of industry engagement (see Table 2).

 Insert Tables 2 and 3 about here

For every type of industry engagement, we established whether a researcher had collaborated or not ('occurrence', denoted by b_j); see Table 3 for how we coded response items. We then computed the frequency of occurrence of each engagement type for the whole population:

$$f_j = \frac{\sum_{n=1}^N b_j^n}{N} \quad (1)$$

f_j represents this frequency, where j is the type of industry engagement, n is the individual and N is the total sample. We then constructed the index by multiplying the actual number of interactions declared by each academic for each channel (T_j) and the frequency of its non-occurrence ($1 - f_j$) and summing all the scores together.

$$III^n = \sum_{j=1}^8 T_j^n \cdot (1 - f_j) \quad (2)$$

To ensure construct validity, we performed some additional analyses using a different dependent variable, representing the number of start-up companies in which individual researchers were involved as an entrepreneur (*start-ups*). To be involved in a start-up company indicates an extreme form of industry engagement as this is a far more openly commercial activity than, say, a collaborative project with an industrial partner. In other words, being an academic entrepreneur means to fully embrace the logic of the commercial world, hence facing relatively strong potential clash with the logic prevailing in the academic world.

Independent variables

Our independent variables express the position of the researchers in both their scientific field and their organization. To capture their status in the scientific field, we use the number of publications, standardized by the average of the discipline (*publications*). In the academic world, publications are the primary professional currency for individuals to gain status. As we are trying to capture scientific prominence, we use the number of publications over the whole lifespan of researchers. Because both the number of publications and scientific status depend on the age of the researcher in question, we use the total number of publications and control for academic age, rather than using the average number of publication per year. As an indication of the researchers' organizational statuses, we use a dummy variable (*professor*) taking the value of 1 if the individual was a full professor.

To test H3, we use a question on researchers' motivations to interact with industry. In particular, we exploit an item in the questionnaire which asked to rate the importance of receiving additional personal income as a reason for collaborating with private companies over a 5-point Likert scale, ranging from "not at all important" to "crucial". The academics' commercial motivation (*money*) is captured by a dummy variable which takes value of 1 if the researcher answered 'very important' or 'crucial'. To explore the moderation effect of H4, we deploy a university status measure for the universities to which individuals are affiliated. This measure of quality is the overall score given by the Times Higher Education rankings and based on the evaluation from the RAE 2008 (*university research quality*).

Control variables

We included a range of control variables to account for the individual, department and university level effects on individual's engagement efforts. These measures build on past research on academic's industry engagement efforts. The first group of control variables relates to individual characteristics. We included researchers' demographic characteristics

such as *gender* and *academic age* whereby the latter is defined as their age minus their age when being awarded their PhD (Link, Siegel, & Bozeman, 2007). We control for training and socialization effects (Bercovitz & Feldman, 2008) by including the number of years of work experience in the private sector (*industry experience*). We use dummy variables identifying holders of doctoral degrees from a British institution (*British PhD*) and from a highly ranked institution (*elite PhD*) in the Times Higher Education Supplement (2004) list of worldwide top universities. We control for the type of scientific discipline of the researcher by introducing a dummy variable (*basic discipline*) identifying researchers in the ‘basic’ fields of mathematics, chemistry or physics.

The second group of variables refers to the characteristics of the organizational environment in which the researchers operate. For the departments to which individuals were affiliated, we included the total income per Full Time Equivalent (FTE) staff received between 2005-2007 (*department funds*) and the *department research quality*, measured as the percentage of staff rated ‘internationally leading’ and ‘international excellent’ (RAE2008 data). On the university-level, we control for the income received from industry per employee in the period 2005-2007 (*university industry funds*).

Estimation

To test our hypotheses, we used an ordinary least squares (OLS) model. To satisfy the basic assumption of normality of distribution of the dependent variable, we employ the natural logarithm of the individual industrial involvement index. OLS also require standard errors to be independently and identically distributed. If errors are clustered, resulting estimates are unbiased but standard errors may be wrong, leading to incorrect inferences. As in our sample respondents are affiliated with different disciplines, we can expect some group correlation that we are not able to observe. We therefore clustered errors by scientific

discipline. To address the possible problem of heteroskedasticity, we use robust standard errors.

We performed an additional analysis, using the start-up activities of academics as dependent variable. We required a model which takes into account that the dependent variable is a count variable (number of start-up companies) and frequently takes the value of zero (academic entrepreneurship is a rare event). We therefore employ a zero-inflated negative binomial model. This specification is preferable to a zero-inflated Poisson regression because the data are overdispersed (the variance of the dependent variable is greater than its mean). The zero-inflated negative binomial regression specifies several steps. First, a logit model is generated predicting whether or not a researcher would start a commercial venture. Subsequently, a negative binomial model is generated predicting the counts for those academics who are entrepreneurs. Finally, the two models are combined. A Vuong test provided evidence for the appropriateness of the model.

RESULTS

Table 4 presents the descriptive statistics and correlations for all the variables employed. Correlations are generally low to moderate; therefore multicollinearity is not a problem for the estimation. The appropriateness of using weights for the industrial engagement index can be gauged from the pattern of academics’ engagement across different disciplines. As shown in Table 2, some activities are far more common than others. For example, nearly 83% of respondents attended conferences in which industrial participants are present while just the 17% were involved in the creation of physical facilities, such as laboratories, with industrial partners. Moreover, a small share (around 8%) of our sample did not participate in any type industry engagement.

Insert Table 4 about here

In Table 5 we present the results of our econometric analysis. Model (1) provides a baseline model with the individual industrial engagement index as the dependent variable regressed against the controls. Work experience in the private sector has a positive and statistically significant effect on the level of engagement with industry, in line with previous research (Audretsch, 1998). Moreover, faculty trained in the United Kingdom is significantly more likely to engage with industry than those trained in other countries, while holding a PhD degree from a top institution has the opposite effect. Being affiliated with a basic discipline has no effect on engagement. None of the variables at the department and the university levels have a strong significant effect: the amount of department or university funds coming from industry is significantly correlated with individual engagement but the effect is very close to zero. Faculty members from departments and universities with high levels of commercial activities are themselves more likely to collaborate with industry: this can be an effect of both wider opportunities for collaboration and a more supportive institutional culture.

Model (2) builds on the base specification by adding the variables capturing the position of the researchers both in the field and in their organizations. The explanatory power of the model increases by adding the independent variable indicating individuals' professor status, with R-squared increasing from 0.14 to 0.17. All the control variables maintain the same effect as in the baseline, except *academic age* which becomes significant and negative. As observed by Bercovitz and Feldman (2008), the earlier researchers have completed their training, the less likely they will be to engage in commercialization. This cohort effect indicates that individuals socialized in a period in which universities' engagement with industry was less relevant or even discouraged are consequently less likely to do so.

Both *publications* and *professor* have a significant and positive effect on individual engagement with industry, thus supporting H1 and H2. This means, the more status an individual has within the field, based on the adjusted number of publications, the more likely

they are to engage with the industrial logic. Similarly, the more status an individual has within their organization, the more likely they are to engage with the industrial logic.

In Model (3), we add the two moderator effects. First, we find that the interaction term between field status (*publications*) and commercial motivation (*money*) is negative and significant, supporting H3. This means the positive effect of individuals' field-wide status on engaging with the industrial logic is reduced if such engagement leads to contamination, i.e. if it is pursued for reasons that are in line with the industrial logic (i.e. pecuniary gain). In other words, the higher individuals' status within the field, the less there are inclined to work with industry for pecuniary gain. Second, the interaction term between *professor* and *university research quality* is negative and significant. This suggests that the positive effect of individuals' organizational status on engaging with the industrial logic is reduced when researchers are affiliated with high-status universities, confirming H4.

To improve construct validity, we performed an additional analysis, investigating the effect of the same independent variables on the number of start-ups created by the researchers. Academic entrepreneurship is the most extreme form of engagement with industry, and we therefore expect it to be more likely to lead to contamination, compared to mere collaboration activities. We found that in this estimation, the variable *publications*, indicating field status, was no longer significant while *professor*, indicating organizational status, remained significant and positive. This suggests that this extreme form of hybridization is pursued by individuals with high organizational status while it does not appear to be positively associated with high field status and hence of limited value for arbitrage.

Insert Table 5 about here

DISCUSSION

The theory and supportive findings presented in this paper suggest that hybridization, i.e. engagement with alternative logics, is primarily the domain of actors occupying high status social positions. We found that the higher the status of academic scientists, as measured by their academic achievements, the more likely they are to work with industrial organizations. These core actors command high levels of visibility and credibility, providing signals to actors in other domain and singling themselves out as potential interaction partners. As high-status actors, they are also prepared to be less conformist compared to lower status actors and hence find it easier to go against field-specific norms and conventions. Similarly, actors with high organizational status are in a similarly privileged position as they are able to go beyond the narrow constraints of professional norms, and are also more likely to be exposed to alternative logics as they broaden their professional roles into more generic bureaucratic roles.

However, we find nuanced differences in the way field status and organizational status affect hybridization. Actors with high field status who are most invested in a field's focal logic pursue hybridization only if it does not compromise their attachment to the focal logic. In other words, high-status academic scientists work with industry to further their scientific work. We call this strategy 'arbitrage', in the sense that they exploit institutional differences between their own and alternate field to pursue goals aligned with logic prevailing in their focal field. By contrast, actors with high organizational status are more likely to pursue hybridization as 'contamination', implying that they more genuinely adopt means and ends from another field.

We contribute to several literatures. First, we extend prior research on institutional complexity by exploring what determines engagement with alternative logics. Extant contributions have shown that organizations' actions are systematically influenced by their

exposure to multiple logics (Greenwood et al., 2010). Related research has addressed the question how organizational actors recombine multiple logics to create hybrid organizations (Battilana & Dorado, 2010; Kraatz & Block, 2008). However, extant research has paid less emphasis on how organizations process institutional complexity and engage in logics hybridization. Calling for research on how via organizational leadership actors creatively use institutional prescriptions drawn from multiple institutional realms, Greenwood et al (2010: 536) noted that ‘we need to better understand when and how such leadership occurs’.

We respond to this call by exploring how individuals within a field engage in hybridization. Our general finding is that such ‘leadership’ is the domain of central, powerful actors who enjoy high status and control resources, rather than a response to marginality at the fringes of fields and organizations. This suggests that engagement with different logics, rather than representing a passive response to institutional pressures, constitutes a purposeful strategy by actors aimed at accessing alternative action repertoires in order to draw benefits that are not only compatible with the primary logic prevailing in their field but can even further their positions. The adoption of practices informed by alternative logics may often not be driven by institutional processes, in the sense of actors following taken-for-granted prescriptions that appear natural and legitimate. Rather, the patterns found in our study appear to be propelled by mechanisms described by resource dependency theory (Pfeffer & Salancik, 1978). The scientists in our study chose to engage with logics external to their field because this provided them with benefits cementing their position within their own field. Oliver (1991) has previously argued that organizational actors may respond strategically to institutional processes, implying that institutional theory is able to accommodate interest-driven behavior by organizational actors. Our study brings this line of thinking to the study of multiple institutional logics, helping to mitigate the lack of studies on how organizational actors behave in situations of institutional complexity and why alternative logics are chosen.

Second, we contribute to the literature on practice variation (Lounsbury, 2007; Glynn & Lounsbury, 2005; Ansari et al., 2010). This research has explored why and how specific practices are implemented differently in different organizations. Lounsbury (2001) found two different ways in which recycling programmes were implemented at universities: those involving full-time coordinators, and those established through mere role accretion. In the latter case, adoption was more ceremonial and hence decoupled from the core practice. Edelman's study of the adoption of legally mandated practices similarly showed that compliance can range from merely symbolical to more substantial (Edelman, 1992).

Our study adds nuance to this literature by illustrating how actors engage with alternative logics with different degrees of decoupling. In the case of arbitrage, preferred by high status field members, actors adopt elements from an alternative logics without however compromising on their own logic, indicating decoupling. By contrast, organizationally central actors are more likely to be subject to contamination as they more genuinely adopt the ends and means associated with other logics, indicating a lesser degree of decoupling. The decoupling process we observed in the case of arbitrage is, however, not symbolically motivated. Rather, decoupling occurs because actors adopt practices that are conformance with a alternative logic but subsequently deploy them to achieve ends in line with their focal logic.

Third, we extend research on the microfoundations of institutional theory (Powell & Colyvas, 2008). Institutional theory has traditionally focused on how organizations adapt to field-wide conformance pressures. More recently, individual actors have entered the picture as institutional entrepreneurs who purposefully work towards challenging and uprooting entrenched institutional orders (Maguire et al., 2004). Related work has addressed the behavior and strategies of individuals within non-transformatory contexts (Lok, 2010; Battilana, forthcoming). Despite these promising contributions, there is relatively little

research on the relationship between institutional orders and individual behavior in everyday organizational life.

Because institutional theory has largely focused on the field and organization levels, its microfoundations have remained implicit. Scholars have commented that the agency concept underlying institutional theory draws inspiration from theories that emphasize cognitive aspects of human agency, such as Garfinkel's ethnomethodology (DiMaggio & Powell, 1991). Individuals use rules and norms in a reflexive way and employ them flexibly to ensure that their behavior is viewed as reasonable by themselves and others around them (DiMaggio & Powell, 1991). In this way, behavior is not 'scripted' but actors use available scripts skillfully in order to achieve specific purposes. Rules do not merely prescribe behavior but provide possible repertoires for action (Swidler, 1986).

Our study contributes to this work by establishing a link with the literature on institutional logics. Logics are meta-rules in the sense that they provide second-order principles that inform a multitude of possible behaviors within a domain. Our findings suggest that powerful, high-status actors in particular have higher degrees of discretion when using alternative logics as repertoires for action. Individuals who enjoy positions of high status and control organizational resources are able to justify 'unorthodox' behavior, particularly if this can be presented as a means to achieve ends in line with the primary logic prevailing in a field.

Finally, apart from our organizational theory contributions, we also advance the literature on university-industry relations and academic entrepreneurship (Louis et al., 1989; Bercovitz & Feldman, 2008). Our data cover a range of industry engagement behaviors that is considerably broader compared to studies that focus on more specific behaviors, such as patenting or engagement in spin-off companies. Using our industry involvement index, we capture collaboration behaviors that are far more common than the types of behaviors explored in other studies. For example, patents and licensing represent only a small amount of the

information transferred out from a university (Agrawal & Henderson, 2002). We also use data on a broad population of basic and applied researchers across the physical and engineering sciences. Previous studies often focused on the life sciences, or medical sciences, which constitute fields where university-industry relations are widespread and well-established (Owen-Smith, Riccaboni, Pammolli, & Powell, 2002). However, because of the peculiarities of these fields, including high dependence on intellectual property and the existence of strong linkages between university researchers and for-profit firms (Owen-Smith & Powell, 2001a), these relationships may not be representative for the wider population of academics. Therefore, our study provides useful insights into the generalizability of previous research.

CONCLUSION

Engagement with different logics does not just represent a theoretical puzzle but represents a common challenge faced by individuals and organizations. Whether it is banks having to deal with public accountability issues, academic scientists called upon to be relevant, or charitable organizations competing with commercial providers, in all these cases actors face the issue of having to combine their home-grown logic with an alternative logic. In our study, we have attempted to shed light on such hybridization processes. Our findings indicate that hybridization is pursued by high-status and resourceful actors, rather than marginal actors at the fringes of organizational field. Furthermore, the more status actors have in a field, the more they are able to deploy practices underpinned by other logics without having to compromise on their commitment to their original logic. This suggests that these actors draw elements from other logics in order to achieve specific advantages. While institutional theory has traditionally deemphasized the incidence of purposeful, strategic action, our study illustrates how such agency matters even in stable, non-transformatory institutional contexts.

REFERENCES

- Abbott, A. 1981. Status and status strain in the professions. *American Journal of Sociology*, 86(4): 819-835.
- Abbott, A. D. 1988. *The system of professions: An essay on the division of expert labor*. Chicago; London: University of Chicago Press.
- Agrawal, A. & Henderson, R. M. 2002. Putting patents in context: Exploring knowledge transfer from MIT. *Management Science*, 48(1): 44-60.
- Allison, P. D. & Stewart, J. A. 1974. Productivity differences among scientists: Evidence for accumulative advantage. *American Sociological Review*, 39(4): 596-606.
- Ambos, T. C., Mäkelä, K., Birkinshaw, J., & D'Este, P. 2008. When does university research get commercialized? Creating ambidexterity in research institutions. *Journal of Management Studies*, 45(8): 1424-1447.
- Ansari, S. M., Fiss, P. C., & Zajac, E. J. 2010. Made to fit: how practices vary as they diffuse. *Academy of Management Review*, 35(1): 67-92.
- Audretsch, B. 1998. Agglomeration and the location of innovative activity. *Oxford Review of Economic Policy*, 14(2): 18-29.
- Barley, S. R. & Tolbert, P. S. 1997. Institutionalization and structuration: Studying the links between action and institution. *Organization Studies*, 18(1): 93-117.
- Battilana, J. 2006. Agency and institutions: The enabling role of individuals' social position. *Organization*, 13(5): 653-676.
- Battilana, J. & Dorado, S. 2010. Building sustainable hybrid organizations: the case of commercial microfinance organizations. *Academy of Management Journal*.
- Battilana, J. forthcoming. The enabling role of social position in diverging from the institutional status quo: Evidence from the UK National Health Service. *Organization Science*.
- Bercovitz, J. & Feldman, M. 2008. Academic entrepreneurs: Organizational change at the individual level. *Organization Science*, 19(1): 69-89.
- Blau, P. M. 1960. Patterns of deviation in work groups. *Sociometry*, 23(3): 245-261.
- Bourdieu, P. 1986. Forms of capital. In J. G. Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education*: 241-258. New York: Greenwood.
- Bozeman, B. & Gaughan, M. 2007. Impacts of grants and contracts on academic researchers' interactions with industry. *Research Policy*, 36(5): 694-707.
- Castel, P. & Friedberg, E. 2010. Institutional change as an interactive process: The case of the modernization of the French cancer centers. *Organization Science*, 21(2): 311-330.

- Cohen, W. M., Nelson, R. R., & Walsh, J. 2000. Protecting their intellectual assets: appropriability conditions and why US manufacturing firms patent (or not), *NBER Working Paper W7552*. Cambridge, MA: National Bureau of Economic Research.
- D'Aunno, T., Sutton, R. I., & Price, R. H. 1991. Isomorphism and external support in conflicting institutional environments: a study of drug abuse treatment units. *Academy of Management Journal*, 34(3): 636-661.
- D'Este, P. & Patel, P. 2007. University-industry linkages in the UK: What are the factors determining the variety of interactions with industry? *Research Policy*, 36(9): 1295-1313.
- Dasgupta, P. & David, P. A. 1994. Toward a new economics of science. *Research Policy*, 23(5): 487-521.
- DiMaggio, P. J. & Powell, W. W. 1983. The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(April): 147-160.
- DiMaggio, P. J. 1988. Interest and agency in institutional theory. In L. G. Zucker (Ed.), *Institutional patterns and organizations: culture and environment*: 3-22. Cambridge, Mass.: Ballinger.
- DiMaggio, P. J. & Powell, W. W. 1991. Introduction. In W. W. Powell & P. J. DiMaggio (Eds.), *The New Institutionalism in organizational analysis*: 1-39. Chicago: University of Chicago Press.
- Dittes, J. E. & Kelley, H. H. 1956. Effects of different conditions of acceptance upon conformity to group norms. *Journal of Abnormal and Social Psychology*, 53(1): 100-107.
- Dunn, M. B. & Jones, C. 2010. Institutional logics and institutional pluralism: The contestation of care and science logics in medical education, 1967-2005. *Administrative Science Quarterly*, 55(1): 114-149.
- Edelman, L. B. 1992. Legal ambiguity and symbolic structures: Organizational mediation of civil rights law. *American Journal of Sociology*, 97(6): 1531-1576.
- Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. 2000. The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research Policy*, 29(2): 313-330.
- Festinger, L. 1954. A theory of social comparison processes. *Human Relations*, 7(2): 117-140.
- Fligstein, N. 1997. Social skill and institutional theory. *American Behavioral Scientist*, 40(4): 397-405.
- Friedland, R. & Alford, R. R. 1991. Bringing society back in: symbols, practice, and institutional contradictions. In W. W. Powell & P. J. DiMaggio (Eds.), *The New Institutionalism in organizational analysis*: 232-266. Chicago: University of Chicago Press.
- Geuna, A. 2001. The changing rationale for European university research funding: Are there negative unintended consequences? *Journal of Economic Issues*, 35(3): 607-632.

- Glynn, M. A. & Lounsbury, M. 2005. From the critics' corner: Logic blending, discursive change and authenticity in a cultural production system. *Journal of Management Studies*, 42(5): 1031-1055.
- Greenwood, R. & Suddaby, R. 2006. Institutional entrepreneurship in mature fields: The big five accounting firms. *Academy of Management Journal*, 49(1): 27-48.
- Greenwood, R., Diaz, A. M., Li, S. X., & Lorente, J. C. 2010. The multiplicity of institutional logics and the heterogeneity of organizational responses. *Organization Science*, 21(2): 521-539.
- HEFCE. 2008. Higher education-business and community interaction survey 2006-2007, July 2008 ed.: Higher Education Council Funding for England.
- HEFCE. 2009. *Research Assessment Exercise*. Higher Education Funding Council for England. Online Resource: <http://www.rae.ac.uk> (accessed 10/07/2010).
- Heimer, C. A. 1999. Competing institutions: law, medicine, and family in neonatal care. *Law and Society Review*, 33(1): 17-66.
- Hind, R. R., Dornbusch, S. M., & Scott, W. R. 1974. A theory of evaluation applied to a university faculty. *Sociology of Education*, 47(1): 114-128.
- Huang, K. & Murray, F. 2009. Does patent strategy shape the long-run supply of public knowledge? Evidence from human genetics. *Academy of Management Journal*, 52(6): 1193-1221.
- Jain, S. & George, G. 2007. Technology transfer offices as institutional entrepreneurs: the case of Wisconsin Alumni Research Foundation and human embryonic stem cells. *Industrial and Corporate Change*, 16(4): 535-567.
- Jain, S., George, G., & Maltarich, M. 2009. Academics or entrepreneurs? Investigating role identity modification of university scientists involved in commercialization activity. *Research Policy*, 38(6): 922-935.
- Kogut, B. M. 1983. Foreign direct investment as a sequential process. In C. P. Kindleberger & D. B. Audretsch (Eds.), *The multinational corporation in the 1980s*: 242-257. Cambridge: MIT Press.
- Kraatz, M. S. & Moore, J. H. 2002. Executive Migration and Institutional Change. *The Academy of Management Journal*, 45(1): 120-143.
- Kraatz, M. S. & Block, E. S. 2008. Organizational implications of institutional pluralism. In R. Greenwood & C. Oliver & K. Sahlin & R. Suddaby (Eds.), *Handbook of organizational institutionalism*: 243-275. Los Angeles: Sage.
- Lawrence, T. B. & Suddaby, R. 2006. Institutions and institutional work. In S. R. Clegg & C. Hardy & T. B. Lawrence & W. Nord (Eds.), *The SAGE Handbook of Organization Studies*: 215-254. Thousand Oaks: Sage.

- Leblebici, H., Salancik, G. R., Copay, A., & King, T. 1991. Institutional change and the transformation of interorganizational fields: An organizational history of the US radio broadcasting industry. *Administrative Science Quarterly*, 36(3): 333-363.
- Leicht, K. T. & Fennell, M. L. 2008. Institutionalism and the professions. In R. Greenwood & C. Oliver & K. Sahlin & R. Suddaby (Eds.), *Handbook of organizational institutionalism*: 431-448. Los Angeles: Sage.
- Levine, J. M. & Moreland, R. L. 1990. Progress in small group research. *Annual Review of Psychology*, 41(1): 585-634.
- Link, A. N., Siegel, D. S., & Bozeman, B. 2007. An empirical analysis of the propensity of academics to engage in informal university technology transfer. *Industrial and Corporate Change*, 16(4): 641-655.
- Litwak, E. 1961. Models of bureaucracy which permit conflict. *American Journal of Sociology*, 67(2): 177-184.
- Lok, J. 2010. Institutional logics as identity projects. *Academy of Management Journal*, 53(6): 1305 - 1335.
- Louis, K. S., Blumenthal, D., Gluck, M., & Stoto, M. A. 1989. Entrepreneurs in academe: an exploration of behaviors among life scientists. *Administrative Science Quarterly*, 34(1): 110-131.
- Lounsbury, M. 2001. Institutional sources of practice variation: Staffing college and university recycling programs. *Administrative Science Quarterly*, 46(1): 29-56.
- Lounsbury, M. 2007. A tale of two cities: Competing logics and practice variation in the professionalizing of mutual funds. *Academy of Management Journal*, 50(2): 289-307.
- Maguire, S., Hardy, C., & Lawrence, T. B. 2004. Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. *Academy of Management Journal*, 47(5): 657-679.
- March, J. G. & Simon, H. A. 1958. *Organizations*. New York: Wiley.
- Menzel, H. 1960. Innovation, integration, and marginality: a survey of physicians. *American Sociological Review*, 25(5): 704-713.
- Merton, R. K. 1968. The Matthew effect in science. The reward and communication systems of science are considered. *Science*, 159(3810): 56-63.
- Merton, R. K. 1973. *The sociology of science. Theoretical and empirical investigations*. University of Chicago Press: Chicago, London.
- Meyer, J. & Scott, W. R. 1983. *Organizational environments*. Beverly Hills: Sage.
- Meyer, J. W. & Rowan, B. 1977. Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology*, 83(2): 340-363.

- Meyer, R. E. & Hammerschmid, G. 2006. Changing institutional logics and executive identities: A managerial challenge to public administration in Austria. *American Behavioral Scientist*, 49(7): 1000-1014.
- Murray, F. & O'Mahony, S. 2007. Reconceptualizing the institutional foundations of cumulative innovation. *Organization Science*, 18(6): 1006-1021.
- O'Mahony, S. & Ferraro, F. 2007. The emergence of governance in an open source community. *Academy of Management Journal*, 50(5): 1079-1106.
- Oliver, C. 1991. Strategic responses to institutional processes. *Academy of Management Review*, 16(1): 145-179.
- Owen-Smith, J. & Powell, W. W. 2001a. To patent or not: faculty decisions and institutional success at technology transfer. *Journal of Technology Transfer*, 26(1): 99-114.
- Owen-Smith, J. & Powell, W. W. 2001b. Careers and contradictions: faculty responses to the transformation of knowledge and its uses in the life sciences. *Research in the Sociology of Work*, 10: 109-140.
- Owen-Smith, J., Riccaboni, M., Pammolli, F., & Powell, W. W. 2002. A comparison of US and European university-industry relations in the life sciences. *Management Science*, 48(1): 24-43.
- Pache, A.-C. & Santos, F. 2010. When worlds collide: the internal dynamics of organizational responses to conflicting institutional logics. *Academy of Management Review*, 35(3): 455-476.
- Pfeffer, J. & Salancik, G. R. 1978. *The external control of organizations: a resource dependence perspective*. New York: Harper & Row.
- Phillips, D. J. & Zuckerman, E. W. 2001. Middle-status conformity: Theoretical restatement and empirical demonstration in two markets. *American Journal of Sociology*, 107(2): 379-429.
- Podolny, J. M. 1993. A status-based model of market competition. *American Journal of Sociology*, 98(4): 829.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5): 879-903.
- Polanyi, M. 2000 [1962]. The republic of science: its political and economic theory. *Minerva*, 38: 1-32.
- Powell, W. W. & Colyvas, J. 2008. Microfoundations of institutional theory. In R. Greenwood & C. Oliver & K. Sahlin & R. O. Y. Suddaby (Eds.), *Handbook of Organizational Institutionalism*: 276-298. London: Sage.
- Prahalad, C. K. & Bettis, R. A. 1986. The dominant logic: A new linkage between diversity and performance. *Strategic Management Journal*: 485-501.

- Purdy, J. M. & Gray, B. 2009. Conflicting logics, mechanisms of diffusion, and multilevel dynamics in emerging institutional fields. *Academy of Management Journal*, 52(2): 355-380.
- Rao, H., Monin, P., & Durand, R. 2003. Institutional change in Toque Ville: Nouvelle cuisine as an identity movement in French gastronomy. *American Journal of Sociology*, 108(4): 795-843.
- Reay, T. & Hinings, C. R. 2005. The recomposition of an organizational field: Health care in Alberta. *Organization Studies*, 26(3): 351-384.
- Rowan, B. 1982. Organizational structure and the institutional environment: the case of public schools. *Administrative Science Quarterly*, 27(2): 259-279.
- Scott, W. R., Ruef, M., Mendel, P. J., & Caronna, C. A. 2000. *Institutional change and healthcare organizations: from professional dominance to managed care*. Chicago: University of Chicago Press.
- Scott, W. R. 2008. *Institutions and organizations* (3rd ed.). Thousand Oaks: Sage.
- Sherif, M. & Sherif, C. W. 1964. *Reference groups; exploration into conformity and deviation of adolescents*. New York: Harper and Row.
- Shils, E. 1975. *Centre and periphery: Essays in macrosociology*. Chicago: University of Chicago Press.
- Simon, H. A. 1957. *Administrative Behavior: A Study of Decision-making Processes in Administrative Organisations*. New York: MacMillan.
- Sorensen, J. E. & Sorensen, T. L. 1974. The Conflict of Professionals in Bureaucratic Organizations. *Administrative Science Quarterly*, 19(1): 98-106.
- Stern, S. 2004. Do scientists pay to be scientists? *Management Science*, 50(6): 835-853.
- Stuart, T. E. & Ding, W. W. 2006. When do scientists become entrepreneurs? The social structural antecedents of commercial activity in the academic life sciences. *American Journal of Sociology*, 112(1): 97-144.
- Suchman, M. C. 1995. Managing legitimacy: strategic and institutional approaches. *Academy of Management Review*, 20(3): 571-610.
- Swidler, A. 1986. Culture in action: symbols and strategies. *American Sociological Review*, 51(2): 273-286.
- Thornton, P. H. 2002. The rise of the corporation in a craft industry: conflict and conformity in institutional logics. *Academy of Management Journal*, 45(1): 81-101.
- Thornton, P. H. 2004. *Markets from culture: Institutional logics and organizational decisions in higher education publishing*. Stanford, CA: Stanford University Press.
- Thornton, P. H. & Ocasio, W. 2008. Institutional logics. In R. Greenwood & C. Oliver & K. Sahlin & R. Suddaby (Eds.), *The SAGE handbook of organizational institutionalism*: 99-129. Los Angeles: Sage.

Tripsas, M. & Gavetti, G. 2000. Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Management Journal*, 21(10-11): 1147-1161.

Tushman, M. L. & Anderson, P. 1986. Technological discontinuities and organizational environments. *Administrative Science Quarterly*, 31(3): 439-465.

Weber, M. 1968. *Economy and society*. Chicago: University of Chicago Press.

Zajac, E. J. & Westphal, J. D. 2004. The social construction of market value: Institutionalization and learning perspectives on stock market reactions. *American Sociological Review*, 69(3): 433-457.

Zucker, Lynne G. & Darby, Michael R. 1996. Star scientists and institutional transformation: Patterns of invention and innovation in the formation of the biotechnology industry. *Proceedings of the National Academy of Sciences*, 93(23): 12709-12716.

TABLES AND FIGURES

Table 1: Academic vs. commercial logic in scientific research

Characteristic	Academic logic	Commercial logic
Economic system	Public/not-for-profit funding	For profit funding
Organizational identity	Science as a profession	Science as a business
Legitimacy	Scientific reputation	Successful innovation
Authority structures	Craft-based authority, personal laboratory	Accountability to business leaders
Mission	Pursue scientific novelty	Use knowledge to develop new products
Strategy	Attract research funding and train junior staff, maximize publication impact	Research undertaken only if chance of profitable exploitation
Governance	Open publishing, scientific autonomy, 'market for ideas'	Proprietary intellectual property rights (e.g. patents), markets for technology

Categories adapted from Thornton (2002)

Table 2: Types of researchers' interaction with industry

Type of interaction (j)	Frequency % ($b_j=1$)
Attendance at conferences with industry and university participation	82.7
Attendance at industry sponsored meetings	63.4
A new contract research agreement (original research work done by University alone)	57.9
A new joint research agreement (original research work undertaken by both partners)	57.3
Postgraduate training with a company (e.g. joint supervision of PhDs)	47.5
A new consultancy agreement (provision of advice that requires no original research)	47.3
Training of company employees (through course enrolment or through temporary personnel exchanges)	29.9
Creation of new physical facilities with industry funding (e.g. new laboratory, other buildings in campus)	16.7

Table 3: Coding of occurrences of researchers' engagement with industry

Questionnaire answer (category)	0	1-2	3-5	6-9	>10
Occurrence (b_j)	0	1	1	1	1
Volume of interaction (T_j)	0	1.5	4	7.5	10

Table 4: Descriptive statistics and correlation matrix

Variable	Mean	Std. Dev.	Min	Max	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	
[1] Industrial involvement	1.44	0.74	0.00	3.53	1.00														
[2] Academic age	21.27	9.99	1.00	60.00	0.04	1.00													
[3] Gender	0.12	0.32	0.00	1.00	-0.04	-0.15	1.00												
[4] British PhD	0.84	0.37	0.00	1.00	0.16	0.15	-0.04	1.00											
[5] Elite PhD	0.41	0.49	0.00		-0.06	0.04	0.00	0.13	1.00										
[6] Industry experience	2.84	5.38	0.00	45.00	0.20	0.14	-0.06	0.10	-0.01	1.00									
[7] Basic discipline	0.39	0.49	0.00	1.00	-0.22	0.06	0.01	-0.05	0.11	-0.09	1.00								
[8] Dep. research quality	0.63	0.15	0.10	0.95	0.05	0.01	-0.01	0.01	0.16	0.02	-0.17	1.00							
[9] Dep. industry funds	21173.05	23437.67	-93.34	143787.80	0.26	0.04	0.00	0.07	0.03	0.11	-0.37	0.23	1.00						
[10] Univ. industry funds	23.51	23.16	1.43	142.81	0.16	0.02	0.03	0.04	0.07	0.07	-0.11	0.11	0.32	1.00					
[11] Professor	0.54	0.50	0.00	1.00	0.14	0.53	-0.12	0.08	0.03	0.09	0.08	0.01	-0.01	0.02	1.00				
[12] Univ. research quality	2.67	0.21	1.75	3.15	-0.07	0.02	0.00	-0.01	0.28	-0.06	0.13	0.62	0.06	0.11	0.00	1.00			
[13] Publications	1.03	1.05	0.01	13.45	0.10	0.34	-0.08	0.08	0.06	0.03	0.01	0.12	0.01	0.01	0.36	0.13	1.00		
[14] Money	0.12	0.32	0.00	1.00	0.08	-0.04	-0.03	-0.03	-0.05	0.09	-0.07	0.06	0.04	0.05	-0.01	0.05	0.02	1.00	

Table 5: Regression results

VARIABLES	(1)	(2)	(3)
	Ind. Involvement	Ind. Involvement	Ind. Involvement
Academic age	-0.00 (0.002)	-0.01*** (0.002)	-0.01*** (0.002)
Gender	-0.07+ (0.036)	-0.05 (0.033)	-0.04 (0.033)
UK PhD	0.26** (0.080)	0.26** (0.077)	0.26** (0.077)
Elite PhD	-0.09+ (0.046)	-0.10+ (0.049)	-0.08+ (0.045)
Industry experience	0.02*** (0.004)	0.02*** (0.004)	0.02*** (0.004)
Basic discipline	-0.19 (0.109)	-0.20 (0.113)	-0.17 (0.117)
Department research quality	-0.08 (0.122)	-0.14 (0.138)	0.01 (0.196)
Department industry funds	0.00** (0.000)	0.00** (0.000)	0.00** (0.000)
University industry funds	0.00** (0.001)	0.00** (0.001)	0.00** (0.001)
Professor		0.25*** (0.032)	0.65* (0.291)
University research quality			-0.11 (0.158)
Professor*University research			-0.16+ (0.109)
Publications		0.05** (0.018)	0.06** (0.019)
Money			0.15+ (0.101)
Publications*Money			-0.06* (0.032)
Constant	1.16*** (0.119)	1.19*** (0.108)	1.37** (0.411)
Observations	1,530	1,530	1,525
R-squared	0.142	0.170	0.174

Notes: Ordinary Least Squares, robust standard errors clustered by discipline.

Two-tailed tests for controls, One-tailed tests for independent variables.

⁺*p*<0.10, **p*<0.05, ***p*<0.01, ****p*<0.001

Figure 1: Individuals' engagement with alternative logics

