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Employment systems, skills and knowledge

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Introduction

Learning-by-doing and the accumulation of practical experience while in employment provide a large proportion of the skills and knowledge used in all the advanced economies. As a result, employment systems, which encompass the organisation of work, career patterns, and the learning opportunities they provide, shape the skills and practical knowledge that workers and managers bring to their jobs. Conventional wisdom has classified the structures within which these evolve into three generic types: organisational internal labour markets (ILMs), occupational or professional labour markets (OLMs), and general or sometimes 'secondary' labour markets (see Doeringer and Piore, 1971; Robinson 1970; Eyraud et al. 1990). Although initially useful, this categorisation was built against the background of 'managerial capitalism', with a focus on large industrial firms, and at a time when union agreements often set the tone also for non-union firms (Foulkes, 1980).

Much has changed since then. In the US, the 'patient capital' of managerial capitalism has given way to a more 'footloose' form of capital as a result of changes in company finance placing its associated employment practices under great strain (Lazonick and O'Sullivan, 1996). The rise of 'Japanese management' and its associated long-term human resource policies have not only challenged the large bureaucratic internal labour markets analysed in Doeringer and Piore's (1971) classic study of employment practices in US manufacturing but also offers a different relationship between workers' and managers' skills and knowledge, and a different distribution of knowledge within the firm (Cole, 1994). A third challenge to the accepted view of skills within ILMs arises from the new ways of managing the distribution of skills and knowledge between firms as illustrated by high-tech clusters of firms, such as in Silicon Valley, and in project-based work (Camuffo, 2002). Finally, many writers have argued that the present stage of globalisation generates greater competition on quality because firms' participation in the trade in tasks along global value chains has to meet the quality standards required of the whole chain (Ericksson 2010, Sutton, 2012). These changes have affected both the large firm internal labour markets of the US and Japan, and the institutionalised occupational labour markets for intermediate and professional skills as in Germany. These developments have led many firms to focus on tasks where there is alignment between their capabilities and their employment practices, and for other tasks, to look outside to external suppliers and collaborative ventures, causing their employment practices to become less inclusive than in the past (eg. Cappelli, 1999; Grimshaw et al. 2001; Appay and Jeffrys, 2009).

This chapter begins by looking at structures of workplace knowledge and skill development within different types of employment systems, as these are the foundations of firms' capabilities. It then looks at the governance problems created by different knowledge structures within a three-way relationship between workers, managers and investors, building on Aoki's (2010) argument that they will only adopt a particular governance framework for their cooperation if it protects their respective interests. It then moves on to look at a number of innovative developments in employment systems and their skills, and how these appear to address a number of changes in economic organisation that have come about since the classic works on the theory of skills in internal and occupational labour markets, and hopefully sheds some light on their apparent erosion.

Work organisation and the distribution of job knowledge from learning by doing

Learning-by-doing provides a major component of workforce skills in any economy. It applies both to passing on the *stock* of existing job knowledge to newly hired workers and to the *flow* of new

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knowledge that arises from solving work-related problems (Koike and Inoki 1991). Mincer (1974) provided one of the earliest quantitative estimates of the value of post-educational experience, based on the argument that the rise in employees' earnings after labour market entry reflected their increasing value to employers, which he attributed to work experience. He found that, in the United States in the late 1950s, experience accounted for roughly half of workers' human capital stock for highly educated workers, and even more for those with low levels of education. Earnings relate to the returns that accrue to workers. However, employers also invest heavily in training, and so might expect returns of their own: one estimate for Britain put it at about 3% of GDP per year (Ryan, 1991). The national training systems, time periods and methods of estimating are different, but taken together they give an idea of the large scale of investments in in-work learning in modern economies.

Given the magnitude of these investments, it is logical that there should be a close relationship between the organisation of the jobs that give rise to learning-by-doing, and the nature and distribution of skills and knowledge within the firm. We propose to approach this relationship first by looking at the cognitive structures of knowledge and skills, and then at their governance.

Cognitive and skill, dimension

The workplace knowledge that underpins workers' skills comprises two dimensions: its *mode of expression*, whether it is explicit or tacit; and its *locus*, whether held by individuals or groups (Lam, 2000). Explicit knowledge is codified whereas tacit knowledge is not - as Polanyi (1967) wrote: 'we know more than we can say'. Explicit knowledge can be transmitted by the written word and conveyed by manuals and formal instruction. Tacit knowledge is usually passed person to person by demonstration and story-telling (Brown and Duguid, 1991, Orr, 1996).

The *locus* of such knowledge in organisations may be encapsulated within individual workers or distributed within groups or teams. In all organisations there is a division of labour with regard to knowledge. The key difference is how far employees can function independently in their jobs as opposed to needing to draw interactively on the knowledge of other employees. Professional and craft workers often work independently because they have the necessary knowledge to produce the outputs required of them. On the other hand, knowledge can also be distributed within a group or team such that key tasks require multiple contributions from different group members.

Lam (2000) applies these two dimensions to identify four different types of work-related knowledge. These different knowledge types can be described briefly as follows:

- 'Embrained' (explicit-individual): knowledge derived from formal and theoretical training, encapsulated in the 'brains' of individual knowing experts;
- 'Encoded' knowledge (explicit-group): knowledge encoded in the organisational routines and written procedures applied in white or blue collar work;
- 'Embodied' (tacit-individual): individual action-oriented knowledge heavily reliant on practical experience;
- 'Embedded' (tacit-group): the collective form of tacit knowledge embedded in the group because of shared norms, mutual adjustment within flexible work roles, and group problem-solving activities which cause new knowledge to be distributed within the group.

The cells in Figure 1 show additionally the four types of organisation structures that can be aligned with them (Mintzberg 1979, 2009). The bureaucratic structures rely upon coordination by standardisation be it of professional or management-designed work roles. In contrast, adhocracy relies upon coordination by mutual adjustment within flexible work roles. Management may also coordinate by specifying either the *outputs* or the *inputs* it requires: relying upon workers' expert knowledge, as in professional bureaucracy and operating adhocracy, or by taking control of the

work process, as in machine bureaucracy, such as Taylorist systems, and in administrative adhocracy, such as in 'Japanese-form' work organisation.

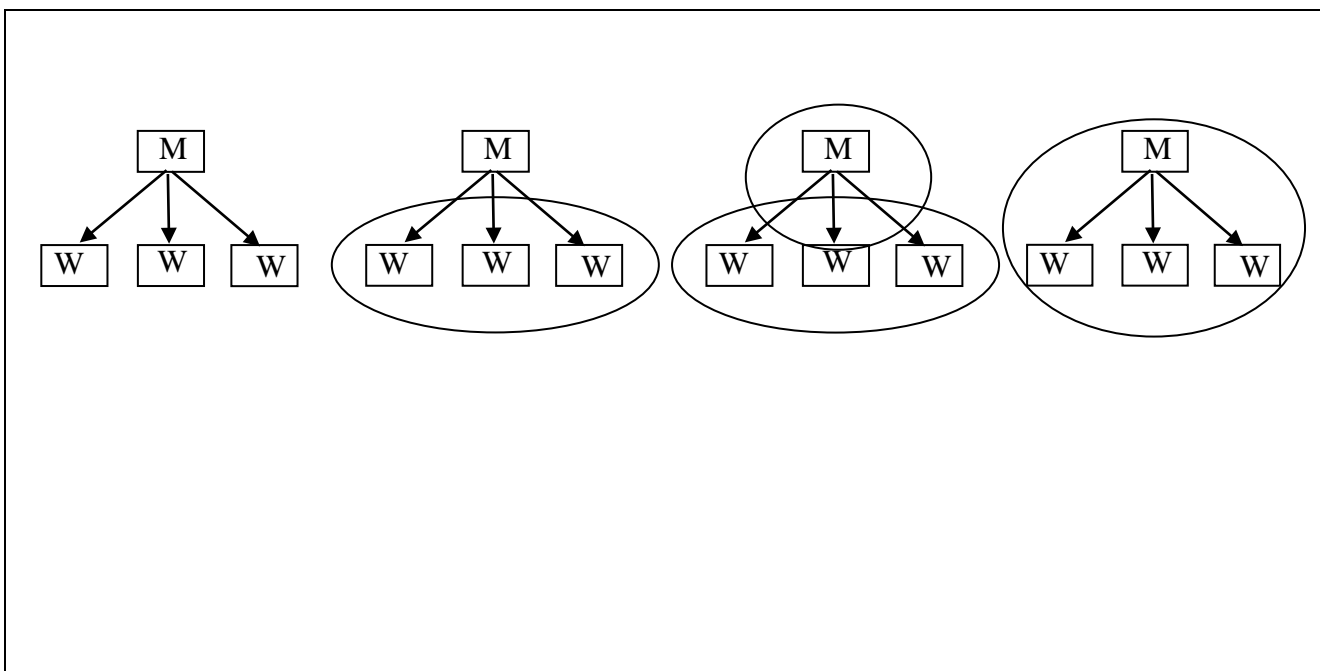
Figure 1: Knowledge types

		Locus of knowledge	
		Individual	Group
Mode of expression of knowledge	Explicit	<i>Embrained (Professional bureaucracy)</i>	<i>Encoded (Machine bureaucracy)</i>
	Tacit	<i>Embodied (Operating adhocracy)</i>	<i>Embedded (administrative adhocracy, 'J-form' organisation)</i>

Learning and sharing of knowledge / skills between workers and substitutability

In practice, few jobs involve exclusively either explicit or tacit knowledge. As Mincer argued, formal education and experience are complements, although their proportions vary greatly across jobs. Their distribution among co-workers and between workers and managers, and how they evolve also varies greatly, and has an important effect on the bargaining relationships. Consider the types of relationship among co-workers and managers shown in Figure 2. They illustrate different settings in which the job-related problems may give rise to problem-solving and learning opportunities. In the first, work has been organised into a set of work posts, with individual workers assigned to each one and coordinated by their line-manager. In the second, the co-workers function as a team, although still coordinated by their manager, and in the latter two, the manager is part of the team, respectively with overlapping and integrated roles.

Figure 2: Management-work group configurations and on-the-job learning



In all four cases, the emergence of learning opportunities and tacit knowledge arise on the job (Koike and Inoki 1991). However, their scope and distribution differ greatly. In the first, tacit

knowledge grows around the margins of each individual work post. As management has the coordinating role even at job level, increases in workers' job knowledge will be confined to problems that arise in their individual work, whereas anything that affects relations between work posts will fall to management. Maurice et al (1982) observed how semi-skilled French production workers had to stand aside while managers and technicians fixed problems for them. Any new knowledge that resulted from that process would, in the first instance, reside within the managerial hierarchy. They contrasted this situation with that in Germany where, while still responsible for individual jobs, workers started from a higher level of intermediate skills, which meant that management could delegate more problem-solving tasks to them, albeit within the same hierarchical structure. In the second example in Figure 2, co-workers function as a team, working flexibly, so that all develop an understanding of their co-workers' jobs and how they are connected. In this case, co-workers are in a position to deal with problems that arise from how their jobs articulate and can develop a more holistic understanding of their work process. In the final two examples, the management function is integrated increasingly into the team which enables more sophisticated problem-solving, spanning both technical and coordination issues, for example, in the J-form and operating adhocracy structures respectively. This time, as tacit knowledge develops, it is distributed not just horizontally among co-workers as in the previous example but also vertically. This distribution enables more sophisticated problem-solving and skill development, but it also creates greater inter-dependency between managers and workers as neither group has a monopoly of the knowledge required for linking together different parts of the production process.

Organisational knowledge evolves over time as the organisation's environment and needs change. Codifying tacit knowledge requires time and resources, so that in practice even the most formalized organisations rely a good deal on tacit knowledge and skills. This means that the organisational structures around which tacit knowledge evolves, such as those in Figure 2, will strongly influence the supply of labour with the requisite skills and knowledge. It is widely recognised that tacit knowledge is 'sticky': best communicated by person-to-person contact. In the hierarchical work post example (Figure 2), new workers can acquire the requisite skills either by their own experience on the job, or from co-workers who are willing to share their knowledge. This method of training is popular because it is simple and cheap so long as new trainees remain modest in number.

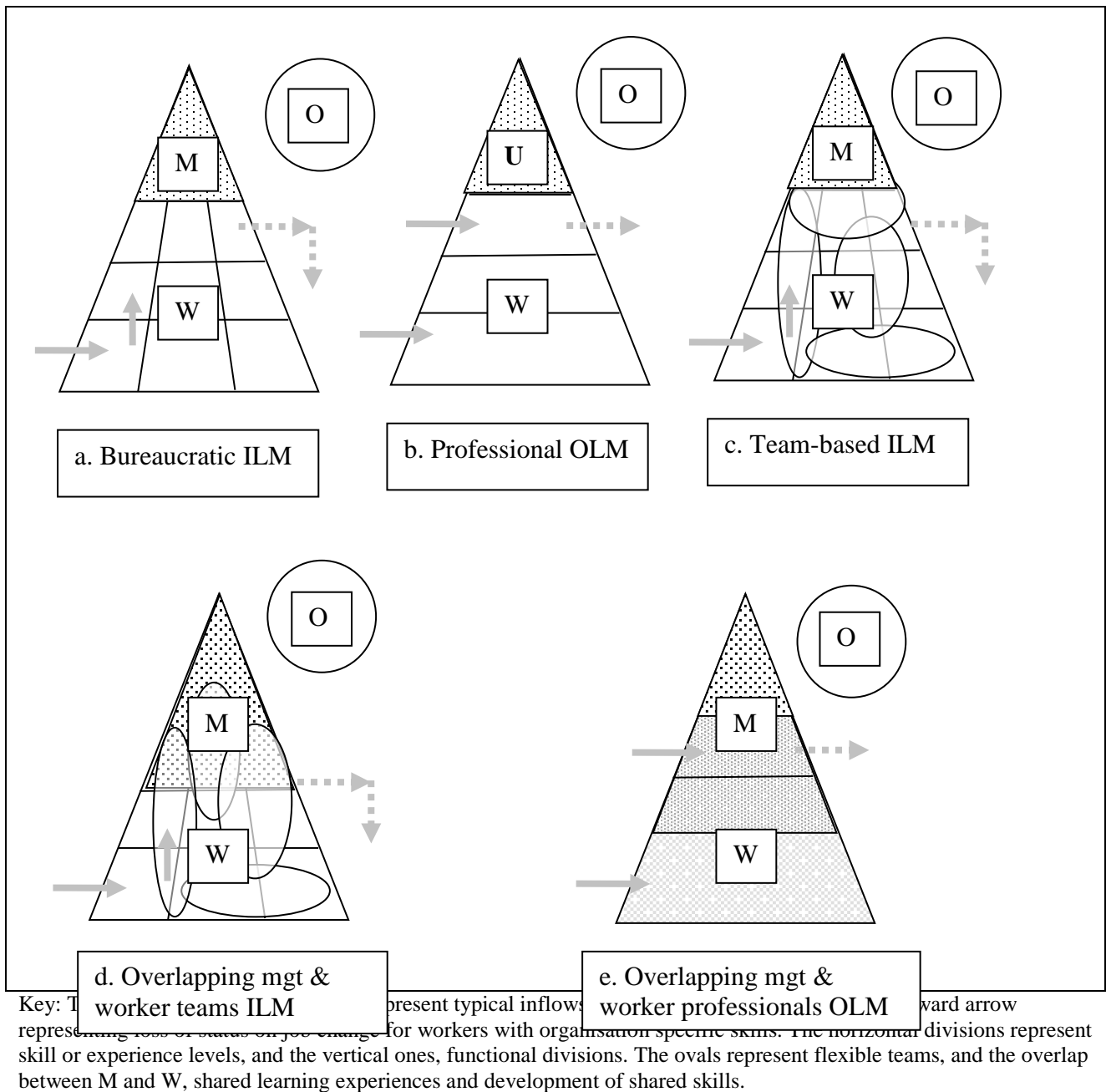
The greater the span of tacit knowledge the more it provides a tool for solving job-related problems but it also places a premium on the quality of cooperation among co-workers and with management. In the co-worker team (Figure 2), tacit knowledge can develop within the team as a result of their more integrated problem-solving activities, giving the team a potential information advantage over management. It also creates a stronger basis on which work groups can cooperate with management compared with the previous model. The experience of cooperation among team members, their shared knowledge, and their control over its transmission to new members mean that in a conflict, in the last resort, management would have to replace a whole team as well as its stock of tacit knowledge. In the final two cases in figure 2, management is actively involved in joint problem-solving, as 'player managers'. The greater scope of the activity considerably enhances its value to the organisation but, at the same time, blurs the distinction between the tacit knowledge of workers and of management. It is in this sense that Aoki (2010) refers to the skill and knowledge assets of workers and management as 'fused': neither party can substitute an outsider for the other.

Finally, we return to professional skills. Experience is also an important complement to formal educational qualifications, and although many such workers may be engaged in jobs that approximate to the hierarchical model with individual rather than team responsibilities, there is an important difference. The market price for professional skills will reflect the level of productivity when they are fully utilised, so that employers have good reason to align job demands with the range of knowledge of these workers. If workers move between similar jobs in different organisations, then the tacit skills they build up will tend to be of similar nature and thus of use to a variety of employers. Two consequences follow: professional workers retain a viable outside option

as both their formal qualification and their experience remain transferable; and employers retain the possibility to recruit replacements externally. In contrast, the firm-specific hierarchical model involves usually narrow and idiosyncratic skills which lack transferability, and because of the limited amount of training, they can also be replaced with relatively short training times from outside. Thus, in both cases, the knowledge assets of the workers can be quite quickly replaced from outside but workers' bargaining power differs greatly owing to the difference in their outside options.

From the above, a number of different configurations of employment systems can be identified. Figure 3 shows the three key actors, workers (W), managers (M) and investors or owners (O). Managers are shown at the apex of the pyramid and the workers are divided horizontally by level of skill and, in some cases, vertically by function. The arrows represent typical entry and exit points: the organisational ILM recruiting predominantly at the base of the skill hierarchy, and upgrading subsequently, and the occupational or professional model recruiting directly from outside. The ovals within the triangles represent different possible team configurations that may cross skill and functional boundaries. The traditional US large-firm ILM, as in Doeringer and Piore's model and in Aoki's 'A-firm', is case (a). Versions of Aoki's 'J-firm', with its flexible cross-skill and cross-functional working are represented by cases (c) and (d). The former involves the more 'lean' version in which teams come under stronger management control, whereas the latter provides a richer joint-learning model with overlapping management and worker roles and skills. Lorenz and Valeyre (2005) and Holm et al (2010) using European data also distinguish team working into 'lean' and 'learning' versions. The traditional German and British occupational models, with their scope for direct external recruitment at the level of skill required, are shown in case (b). The final case (e) bears some resemblance to the occupational model, except that managers' and workers' skills and knowledge overlap considerably, as they might do in professional service firms. Workers' and managers' skills and knowledge are relatively discrete in the first three cases, whereas in the latter two, joint problem-solving causes them to overlap both in their stock and how they co-evolve.

Figure 3: Different configurations of ILMs and OLMs and employee, manager and owner relationships



Skills and governance structures of employment systems

Suitable governance structures are needed to facilitate the development of workplace skills and knowledge. Figure 3 illustrates alternative configurations of skills and knowledge and the governance problems associated with them. In this section, we consider first how the boundaries of each party’s work obligations can be established, and then look, in simple terms, at how they can be enforced in a manner that is self-sustaining. The resulting patterns of work systems will be found to mirror those of types of knowledge discussed in the previous section. It also considers the position of investors. It starts by looking at governance in firm ILMs and then looks at occupational markets.

Management-worker governance and the employment relationship

The employment relationship is flexible, enabling management to hire labour, and only after the contract has been agreed, to determine employees’ detailed task obligations. To varying degrees,

this applies to all the models shown in Figure 3. Such open-endedness gives employers great flexibility (Simon 1951) but without limits to management's authority to direct work, employees are exposed to abuse. As Williamson (1975) has shown, it would be impractical to specify the content of an employment contract by means of a detailed inventory of tasks. Hence the importance of mostly unwritten work rules and conventions that are readily understood by employees and their line-managers to establish the limits of managerial authority over work assignments. These rules and conventions enable workers and their managers to identify the boundaries of jobs and possible breaches to the arrangement. They are the foundations on which governance structures have to build.

The work rules that delimit managerial authority need to be both *enforceable* by ordinary employees and their line-managers, and *efficient* at aligning the employer's job demands with workers' skills (Marsden, 1999). Broadly speaking, the enforceability dimension focuses on either the tasks that make up a worker's job or on the function within which the job is integrated. For the efficiency dimension, aligning job demands and skills can be achieved either by taking the job demands as given, for example by technology or organisational design, and shaping workers' skills accordingly; or in the reverse direction, starting from workers' skills, and organising job demands. Lazear (1995) described the first as the 'production approach', and Sengenberger (1987) identified the second as the 'training approach'. Figure 4 cross-tabulates these two approaches, generating four types of governance arrangements that are congruent with Lam's typology of knowledge types (Figure 1). The training approach is associated with the individual dimension of knowledge because skills are packaged so as to enable workers to move from one organisation to another, as with the professional and expert skills of professional bureaucracy and operating adhocracy. The production approach is associated with the group or organisational dimension because skills belong to groups that are formed around administrative routines and technologies and by and large are specific to each organisation. In such an environment, even when jobs emphasise individual accountability for performance, such as in Taylorist work systems, there is a real sense in which the skills are an attribute of the job rather than the individual employee.

Figure 4 Four approaches to monitoring work obligations

		Efficiency criterion	
		Training approach	Production approach
Enforceability criterion	Task-focused	<i>Embrained</i> (<i>Professional bureaucracy</i>)	<i>Encoded</i> (<i>Machine bureaucracy</i>)
	Function-focused	<i>Embodied</i> (<i>Operating adhocracy</i>)	<i>Embedded</i> (<i>administrative adhocracy, 'J-form' organisation</i>)

Adapted from Marsden 1999.

Turning to enforceability, it is easier to codify the tasks of individual workers engaged in relatively independent units than when there is a good deal of mutual adjustment within flexible work roles. In 'machine bureaucracy', with Taylorist work design in the factory and office, work tasks and job contents have a high degree of codification. Detailed job classifications provide one means for management to standardise jobs and reduce job idiosyncrasy. As suggested earlier, tacit knowledge grows around the edges of such jobs but is also limited by their narrow scope. Professional bureaucracy, in both white and blue collar occupations, is similar except that the skills are standardised across firms so that workers may move freely between employers while remaining within the same occupation. Whereas machine bureaucracy standardises jobs around the organisation's own internal principles, professional bureaucracy does so around externally given

qualifications. This contrast echoes that between the group and individual focus of knowledge, the group following internal organisational principles and the individual following skills that are portable between organisations. Based on flexible work roles, the two adhocratic forms derive enforceability not from individual tasks but from the more abstract concept of the function within which mutual adjustment takes place. Thus a team of scientists might focus on a particular research outcome, and a team of workers operate flexibly within their designated work area of a production system.

Work systems underpinned by these rules are partly self-sustaining because they benefit both parties, and partly maintained by potential sanctions to ensure fair dealing. Termination, and use of the quit and dismissal threats are the ultimate sanctions in any continuous economic relationship, such as employment, should either party fall short on its side of the bargain. They may be supplemented with lesser sanctions and with use of voice (Hirschman 1970). Because of their informal nature, work rules rely heavily on each party's readiness to punish breaches by the other. Drawing on evolutionary game theory, the use of such informal rules to identify job boundaries can be part of a self-sustaining process of cooperation provided that the costs of conflict exceed the potential gains and provided that both parties are equally willing to hold the line against encroachments by the other (Bowles 2005; Marsden 2013). Factors that increase the cost of conflict include joint investments in organisation-specific training and knowledge that are lost in the event of quits and dismissals.

This process can be undermined if either party fails to punish breaches systematically, which might happen if the costs of conflict become asymmetrical. For example, high local unemployment may discourage workers from punishing breaches, and inversely, recruitment and retention difficulties may discourage management. In such cases, the weaker party may respond by withdrawing from activities that enhance skills and by reduced 'give-and-take' within the employment relationship. Workers might insist on narrower interpretations of their jobs and greater use of seniority for which breaches are easier to detect and generally lead to smaller gains. Indeed, Doeringer and Piore (1971) identified seniority rules for established job ladders as providing the necessary job security for workers to invest in (narrow) firm-specific skills within the classical north American ILMs.

Strongly developed teams may make flexible work organisation more robust in a number of ways, and so support more stable management-worker governance within the employment relationship. On the one hand, teams of workers are harder to replace than single employees, especially when knowledge is diffused within teams. On the other, teams can also enable management to use peer pressures for more consistent performance (Kandel and Lazear, 1992). This mixture of reduced dismissal threat and improved work discipline potentially enables teams to provide a useful channel for employee voice with management and so enrich the palette of graduated responses to breach, thus enabling a greater degree of balance between workers and management.

Governance and investors

One of the challenges posed by the growth of knowledge intensive activities identified by Aoki (2010) concerns changes in relationships with investors. The hierarchical design of the conventional firm, he argues, works well for the bureaucratic ILM model but comes under increasing strain as worker and manager skills and knowledge become more integrated. Such integration can be found in strong forms of the 'J-firm' and in emerging patterns of project-based organisation for example in the high technology and creative sectors. Aoki argues that it increases the risk of a coalition between workers and managers against investors, and unless it can be resolved by a suitable governance mechanism, investors will hold back.

The core of his argument concerns the value derived from control over use of the physical assets provided by investors. In conventional hierarchical firms, this lies in the hands of managers. They

are the brokers between the other two stakeholders, and benefit from important information asymmetries. They specialise in commercial and coordination activities whereas workers focus on the technical aspects of their jobs under management direction. Investors take the residual income, profits, after payment of all costs including contractual payments to managers and workers. Drawing on Hart (1995), Aoki shows that this is an effective form of organisational 'self-governance' as he puts it, provided that investors can discipline managers' activities in both the commercial and internal coordination spheres. In this model, coordination depends upon management's power vis-à-vis workers, which in turn depends upon how easily workers can be replaced externally. The problem for the investors is to judge how far cooperative policies with the workforce deliver business results as opposed to giving management and workers a quiet life. If the investors can easily identify a breach they can apply the usual incentive mechanisms such as linking managers' pay to market performance, dismissal and hostile takeovers. The more productivity depends upon substantial levels of firm-specific skills and knowledge, the harder it is to identify breach using conventional financial indicators and the harder it is for investors to take corrective action.

The first three models in Figure 3 are variants of the conventional hierarchical model although they differ in important respects. The bureaucratic ILM model resembles the first. One interpretation of the erosion of large firm ILMs of US industry since the 1960s arises if we consider Doeringer and Piore's (1971) theory about the growth of firm-specific skills and seniority-based job rights alongside Lazonick and O'Sullivan's (1996) observation of the transition from a situation of dispersed to more coordinated shareholder voice from the 1960s. Under the dispersed ownership of preceding decades a model of training and workforce skills underpinned by seniority rules had grown up that brought workers and management together at the expense of shareholder returns, arguably by over-extending a rigid model of firm-specific skills. Stronger shareholder voice in subsequent years then contested this relationship, pulling management back into its role as agent of the shareholders, and putting a brake on further development of this kind of ILM. The question Aoki asks then is how far can ILMs based on more flexible team models develop while satisfying all three parties? He argues that it depends upon a change from extensive to intensive monitoring of management policies and performance by investors, and from an 'arm's length' to a 'relational' approach. He argues that historically this function was carried out by the main bank system in Japan. In Germany, where many large firms also built strong internal labour markets on an occupational system to be examined shortly, bank finance together with supervisory boards have played a similar role. Thus, where the distribution of knowledge and skills brings management and a significant part of the workforce together, his argument is that extensive, arm's length, monitoring is less efficient than intensive, relational monitoring. Looking across a wider range of European countries, Lorenz and Valeyre (2005) identify two types of team-working, 'lean', management-directed teams, and 'learning' teams in which workers have a good deal of scope for problem-solving activities. The lean model appears to be associated with stronger unilateral management control, and the learning model more with greater institutional joint-regulation (Holm et al. 2010).

Finally, how has the three actor model adapted to the emergence of networks of small and medium-sized firms which have been very dynamic in the knowledge-intensive and creative industries? In many such firms, the distribution of knowledge and skills is such that there is no clear boundary between the roles of management and expert workers, and neither can easily substitute the other. Under the conventional governance model, this situation would be unattractive for investors. Aoki argues that a different governance system has emerged in which teams of workers and managers with a good commercial project compete for funding from venture capitalists. He presents this process as a tournament in which those bidding for funds have to reveal the detail of their business plans, agree milestones for results and how gains are to be shared, thus overcoming some of the informational asymmetries in this kind of work that weaken the hierarchical model. As will be seen shortly, this model fits well with the labour market conditions found these industries.

Governance structures for occupational skills

Although employed in both the hierarchical and the networked models, occupational skills require separate treatment because they improve the worker's outside option in this three-partner governance relationship. Becker (1975) made a fundamental distinction between payment mechanisms for on-the-job training that give rise to transferable skills and those where the skills are firm-specific. Transferability means that trainees can quit taking the employer's investment with them once their training is complete. This is not the case for skills which have little value to other employers. As a result, employers will invest in firm-specific but not in transferable skills. The latter course would create a 'free-rider' problem as competitor employers could poach instead of training skilled labour. Although Becker's theory identifies some critical problems of training policy, there has been much debate as to whether, in practice, the picture is as 'black and white' as he supposed. For example, employers can use other policies to retain their skilled workers so that investment in training is more secure (Stevens, 1998; Acemoglu and Pischke, 1999, Franz and Sockice, 1995). In practice, many employers spend considerable sums on developing transferable skills. Nevertheless, fear of poaching by other employers is widely believed to be a major discouragement for firms wishing to provide such training.

Sometimes employer collective action and industrial governance arrangements can facilitate employer investment in transferable skills. According to Olson (1971) collective action can overcome free-rider problems if the group benefits from a strong coordinating body, or alternatively it comprises a small clique of powerful members. In a Norwegian study of employer-funded training for transferable skills, Johansen (2000) found that employers' ability to coordinate conformed to Olson's theory. Employer-funded transferable skill systems developed when sectors benefited from employer coordination, and when they were dominated by a clique of large firms. The sector which could not resolve the collective action problem on account of its dispersed membership and lack of a coordinating body, engineering, had great difficulty in establishing a system of transferable skills. Observers of job-training for transferable skills in Germany attribute much of the success of small and medium-sized engineering firms in this sphere to employer-led coordinating bodies (Drexel, 1993; Streeck, 1989). Large firms, on the other hand, benefit partly from comprising small cliques in their sectors, and partly from a system of industrial governance (Franz and Soskice, 1995; Backes-Gellner et al. 1997). One element is industry wage bargaining which limits the opportunities to use pay to poach those workers trained elsewhere. The other concerns the system of codetermination involving workers, management and investors, which facilitates intensive monitoring of management policies and performance. In the case of training, these institutions also provide workers with some assurance that the skills to which they are contributing will have a viable external market.

To conclude this section, Aoki describes these models as 'self-governance' because he is concerned with the forms that the three stakeholders would adopt voluntarily as a framework for their collaboration. For this to happen, each must feel that its interests are sufficiently protected. Otherwise, it will not collaborate or it will seek an alternative model. If there is a poor match between the governance system and the configuration of skills and knowledge, then one can expect that one or other will gradually be abandoned over time, as appears in the case of the North American large-firm ILMs discussed earlier. Likewise, in Japan and Germany, there is much debate about a realignment of skill and governance systems confining long-term employment commitments to employees whose skills and knowledge are essential to the business (for example, Aoki 2010, Thelen 2004, and Streeck 2009).

ILMs and inter-organisational linkages

Recent years have witnessed several innovative forms of managing skills and knowledge which provide an alternative to the traditional models of ILMs and OLMs. They are suggestive of possible

future lines of development of theory on skills and labour market structures, and also take account of the interests of investors.

Project-based work and the ‘modular’ approach

Industrial districts comprising clusters of small firms in related activities have long thrived (Marshall, 1920; Piore and Sabel, 1984; Bellandi, 1986). The small firm networks and project-based work of Silicon Valley, Hollywood and other industrial districts elsewhere have been extensively studied. On the labour market side, this research emphasises the high worker mobility between firms and between projects, and the resulting fast communication of new, and especially tacit, knowledge across organisations (Saxenian, 1996). A key part has been played by occupational communities of practice (CoP), that is, mostly informal groups of workers with a particular expertise who recognise each other’s competence and reputation. Because of this recognition, they are willing to join together in project teams or in small firms in the belief that their collaboration will be fruitful. In many such activities, most of the members are highly qualified and there is often no clear division between the expertise of the entrepreneur and that of the other members.

On the financial side, Aoki (2010) has argued that the base for such activities is provided by a modular organisation of activity, combined with tournaments for funds from venture capitalists. Modular organisation enables firms to combine extensive knowledge sharing about basic principles and common platforms, while retaining key areas of expertise which enable them to compete with other similar firms. The ‘black box’ of knowledge within the firm can be integrated within a wider production process by specifying requirements at the interface between different modules. Thus firms might use a common platform to which they all contribute, but retain a specific area or service for their own operations. For funding module development, and bigger collaborative projects, they engage in competitive bidding for venture capital funding which protects investor interests by enabling them to select the best managed proposals.

On the employment side, many writers have argued that communities of practice provide an alternative incentive framework to that of large firms. CoPs encapsulate a collective memory of how well and fairly individual members have performed in the past, their reputation. They derive their effectiveness from the social bonds that bind them together, whether they be the local communities that underpinned the northern Italian industrial districts (Piore and Sabel 1984) or the shared educational backgrounds and places of socialisation of Silicon Valley (Saxenian 1996) and the media industry (Sydow 2002, Baumann 2003). They are built on ‘weak ties’ such as those based on shared past educational and work experiences (Granovetter 1974).

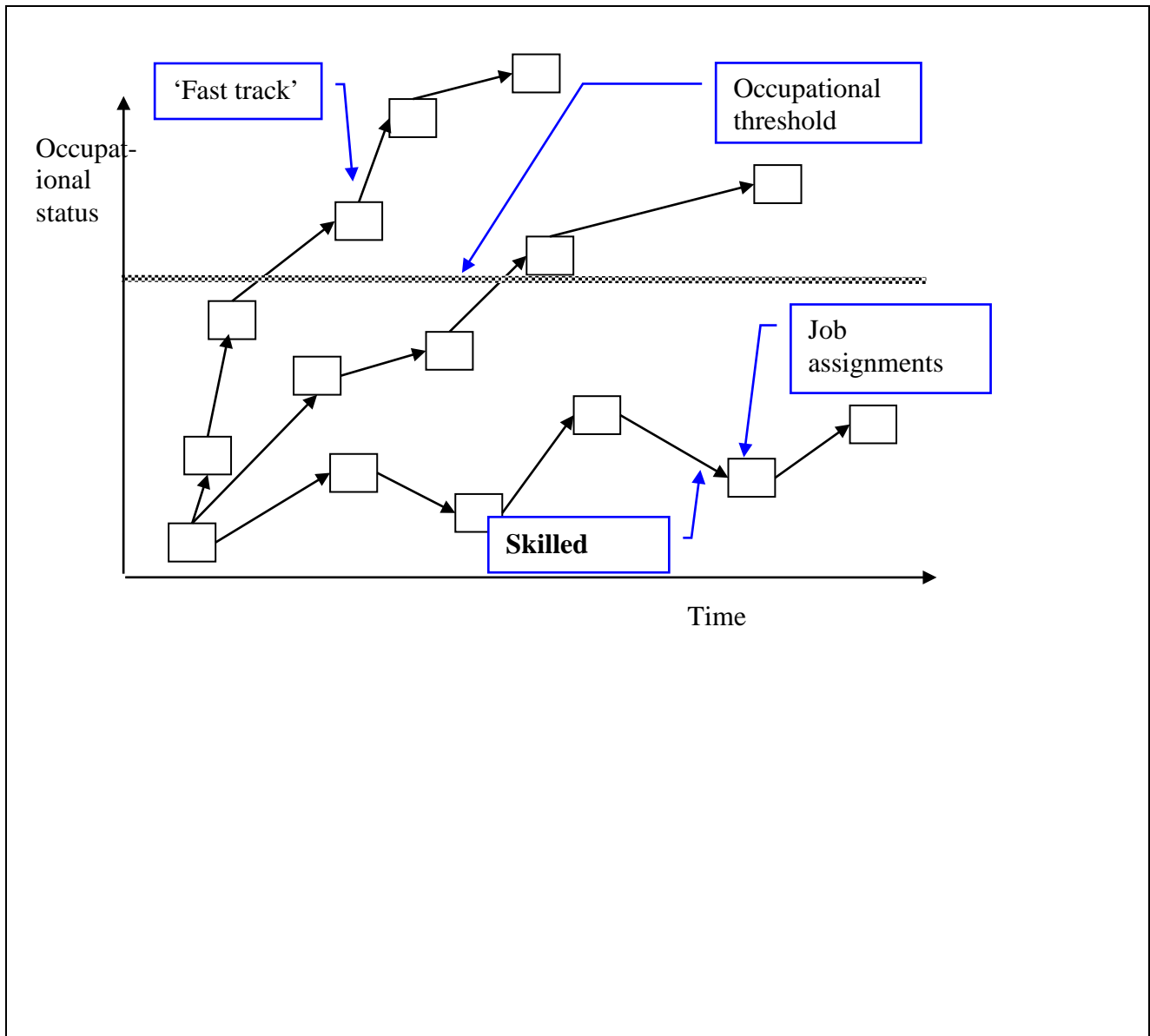
How do workers gain entry into these more fluid and less structured communities, and what happens to the training and quality control functions of selection into traditionally organised ILMs and OLMs? In some occupations, these institutionally regulated entry paths have eroded in recent years as employment on a more transient project-basis has spread, for example, in some knowledge intensive activities in the media, new technology and research. There, one-off production is common, and has required an organisational adaptation towards more transient structures. In many activities in the creative sectors, the development of a new product, be it a film, a piece of software or a research project often requires an intensive input of time and resources, whereas its subsequent reproduction is relatively easy and cheap, hence the problems of intellectual and artistic copyright (Baumann, 2003). In comparison with traditional manufacturing organisations, project-based organisation is less dependent on permanent structures, and so lacks the basis both for well-developed internal labour markets, and for employer investment in transferable skills.

A potential solution that has emerged in some activities in Britain might be described as ‘extended entry tournaments’ in which aspirant members of an occupation compete for peer recognition as full members of an occupational community. In traditionally structured occupations, they would have competed for entry into the firms that provided the best ILMs or the highest quality occupational

training places. If they failed there, they would move down the queue, and in a relatively short time would have either found a suitable employer, or reconciled themselves to a different occupation. In the less structured case, owing to the ambiguity of signals of successful entry, aspirant members may be tempted to persist for much longer. Because income levels tend to be low during this stage, they often draw on family economic resources for support (Sutton Trust 2006; Eikhof and Warhurst 2013). During this time, they take on commissions and short-term work for contacts and experience, hoping for the ‘break’ that will bring peer recognition and entry into the occupation.

One reason why this appears to be an economically viable form of labour market organisation can be found in Aoki’s analysis. In knowledge intensive activities, the boundary between the knowledge and skills of creative workers and their managers is fuzzy, and they may join forces to compete for funds from investors. Established members of an occupational community need to know whether their aspirant collaborators will produce work of the right quality, and will work well with their colleagues. In a study of legal partnerships, Landers et al (1996) argued that a tournament process was at work in which aspirants demonstrate their acceptance of occupational norms is by working very long hours. In less structured occupations, willingness to work in unstable and low-paid conditions while the quality of your work is being established – ‘waiting for the break’ – provides a similar mechanism.

Figure 5 Career tracks for an unstructured occupational entry for a given cohort



Adapted from Marsden (2011).

Figure 5 provides a stylised representation of the entry process into an occupation where there is little pre-established structure in the entry segment, and aspirants have to find work assignments, represented by the small boxes, that bring them relevant experience, network contacts and help them build up their career portfolios and reputations. It shows three possible career paths linking successive jobs or work assignments through which aspirant members might progress. These paths are known only *ex post*, and during their careers, aspirants know only about their past and present jobs. Progression is not always upwards. The next job may be better or worse than the current one, and aspirants do not know in advance whether their career is fast or slow track. The fuzzy grey line represents the threshold of peer recognition as a full member of the occupational community. Unlike in occupations with structured entry paths, there is no clear signal and no clear map, and aspirants may end up trapped outside the occupation but having left it too late to change orientation. These people have many of the skills needed within the occupation, and so may add to the competition for work.

In such tournaments, aspirants are under strong pressure to assume the costs of training and building up their work experience and contacts, which creates scope for increased rewards for those who succeed in becoming members, boosting the attractiveness of entering the tournament. If they lack

the funds themselves, they may draw support from their families who sustain them through years of work on a low income. The outcome is a form of social selection (Sutton Trust, 2006; Eikhof and Warhurst 2013). Firms benefit from their reduced training costs when employees bear more of the cost of gaining experience, and they also benefit from employees' apparent willingness to remain in the occupation's outer orbit long after their prospects of entry have declined. Such savings are likely to offset the pay cost of the small minority at the top.

Thus, in the less-structured labour markets of the knowledge intensive and creative industries, the overlapping of skills and knowledge of those with the managerial and worker functions, combined with the transient nature of projects, two problems appear to have called forth two institutional innovations. The first concerns the tournaments for funding which protect investor interests; and the second, the tournaments for peer recognition within a community of practice, which regulate the relationships between established and non-established members of the community.

Skills, subcontracting and voice relationships

A second example of innovation concerns the management of skill inputs across organisational boundaries using voice relationships to ensure supplier skill inputs are of the appropriate quality, and co-evolve according to the buyer's needs. In former decades, these activities might have been encompassed within a single organisational ILM.

A traditional way of thinking about make-or-buy decisions, and thus whether a group of workers would be included within an organisation's ILM, has been to emphasise the bargaining dimension, and thus to focus on product specification and price, and to ensure that the buyer is never dependent on a single supplier. Should the buyer organisation take direct control of the physical and cognitive assets of the supplier or should it continue to contract externally? If we follow Sutton's argument, mentioned earlier, about quality along supply chains, then it might seem that when skills and knowledge are such important contributors to quality, and thus potential sources of informational asymmetry, that the buyer firm should simply take control. Although this approach may prevent one kind of hold-up, threatening to switch to another buyer, it leaves another, namely that the workers and managers of the supplier unit collude, using their superior knowledge, to negotiate a better deal for themselves. Given that the buyer firm now owns its former supplier, it is harder for it to extricate itself from the relationship. As Gibbons (2001) argues, if one focuses exclusively on explicit contractual rights, then the problem of quality in a supply chain can seem intractable. However, forms of relational contracting open up a wider range of possibilities.

In a series of studies of buyer-supplier relations among Japanese and US firms, Helper and Sako (1995) illustrate the importance of 'voice' in long-term contractor relationships where supplier and buyer mutually adapt their skills and knowledge. The ownership of physical assets remains distinct but voice creates possibilities for a richer collaboration in the development of employee skills and of organisational capabilities in the supplier firms. In long-term voice relationships exit remains the option of last resort but joint skill and product development create opportunities for both parties to monitor each other's behaviour, and to signal to the other if they feel conditions are tipping unfairly one way or the other. Commitment, or 'loyalty', in Hirschman's sense, is valuable to both parties because it motivates effective voice and so facilitates collaborative production. Such relational contracting may be more valuable in some cases than in others. In particular it offers an alternative solution where worker and manager skills and knowledge in the supplier unit create scope for them to collude against the buyer unit whether it uses open-market contracting or integration into a single organisation's internal labour market.

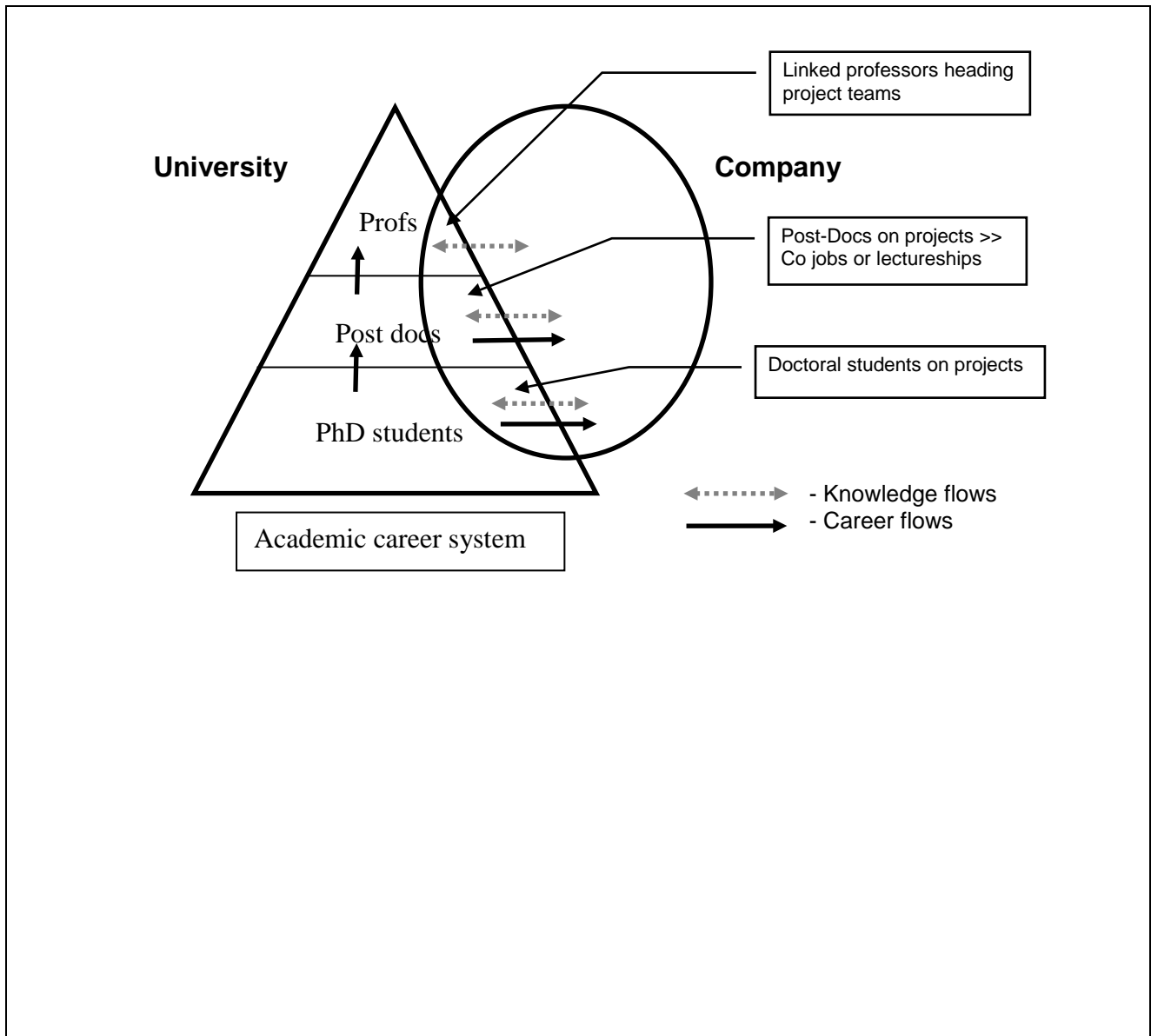
Overlapping internal labour markets

The third example concerns organisations that need to mobilise different capabilities in combination for a particular activity, and yet these capabilities fit best into different types of employment

systems. The five models of employment systems shown in Figure 3 treated organisations implicitly as focusing on a homogeneous set of capabilities and related skill resources. What happens if organisations need to combine two types of resources that are each best suited to a different model of employment system and governance structure? For example, what happens if the conditions which favour basic research conflict with those that favour commercialisation, as might occur with the development of a new drug?

One solution is illustrated by Lam's (2007) study of university-industry joint research ventures (Figure 6). These joint ventures sought to deal with the tension between two contrasted capabilities, one focused on discipline-based theoretical knowledge and the other on knowledge in commercial application. In terms of the models in Figure 3 above, one might think of the university as characterised by model (e), with a great deal of knowledge overlap between those in managerial and non-managerial positions, and with investors placed at arm's length. In the private firm, management has more clearly defined authority to determine the content of employees' work, and to relate this directly to its business objectives. The past experience of the firms highlighted the difficulty for them to run research operations. In previous decades, they had alternated between internalising and externalising their research functions. Internalisation had been associated with the development of narrow research agendas and a slowness to respond to new scientific advances, whereas externalisation had meant that firms lost their ability to assess the latest research developments and appreciate their commercial significance.

Figure 6 Project-based overlapping internal labour markets.



Based on Lam (2007).

To address these limitations, a number of knowledge-intensive firms had engaged in collaborations with major research universities. Unlike their previous internal research staff, university researchers compete to stay at the cutting edge of new developments in their field: access to research funds and journals depends upon being first to publish. At the same time, academics also have wide-ranging knowledge networks among their peers which they maintain by publication, conference presentations and general scientific interchange. Academic science places new knowledge in the public domain, and this brings reputation, promotion and access to research funds. Commercial science depends upon establishing property rights over new knowledge and its applications so that it can generate marketable products.

By collaborating with a research university, the firm can gain access to cutting-edge and pre-publication knowledge, and it is guided to the best scientists by the university's academic standing and the reputation of its researchers. The university stands to gain research funding. However, a suitable framework is needed if this collaboration is to work, and in particular if the bridge between academic and applied research is to be crossed. The solution identified in Lam's case studies was to construct a form of 'overlapping ILM' with knowledge, personnel and funding exchanges between

the two organisations. The firms would provide funding for basic research relevant to their commercial needs, and they would deal with its commercial application. The university would provide the mechanisms of peer review in publication and promotion necessary for the quality control of the scientists' work. The academic career system provides the rewards and incentives for the academic scientists involved. At the same time, by recruiting a number of former doctoral students and post-doctoral researchers, the collaborating firms can build up their internal capacity to absorb and evaluate new knowledge so that they can draw out the best commercial opportunities. By organising collaboration on a project basis, or by means of a series of projects, the academics retain a long-term career system, and the firms avoid becoming locked into paths of research that may cease to be commercially useful to them. In this way, the overlapping ILM helps to overcome some of the drawbacks of both the internalisation and externalisation strategies.

Societal dimension and conclusion

This chapter has outlined the implications for learning-by-doing and the accumulation of practical experience and skill in the context of organisational change. So far, the argument has been abstracted from societal influences on employment systems and skills. This link is explored historically by Martin in this volume. Here, the analysis suggests a number of ways in which societal influences may affect the current operation of employment systems. They could be thought of as coming from two principal directions: the nature of skills and knowledge that employees bring to the labour market from educational systems; and the way societal institutions affect the operation and choice of governance arrangements for skills and knowledge.

Educational systems clearly play an important role as they determine the platform on which experiential learning by doing can build. Does the educational and vocational training system encourage firm-based internal labour markets or does it support inter-firm occupational markets? The initial Franco-German study by the Aix group showed the influence of the labour market entry skills of French and German workers on firms' choice between the internal and the occupational models (Maurice et al. 1982). On the governance side, Johansen's study of Norwegian employer-based training showed that the capacity for collective action was a key factor in the development of employer-funded transferable skills. In particular, the existence or otherwise of strong employer coordinating bodies in different economies has been a major influence on the success of systems of occupational skills. An interesting development in the US has been that occupational licensing has expanded in step with the decline in unionisation and joint union-management regulated ILMs (Kleiner and Krueger 2010). The precise causes of this change are not fully known but one possibility is that if employers are less willing to engage in skill formation within ILMs, occupational skills provide an alternative route. If employees are to acquire these skills in sufficient numbers, they need a regulatory framework to ensure they can earn a return on their investment. Licensing is one method. On the other hand, for non-transferable skills a critical support is given by employment protection rules, whose strength varies considerably among OECD countries. Earlier in this chapter, it was argued that employees need some form of protection against bad faith dismissal threats if they are to invest in non-transferable experience. Otherwise, employers would face either reduced availability of such skills or reluctance on the part of employees to accept flexible, team-based working and the associated skill and knowledge benefits.

This chapter has sought to provide a partial review of the direction of travel of thinking on employment systems, skills, knowledge and labour market organisation, and to draw a link with the research on the changing competitive and funding environment in which firms operate. Sutton's (2012) work on globalisation and its impact on competition on quality offers a useful counterweight to the arguments about a 'race to the bottom' which would see the dismantling of ILMs as part of a cost reduction strategy by western employers. This chapter has sought to provide a means of understanding how and why they might be refocusing rather than disappearing, something borne out by the resilience of the proportion of long-term jobs in the advanced industrial economies

documented by the ILO (2003) and regularly shown in the OECD's Statview data on job tenures in different countries.

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