

Offshoring Professional Services: Institutions and Professional Control

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Abstract

We examine the reasons why one might expect it to be more difficult to offshore professional work than manufacturing work in a globalized world. We then provide data on the variations in a specific case — the offshoring of diagnostic radiology from the USA, UK and Singapore. We show that existing theories on the ‘offshorability’ of jobs have not captured how national institutions and occupational regulations continue to define professional work. We then review the question of supply from India’s perspective and report that both macro-institutional and organizational contexts make it complicated for Indian doctors to supply much of this service.

1. Introduction

Globalization is frequently described as having integrated national markets into one single market. In a review of the 1990s literature, Berger (2000) points out that ‘there is a common understanding of globalization as a set of changes in the international economy that tend to produce a single world market for goods, services, capital and labor’ (p. 44). Omae (1990) goes further to say that ‘interlinked economies’ have wiped out national borders. With respect to work, globalization has been associated with the movement of capital and the corresponding movement of jobs. For example, research on production value chains has suggested that production can occur wherever the right mix of skills, technology and market knowledge can be organized (Gereffi and Kaplinsky 2001; Gereffi *et al.* 2005; Sturgeon and Lester 2002).

Most examples leading to these conclusions, however, come from manufacturing and back office services. In a 1998 survey of the state of manufacturing around the world, *The Economist* stated that the world is witnessing an ‘emergence of a global structure for manufacturing’ (Carson 1998: 18). The prototypical examples of this global structure were provided from the textiles

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and electronics industries. Professional services were generally absent in these enduring descriptions of globalized production.

In 2005, however, a flurry of media reporting announced that globalization had reached diagnostic radiology, a highly skilled professional service. According to these articles, a large and growing number of US medical images were being read by low-wage radiologists in India. As we have shown elsewhere (Levy and Goelman 2005; Levy *et al.* 2006), these reports were highly exaggerated for the US market. More importantly, the debate belied essential distinctions between diagnostic radiology and well-known practices in non-professional work. In this article, we seek to address this distinction.

We first provide a theory that explains why national institutions are more likely to influence offshoring of professional services than that of manufacturing or back office services. We then provide data on the variations in a specific case — the offshoring of diagnostic radiology in the USA, UK and Singapore — to show how differences in national institutions continue to act upon market transactions of professional services even in a globalized world. We show how variations in national institutional configurations of health-care, and particularly the level of professional power in relation to the state, influenced the amount of work offshored, as well as the extent of control the radiologists were able to exercise over offshored work processes. We then review the question of supply from India's perspective, and report that both macro-institutional and organizational contexts make it complicated for Indian doctors to supply much of this service. We conclude with observations about factors that influence the professions' strategies towards globalized markets.

2. Variations in outcomes of globalization — professional vs. non professional work

Scholars have shown that countries, sectors, and industries are vulnerable to forces of market integration to different extents (Frieden 1991; Hay and Rosamond 2002). In previous literature, this variation has been attributed to differences in institutions (Hall and Soskice 2001), differential rates and patterns of institutional change (Streeck and Thelen 2005) and actors' abilities to influence economic integration (Hay and Rosamond 2002). But in this literature, there has been little focus on how globalization may impact professional work, where discretion and judgment are involved in the work performed, and the work is typically embedded in highly institutionalized fields.

In the case of professional work, three theoretical approaches suggest why global integration will be slower than it is for manufacturing or non-professional services. The first is an actor-centred explanation that hinges on professionals' superior power in controlling their work. Professions, because of their dominant position in the education, training and practice of a particular occupation, can effectively safeguard their work by mobilizing

institutional resources to oppose offshoring (Freidson 1970). In particular, Friedson theorized that a certain profession's control over its work is sanctioned by the state via a system of occupational licensing, thus creating a 'monopoly' over knowledge and resources (Freidson 1970: 117).

The second explanation is based on the structure of knowledge involved in professional work. This line of reasoning distinguishes between routinized work that can be specified into discreet rules, and work requiring high levels of skill and tacit knowledge, which is difficult to specify into rules. Examples of the former type of work, such as data inputting or medical transcriptions, are easily replaced by technological change (Autor *et al.* 2003). They are also thought to be more amenable to being offshored (Levy and Murnane 2004). Professional work falls into the latter category, and is not thought to be easily offshored. Because the tacit knowledge involved in professional work is hard to measure, overseas suppliers may find it hard to demonstrate quality, while buyers may deem it more risky to buy services from abroad.

A third argument for why professional work may lend itself less to being offshored than other types of work hinges on the nature of communication. Blinder (2006; Blinder 2007) ranked the 'offshorability' of different occupations according to whether they require 'face-to-face personal communication' and contact with end-users. In this classification, Blinder included the delivery of most healthcare services, including all work done by doctors, as 'highly non-offshorable' — he did not separate doctors' work into subspecialties. Although the criterion of personal communication overlaps considerably with the criterion of tacit knowledge, there are important differences. For example, while scientific discovery involves high skills and educational levels and thus would be difficult to offshore according to the tacit knowledge criterion, some scientific work requires little face-to-face communication, thereby making it 'offshorable' according to the communications criterion (Blinder 2007: 2).

The above reasons help to explain why professional services may be harder to send offshore than manufacturing or back-office services, but they do not explain variations we may observe in offshoring professional services across countries. In addition, these criteria assess what is *potentially offshorable* but cannot address variation within the same occupation and across countries in what is *actually offshored*. We believe these variations are best explained by another aspect of professional services — the institutional environment in which professional services operates, particularly the potential for a strong government role. We draw on concepts from theories of institutionalism (Powell and DiMaggio 1991; Streeck and Thelen 2005) and of agency (DiMaggio 1988; Lawrence and Suddaby 2006) to argue that national institutions determine how much professional work is offshored and how this process is governed in two ways. First, national institutions set regulations that govern offshoring practices directly. Second, national institutions determine the level of power professionals have in controlling their work.

3. Institutions and professional control

The stickiness of national institutions in the face of globalization has been traditionally explained in terms of path dependency, which emphasizes that institutions are self-reinforcing (Berger and Luckmann 1966; Collier and Collier 1991; David 1994; Hollingsworth 2006). But path dependency explanations tend to obscure the fact that institutions are maintained through active participation from actors in favour of the status quo, or despite actors' efforts to thwart the current state. We draw on existing literatures on agency and professional control to argue that professionals are likely to seek influence over policies and rules affecting their work, but that the extent of their agency will be heavily dependent on the level of their autonomy *vis-à-vis* the state.

Actors' propensities to exercise agency have been explained in institutionalist theory in terms of willingness on the one hand, and capability to access resources on the other (Lawrence 1999). In these respects, professionals have been described as being in a good position to influence institutions. Professions dominate the state of knowledge in their fields, and thus exercise considerable authority over educational institutions (Abbott 1988). Second, professionals are guaranteed virtual monopoly over their field of practice via regulatory and certifying institutions that purvey this sovereignty (Freidson 1970; Kleiner 2000). Finally, professionals exert normative control over institutional standards and practices by socializing new members into their occupational group (DiMaggio and Powell 1983; Kornhauser and Hagstrom 1982; Scott 2001). So professionals are both willing and in possession of resources — both material and normative — to exercise agency. However, professional power may also be challenged or constrained by the state. To understand how professional power may be curbed by government action, we need a more contextualized account of professional agency that defines it in terms of its position within the institutional milieu.

Previous research in agency has argued that actors impact institutional change in two ways — through rule-making activities on the one hand, and through legitimating activities on the other (Friedland and Alford 1991; Lawrence and Suddaby 2006; Suddaby and Greenwood 2005). Rule-making activities adhere to formal authority, whereas legitimating activities appeal to deep underlying logics that theorize the desirability of a particular institution over another. We argue that both these activities are mediated by the structural position of actors within the institutional milieu and their relationship to the state. Hence, we advocate both a more deeply embedded view of actors in their institutional terrain, as well as a more institutionalized view of action. In this more institutionalized view of agency, actors' abilities to influence institutions are not primarily a function of their social or political skills. Instead, they are enabled or impeded by their position in the division of labour within the institutional configuration (Battilana and D'Aunno 2009). This way of conceptualizing agency will allow us to understand not only when actors are able to contribute to changing or maintaining institutions,

but also when such efforts fail to produce the intended results, a question that institutionalist theory has been less successful in answering (Lawrence and Suddaby 2006).

For various reasons, including, as we noted earlier, the ambiguous nature of determining quality in professional work, states will seek to regulate the professional services. State intervention in professional services can take several forms, *inter alia*, the delineation of a public sector in which services are owned by the government, regulation of certification, the establishment of incentive structures for professionals and the introduction of reforms to change various aspects of professional work. For medical professionals, state intervention can vary along a spectrum. At one end, doctors can be employed by the state, and their work can be tightly controlled by government agendas. At the other extreme, we can imagine a situation where the state is ‘captured’ by doctors who use the state’s authority to legitimize their own goals of professional dominance.

4. Methods

This project began in 2004 with an investigation of strategies that Indian firms were taking to provide diagnostic radiologic reads to the US market. We verified that although many Indian entities had tried to provide services to the USA, only two had had some success in doing so. These two companies were also either currently providing diagnostic reads to hospitals in the UK and Singapore, or preparing to do so. In 2006, we expanded the project to conduct a comparison of policies and practices in the USA, UK and Singapore during the period 2002–2006. In all three countries, debates around offshoring diagnostic radiology culminated around 2004–2005, when the radiology profession in each country mounted a response to the perceived threat of offshoring their work. Thus, we were able to study the before-and-after dynamics of the impact of professional agency on offshoring outcomes.

For the purposes of our research, outsourcing is defined as the contracting out of any production or service that previously was performed in-house. The distinction between outsourcing and offshoring is relevant mainly in terms of national boundaries (Sako 2006). While outsourcing is a more generic term that includes contracting out to overseas establishments, we are interested in instances where outsourced work is performed by entities in other countries in the form of offshoring.

Data collection for the three client countries relied primarily on collection of documents and content analysis of media reports and secondarily on interviews. We used existing literature to map out the features of institutional contexts in healthcare and diagnostic radiology in the USA, UK and Singapore. We drew on various sources, including media reports, formal and informal interviews and correspondence with informants, to trace changes in the healthcare sector in general and in the practice of diagnostic radiology in particular. We identified specific print media, such as *The New York Times*

in the USA, *The Financial Times* and *The Guardian* in the UK, and *The Straits Times* (Singapore) in Singapore, as the main outlets for debates surrounding the offshoring of radiology reads. Thus, our content analysis was most comprehensive for these outlets, but also included Lexis–Nexis keyword searches for coverage on the topic by other media sources. We selected interviewees for the three client countries from hospitals that engaged in offshoring, domestic teleradiology providers and relevant professional associations. Interviews in the USA (six in total) were conducted both in person and over telephone; interviews in the UK (five in total) and in Singapore (two in total) were conducted by phone and by email correspondence.

Data collection for India, a provider country, comprised primarily of first-hand observations and interviews, and secondarily of relevant literature and information gathering through the Internet. Two month-long field trips to India were undertaken by the first author in 2004 and 2005, respectively. The first visit accomplished interviews (26 in total) with educational institutions and professional associations, and identified the two Indian entities providing services to advanced country markets. During the second visit, the first author compiled case studies of the two Indian firms. Case-study data collection included shadowing radiologists and technologists during a typical day at their work, sitting in on staff meetings, and conducting individual interviews with staff (8 in total). Additional interviews were conducted with other Indian teleradiology providers, as well as the Indian professional association in radiology (five in total).

In total, 52 interviews were conducted for this project. With the exception of a few interviews that were transcribed, we took handwritten notes of interviews and observations. Notes from interviews and observations were extracted onto a computer as soon as possible, and, in most cases, within the same day. A full list of organizations from which we selected our interviewees is attached as the Appendix.

An earlier article we wrote on the subject of offshoring radiology services from the USA to India in 2006 elicited written comments (19 in total) from practitioners and scholars following this topic. The final version of the article is a product of an iterative process of checking and cross-checking data and references between our own field notes, post-data collection commentaries from our interviewees, and correspondence with other practitioners and scholars in the four countries.

5. Diagnostic radiology as professional service

Diagnostic radiology is a medical practice that uses various imaging technologies to aid the diagnosis of diseases. Since radiology is an integral part of a chain of diagnoses, radiologists have historically had little control over *when* they work. Particularly in emergency situations, they must interpret images as they arrive and return a diagnosis in a limited time frame. At the same time, the portability of X-ray images means radiologists have always

had far greater control over *where* their work was done (Linton 2001). Since the early 1980s, the portability of the radiologist's work has been greatly increased by the digitization of radiology images. Whereas physical X-ray prints could be transported only short distances at a time, digital images can be sent anywhere where the radiologist has Internet access. Changes in technology since the 1980s, such as the continued improvement in scanners, increased the volume of digitized scans that radiologists interpret, as well as their variety.

We noted above that a key dimension of professional services is reliance on tacit knowledge. In the case of radiology, one indication of this reliance is the limited applicability of computer-aided diagnosis software — pattern recognition software that attempts to highlight possible abnormalities in an image — in this work. A second indication is the lengthy training required to become a radiologist. One result of prolonged education is that in all four countries that we studied, radiologists were relatively scarce compared with a high and growing demand for their skills. Presumably, the shortages are higher in countries where use of digitized technology in radiology is more widespread, but radiologists are also scarce in India. In many countries like the USA, government involvement in medical education has also restricted the supply of radiologists (Grumbach 2002; Reinhardt 1999).

There is considerable economic pressure to outsource (and, by extension, offshore) diagnostic radiology reads. New organizational forms and variable in and out-house contractual arrangements have emerged to create economies of scale in outsourced work. Most of these involve *teleradiology*, the practice of reading scans and delivering reports remotely (Margulis and Sunshine 2000). For a hospital with limited staff, a teleradiology firm can offer a way to quickly expand capacity. For a small hospital with limited night-time activity, a teleradiology firm offers a low-cost alternative to hiring a full-time radiologist for the night or requiring the hospital's own radiologists to be on night call (Goelman 2005).

Existing theories that predict the extent to which an occupation is offshorable offer ambiguous forecasts for diagnostic radiology. As mentioned, diagnostic radiology involves tacit knowledge that cannot be easily codified into rules (Autor *et al.* 2003). Although diagnostic radiologists typically do not interact directly with patients, they work closely with other physicians in the delivery of medical diagnosis — they are what Friedson called a 'colleague dependent' medical occupation (Freidson 1970: 93). Because knowledge is tacit, radiologists do not always reach the same conclusion given the same data (a frequently cited consensus rate is 80 per cent — see Potchen 2006). Our own observations of hospital radiologists suggest that the referring doctors' trust and personal knowledge of the radiologist they are dealing with can be important in dealing with unclear cases (Levy 2009). To the extent that face-to-face communication between specialist doctors, who order scans, and radiologists, who interpret them, is integral to ensuring the quality of diagnosis, hospitals will not offshore their reads (Blinder 2007). According to both the skills criterion and the communications criterion, then, diagnostic

TABLE 1
Salary Levels of Diagnostic Radiologists in the Countries of Study in 2006

<i>Country</i>	<i>US dollars^a</i>
India	35,000
Singapore (private sector)	95,000
UK (NHS)	140,000
USA	340,000

^a Excludes investments in equipment.

Sources: Interviews (UK, Singapore, India); <http://www.salary.com> (US).

radiology should be extremely difficult to offshore. On the other hand, compared with other types of work performed by physicians, such as surgery, diagnostic radiology is not geographically constrained. Similarly, the colleague dependent nature of diagnostic radiology alleviates the need for face-to-face communication, since medical training shares a common knowledge base, and doctors can be expected to easily communicate via teleconferences and emails. This then makes radiology appear a lot more likely to be offshored than, for example, pediatric care, which is ‘client dependent’ (Freidson 1970: 93).

The USA, UK and Singapore were all actively experimenting with different technologies and work arrangements in order to deal with varying degrees of supply shortages. In Table 1, we list the annual salary levels of diagnostic radiologists in the countries of study for 2006. This shows that all else equal, economic pressures to offshore diagnostic scans to countries such as India are greatest in the USA. In reality, however, we find that the USA sends the least proportion of its total scans to India. The UK offshores a significant amount of reads to other EU countries, including countries with lower wages, and harbours a potential route to offshore reads to India. Singapore offshores the most volume of scans to India. In the next two sections, we examine the reasons behind this apparent paradox.

6. National institutional contexts

We define national institutional systems of healthcare as regulatory and management structures governing healthcare and their accompanying logics (Friedland and Alford 1991; Immergut 1992; Scott 2004). Rather than provide a full description of the nature of these institutional configurations, which has been fruitfully and extensively done by others (see Harrison and Wood 1999; Peckham 2003; Scott 2004; Singapore Ministry of Health 1997, 2004), we identify salient characteristics for understanding propensities for offshoring professional services in healthcare. These are: i) who certifies professional work, ii) the percentage of public employment and ownership in healthcare, and iii) the structure of incentives for professionals. We then use this information to operationalize Freidson’s concept of professional

TABLE 2
Summary Comparison of National Institutional Contexts

	<i>System</i>	<i>Certifying authority</i>	<i>% Public</i>	<i>Incentive structure</i>	<i>Professional dominance</i>
USA	Managed exchange	Professional body	46% reimbursements in private sector ^a	Fee-for-service	High
UK	Professional bureaucracy	Government	71% employment ^a	Salaried by government	Medium
Singapore	State-controlled healthcare	Government	67% employment 80% ownership	Salaried by government	Low

^a Private versus public ownership ratios are difficult to estimate for the USA and UK because there are a number of quasi public operations.

Source: Centers for Medicare and Medicaid Services 2007 National Health Expenditure accounts (USA); National Health Services (UK); The Straits Times Singapore (Singapore).

dominance by categorizing the three sending countries as having high, medium and low levels of professional dominance in healthcare (Freidson 1970). A summary of the comparison of national institutional contexts for the three countries is provided in Table 2.

Managed Exchange: The USA

We characterize the US healthcare system as a *managed exchange system*. This system has traditionally enabled professional dominance over not only certification, but also medical education and practice. Governmental influence over the medical profession in the USA works primarily through funding and reimbursement policies, subsidization of medical education and legislation. Both direct public ownership and employment of healthcare professionals by the government are negligible. In 2007, various government agencies supplied 46 per cent of the reimbursement for healthcare costs to physicians.¹ But policies can have a wider impact outside of services directly funded by government agencies. For example, when Medicare, the agency that funds elderly care, decides on its reimbursement rates, other insurers follow suit, resulting in a larger diffusion of Medicare policy. The managed care environment, which came out of a movement to contain the rising cost of healthcare in the late 1970s and early 1980s, has arguably made physicians more cost conscious (Fine and Sunshine 1986; Scott 2004). Although there are variations within the managed care model, managed care organizations typically oversee costs and quality of service by choosing those physicians who exercise price-sensitive restraint in their clinical decisions (Fine and Sunshine 1986). In return, managed care organizations supply physicians with a network of patients and administrative support.

Despite the surge of managed care in recent decades, America's healthcare fee schedules have assured that physicians are among the highest paid in their profession worldwide. We believe that the fee-for-service structure of doctors' remuneration in the USA, by which doctors are paid proportionate

to the volume of services they generate, incentivizes American doctors to retain control of their services. The profession's umbrella organization, the American Medical Association, and the separate associations for medical specialties, control certification. They are also effective tools for collective action.

Professional Bureaucracy: The UK

The UK health system has, for decades, been governed by a single public agency, the National Health Service (NHS). We characterize the UK health-care system as a *professional bureaucracy*. Mintzberg (1979) and Mintzberg and Quinn (1991) defined the professional bureaucracy as a formalized organization in which the locus of control and authority derive from professional expertise. Scholars have pointed out that the NHS has been configured through a negotiation between the state bureaucracy and healthcare professionals (Harrison 1992; Klein 1998; Peckham 2003). Historically, re-organizations of the NHS, such as the establishment of health districts in 1974, the quasi-market reforms under the Thatcher administration and the recent Labour administration reforms, have challenged the nature of professional control, but have not altered it altogether. However, one area in which professional control *has* diminished is certification. While in the past, professional associations largely ran the system of certifications, since the mid-1990s certification has been charged to a central government agency, the Postgraduate Medical Education and Training Board (PMETB). While the primary aim of such changes was to standardize the qualification of professionals, additionally, it has routinized the cross-certification of medical professionals trained outside of the UK, particularly those trained in other EU countries. Currently, professionals residing in non-EU countries can also register with the PMETB provided they pass additional qualification requirements.

The interdependence of the state and the medical profession under a professional bureaucracy opens the possibility of larger-scale offshoring in the UK compared with the USA. In particular, two aspects of the professional bureaucracy can enable offshoring arrangements. The first is the willingness of the state to intervene to alleviate public need and advance its political interests. As we discuss in the next section, the government initiated outsourcing to abate capacity shortages in the public sector. The second is the incentive structure for professionals under a professional bureaucracy. Because NHS radiologists were salaried by the NHS until only recently, where some incentive schemes were adopted, UK radiologists have no direct economic interest in opposing work from going to the private sector or going abroad. Despite somewhat diminished professional control over systemic decisions, we believe the original architecture of the professional bureaucracy still defines the NHS. Reforms have merely had the effect of accentuating the status difference between NHS professionals and non-NHS professionals (who comprise a minority). Neither the salaried remuneration prior to recent

reforms nor the recent introduction of incentives contradicts the central notion of professional bureaucracy, whose tenet is co-ordination by expert authority (Mintzberg 1979).

State-Controlled Healthcare: Singapore

We characterize Singapore's healthcare system as a *state-controlled healthcare system*. In Singapore, the public sector provides roughly 80 per cent of the nation's total healthcare and employs 67 per cent of total healthcare professionals. Professionals in the public sector do not have agenda-setting authority or discretion in the allocation of resources. Historically, the institutional logic governing healthcare, like many other aspects of the Singaporean state, has been that ensuring citizen's health is part of the responsibility of the developmental state (Singapore Ministry of Health 1997, 2003). The government ultimately sets price guidelines and operative directions for public sector providers. Major reforms are introduced by the Ministry of Health, with typically only *post factum* engagement of healthcare professionals. The government controls medical education, and is the final authority in the certification of doctors. In particular, the government has historically used its authority to recognize the overseas certifications of foreign doctors and other healthcare professionals practising in Singapore as a means to augment its domestic healthcare workforce. Cross-certification is regarded by the government as a way to supplement lower provider-to-patient ratios in Singapore's public healthcare sector (Singapore Ministry of Health 2002–2004).

7. Institutions and agency in offshoring: before-and-after professional resistance

As we pointed out earlier in the article, all three countries faced pressures to offshore diagnostic radiology services. However, who initiated and controlled the initial practice of offshoring, the strength of radiologists' resistance to offshoring and the resulting outcomes are significantly different for each country. In the USA, radiologists tightly controlled initial forms of outsourced radiological reads. In the UK, resistance from radiologists was largely indirect, such as in the form of delayed referrals by in-house professionals to outsourced providers. In Singapore, the ministry of health has maintained near complete control throughout the offshoring process. Table 3 summarizes the initial practice of offshoring, professional resistance and current offshoring practices in the three countries.

USA

American diagnostic radiologists are not new to dealing with changing technology in their work. In 1995, 34 per cent of radiologic procedures and

TABLE 3
Summary of Offshoring Practices Before and After Professional Resistance

	<i>Initial practice</i>	<i>Professional resistance</i>	<i>Current practice</i>	
			<i>Controls</i>	<i>Destinations</i>
USA	Initiated and controlled by radiologists	Direct and collective Public opinion mobilization	US training and certification mandatory Ultimate responsibility of US provider	Spain, Australia, Switzerland, Israel, India
UK	Initiated and controlled by government	Collective but indirect	Quality controls Audits	EU, possibly India in future
Singapore	Initiated and controlled by government	Indirect and individual	'Guidelines' Random audits	India

Source: Data collected by authors.

73 per cent of the work performed by radiologists were in fields that had not existed or were only emergent a generation earlier (Margulis and Sunshine 2000). During the history of their profession, diagnostic radiologists have maintained control over changing technology by constantly revising their professional training. This knowledge has been essential in guarding the boundaries of their work, as with digitization and better-quality scans, the interpretation of radiologic images became more accessible to other specialists (Sunshine *et al.* 1993; Weisz 2006) and to technologists (Barley 1986).

Teleradiology in the United States was introduced by private groups of radiologists who saw a market opportunity. But remote diagnosis of radiological images precluded interacting with other specialists and communicating with patients, which radiologists considered integral to maintaining their occupational jurisdiction (Margulis and Sunshine 2000: 17). Thus, the profession sought to control the use of teleradiology in various ways. First, radiologists have limited the use of teleradiology for night-time work and excess daytime work. Teleradiology is still mostly used for preliminary consultations among radiologists practising in the same group rather than for outsourcing purposes (Goelman 2005: 99–100). Second, guidelines published by the American College of Radiologists prevent teleradiology firms from contracting with hospitals in a way that undermines the hospitals' in-house radiologists. This includes requiring that radiologists providing outsourced services be certified in both the transmitting and receiving states (see <http://www.acr.org>). Lastly, despite the capacity to deliver 'full' reads, teleradiology firms often limit their services to 'preliminary' reads that require the in-house radiologist in the ordering hospital to sign off on the final report.

Initial offshoring of radiological reads occurred primarily through American teleradiology firms, and involved identical operating arrangements as these firms' domestic businesses. The arrangements included equipping radiologists with certifications in the US states from which the scans were sent,

undergoing additional due diligence procedures with hospitals that sent the scans, and retaining the practice of providing only preliminary reads (Wiley 2005). Essentially, teleradiology firms sent their US radiologists to rented offices abroad where they could take advantage of time differences to interpret during the daytime scans that were sent during the night from the USA. Besides the lifestyle attractions to the American radiologists of working in places such as southern Spain, Switzerland, Israel and Australia, teleradiology firms have argued for quality benefits from day-time reading (Kalyanpur *et al.* 2003). If one agrees with the argument of productivity gains from overseas readings, the stationing of US radiologists in overseas offices is a net gain for US radiologic work — that is, no workforce losses are incurred by sending these radiologists overseas.

The much-rebuked exception to this predominant model was US hospitals contracting directly with teleradiology firms located abroad. In 2004, this included two teleradiology firms established in India, both firms that are part of our study. This practice was placed under severe scrutiny by the profession, as well as the American media (Pollack 2003). The Massachusetts hospital that sent its reads to one of the two Indian firms was forced to repeal its contract with this Indian firm (which we refer to as Firm A). The head of the radiology department in this Massachusetts hospital reported coming under direct attack by members of his profession. Currently, only about 50 American hospitals send reads to the second Indian firm, which we designate as Firm B.

The federal government influenced offshoring practices primarily through deterrence rather than direct policy intervention. For example, the Medicare policy that bans reimbursement of medical services performed abroad was devised to target US patients going overseas for medical treatment. However, US teleradiology companies sending their radiologists abroad cited this policy as the reason why they only provided preliminary reads from overseas locations (Goelman 2005). An additional institutional barrier in the USA was the legal context around medical liability. We were told by our Indian informants that, after the initial reports of offshored reads to India, it became extremely difficult for overseas operators to acquire coverage with US-based insurance companies.

The UK

In recent decades, the NHS system has faced difficulty in balancing timely and affordable universal care with increased demand for its services. Long wait lists for treatments and surgical procedures became a political liability to a succession of governments whose attempts to address the problem have largely failed (Harrison 1992; Klein 1998; Le Grand 1999). Diagnostic radiology, along with a number of other procedures, was believed to be contributing to lengthened wait times. In 2004, the government spearheaded an NHS-wide reform that included outsourcing radiologic scans taken at NHS hospitals to an independent service provider in the private sector. In June, 2004, the first outsourcing bid, which included outsourcing of scanning as

well as diagnostic interpretation, was awarded to a private sector company for a guaranteed business of 95 million pounds over five years. This company, in turn, subcontracted this work to multiple radiologic centres. These were mainly teleradiology centres located in other EU countries, including Eastern European countries such as Poland, where wages were considerably lower, as well as one in Australia. Radiologists working for the main contractor and its subcontractors included foreign-trained professionals practising in the UK after their certifications had been recognized in the UK system by the central medical education and training board (see our discussion of accreditation on p. 12). Thus, government-initiated reforms over which professionals had little control opened the way for significant volumes of offshoring.

The UK physicians reacted to the first wave of subcontracts, both individually, by making changes in their work practice, and collectively, through the professional association. First, according to our informants, NHS radiologic units became more efficient, presumably in response to a perceived threat to their domain. Second, non-radiologic NHS specialists were reluctant to refer their diagnostic reads to subcontractors. The guaranteed contract level went unfulfilled, and, in a second wave of subcontracting, the government did away with assured business levels, hence installing a form of quality control. Third, the Royal College of Radiologists (RCR), the largest professional association, raised quality concerns with subcontracted work. Since then, regular audits have become part of the NHS outsourcing scheme.

We note several important differences in the NHS radiologists' response from that of US radiologists. Unlike the intense lobbying and media advocacy mounted by the American radiologists, the NHS radiologists' reactions were indirect and consultative. They relied more on delaying referrals and providing inputs to government audits rather than on direct confrontation. We believe that NHS professionals lacked the economic incentive to strongly oppose these reforms as NHS professionals were salaried. Notably, the recent subcontracting of radiologic services was accompanied with salary raises for NHS radiologists. No NHS radiologist lost his/her job to subcontractors, and none is foreseen to be lost in the near future.

We believe that compared with the managed exchange system, the professional bureaucracy potentially will offshore more professional services to low-cost destinations. However, by contrast to a state-controlled healthcare system, professionals in the UK *did* exercise collective resistance to encroachments on their work, albeit indirectly.²

Singapore

Singapore has faced similar dilemmas of capacity shortage as the UK over its history due to rapid population growth, an aging population, and patients from abroad. According to Singapore's health ministry, the number of foreign patients seeking treatment in Singapore has increased by an average of 20 per cent year-on-year between 2004 and 2006 (Khalik 2006; Lee 2006).

Diagnostic radiology in Singapore faced two related chronic problems. First, due to the emphasis on universal coverage at the cost of investing in new technologies, Singapore had not yet fully transitioned to digital radiography (Lee 2006). In contrast to the conventional X-ray segment, however, Singapore was an early adopter of computed tomography (CT) and magnetic resonance imaging (MRI) technology. Secondly, due to technological impediments, as well as growing demand, wait times for X-ray reads classified as non-emergency cases were getting longer, particularly for Singapore's secondary public healthcare institutions, called 'polyclinics'.

In 2004, the government responded to both issues with a reform program that allocated \$2.3 million in equipping all of Singapore's polyclinics with digital technology. As part of this program, the government planned to outsource low value-added radiology work to an Indian firm. In government statements, officials discussed healthcare as an industry, following finance and petrochemicals, that would boost Singapore's economic performance in the global market. The government program included plans to attract more foreign patients to be treated in Singapore, as well as to provide telemedicine services — health diagnoses facilitated via the use of information technology — to patients abroad (Khalik 2006).

India was sought out as a destination for outsourcing Singapore's low-value radiologic work (e.g. X-rays and ultrasonography) so that Singaporean hospitals could free their capacity for higher value-added radiologic interpretations. It was expected that an initial three-month contract with Firm B, one of the Indian firms we studied, would be the precursor to larger-scale offshoring of low-value radiologic work (Khalik 2005).

Singapore radiologists responded to the planned multi-phase contract with the Indian firm mostly in the form of individual letters in the op-ed pages of *The Straits Times Singapore* in 2006. Notably, these occurred two years after the government first awarded the pilot program to the Indian firm. Radiologists raised two chief concerns: quality control and impeded skills development for Singapore's radiologists. Several of the radiologists writing in the op-ed columns argued for similar certification requirements and quality standards to be enforced in Singapore as the US profession required of offshore teleradiology. But the relatively muted response of the College of Radiologists, Singapore's professional association for radiologists, which issued a statement that essentially held up both sides of the debate on offshoring, paved the way for the ministry to continue with its plan (Velloor 2005).

The Ministry of Health responded swiftly (almost too swiftly, it appeared) to radiologists' reactions, and largely by adopting, wholesale, guidelines that the American professional body issued in the aftermath of the offshore debate there.³ Having responded in this relatively perfunctory way, the MoH proceeded to extend the pilot contract with the Indian firm to cover X-ray reads for all nine of Singapore's polyclinics. MoH's strategy included more ambitious aims beyond sourcing teleradiology from India. MoH planned to use the Indian firm's knowhow for Singapore's own entry into the global teleradiology market. In the summer of 2005, Singapore's National Health

Group, one of two health provider groups in the public sector, entered a joint venture with the Indian firm to enter global tenders in teleradiology, including those that they expected would be given out by large healthcare organizations in the USA (Khalik 2005).

We discern from the analysis above that the logic of Singapore's state-controlled healthcare system extended to recent reforms and to its offshoring practices. Under the national healthcare model, we find professional dominance at its weakest and the profession's ability to safeguard its work from being offshored most diminished.

8. The problem of supply

The proverbial picture that is conjured in discussions of the 'race to the bottom' in a 'flat' world under globalization is that of millions of workers in low-wage countries competing for paltry wages. Indeed, the availability, and even less, the willingness, of potential suppliers is seldom questioned when we discuss globalization. We find that the institutional structure of Indian healthcare, as well as the limited availability of qualified Indian radiologists, makes supply problematic in the global diagnostic radiology market. We also provide evidence, through two empirical cases, that organizational factors further complicate the matter. The relative scarcity of qualified supply in this case, while adding to our general argument that professional services are harder to offshore than are other services, does not weaken our proposition that the cross-country variation in what *is* offshored is explained by national institutions and their impact on professional dominance.

Macro-Institutional Context in India

India's healthcare system is federated, with states setting their own public health policies. Large variations exist in the availability and quality of healthcare across states, and between urban and rural areas. Rapid population growth, coupled with the absolute scarcity of healthcare professionals who furthermore are reluctant to relocate to rural areas, means that the country suffers from a chronic shortage of medical professionals. Table 4 shows the number of physicians per 10,000 people for selected countries; India's ratio is 6, while that of the USA, to take an example, is 26. In recent years, with economic growth and the growth of the middle class in urban areas, a new for-profit system of hospitals and clinics has emerged, which has attracted a disproportionately large number of recent graduates of medical schools.

As with all medical specialties, radiologists are in shortage in India, and those eligible to provide services to the markets covered in this study are even fewer. In 2005, the national professional association for radiologists, the Indian Radiology and Imaging Association, counted 5,500 registered and active radiologists for a population of 1.08 billion. By contrast, the American College of Radiology estimates about 27,000 US radiologists for a country of

TABLE 4
Density of Physicians per 10,000 Population (Selected Countries)

<i>Country</i>	<i>Physicians per 10,000</i>	<i>Latest year data available</i>
India	6	2004
Chile	11	2003
Singapore	15	2003
UK	23	1997
USA	26	2000
Sweden	33	2004
France	34	2006

Source: World Health Organization Core Health Indicators, available at http://apps.who.int/whosis/database/core/core_select.cfm

298 million. As of 2006, there are 7,698 graduate resident seats for all medical specialties in institutions recognized by the Medical Council of India. But only 156 of these seats award a Medical Doctor (MD) degree in diagnostic radiology, and another 100 award a Diplomate in National Board (DNB) in diagnostic radiology, the two degrees our informants deemed to be acceptable to overseas clients.⁴

Formal and informal institutions of training make radiologists eligible to provide teleradiology services to advanced markets an even smaller pool than the numbers suggest. Advanced markets such as the USA require teleradiology providers to have had the training to read multiple modalities (e.g. CT, MR, ultrasonography, nuclear radiology) and to recognize basic abnormalities in most regions of the body. In India, advanced scanning equipment, where available at all, may provide only limited access to medical students. Graduate medical education, as well as organizational practices, often emphasize specializing in a particular scanning technology rather than using multiple technologies in diagnostic investigation.

In theory, a natural source of radiologists familiar with international standards would be returning Indian medical graduates who have completed residencies abroad. The number of such returning graduates is very small, however. For example, in 2001, one-fifth of all foreign-trained physicians practising in the USA graduated from medical schools in India; many more physicians in the USA are of Indian descent (Forcier *et al.* 2004). But within the USA, there is fierce competition for the current 500 radiology residency slots, and interviews suggest that the majority of Indian medical students in US residencies are compelled to choose a specialty other than radiology.

In sum, India's success in teleradiology hinges on Indian firms' abilities to attract and retain qualified professionals from a limited domestic pool, as well as to repatriate Indian medical professionals practising in other countries, a goal that has proved difficult for the Indian firms we observed.

Organizational Contexts in India's Diagnostic Radiology

Indian firms that attempted to supply diagnostic radiology services to the three markets in this study faced obstacles in obtaining certification from

relevant authorities in destination markets, retaining skilled radiologists, maintaining profit levels, and, in the case of the US market, obtaining malpractice insurance. These barriers represent variable constraints placed on provider organizations by the institutional contexts in client markets. We provide short vignettes of the two firms that we studied, only one of which was relatively successful in overcoming all four obstacles. As mentioned in the Methods section, the two Indian firms we studied were chosen on the basis of the fact that they were the only entities that attempted to provide diagnostic radiology services to the USA. At the time of our study, both firms were engaged, in some form or another, in providing services to all three of the markets in our study. Nevertheless, the strategies and organizational structures taken by the two firms differed considerably.

The first firm, which we will call Firm A, is part of an Indian conglomerate that partnered with a large medical group in India that operates hospitals and medical schools. The conglomerate brought financing and managerial skills to the venture, while the medical group provided clinical expertise. Firm A attempted to recruit Indian medical graduates returning from the USA with US certification, but this attempt failed due to the difficulties we mentioned. Without the possibility of its reads being reviewed by a US-certified radiologist based in India, Firm A could not obtain malpractice insurance. Without malpractice insurance, the firm could not attract customers, and so Firm A discontinued the service.

Instead of diagnostic reads, the firm then turned to providing three-dimensional (3D) reconstruction of digital images. 3D reconstruction is the process of combining two-dimensional CT, MRI or ultrasound 'slices' into a virtual three-dimensional model that a doctor would use to highlight pathologies. In the USA, the person doing this work typically is an experienced technician with some additional training. In Firm A, Indian radiologists, aided by technicians, were put to the task. This business did not generate much profit for Firm A. Interviews suggest that the radiologists doing 3D reconstruction felt well remunerated but found their work monotonous.

Around the same time, the Indian medical group that partnered with Firm A, which we will call Medical Group A, learned of opportunities created in the UK market through the large government contract awarded to the private sector. Firm A, through Indian radiologists in the UK, established a branch office in the UK that became one of the NHS subcontractors. At the time of our study, this branch office only employed UK-trained and -registered radiologists to do the subcontracted work. But Medical Group A harboured long-term plans to bring back radiologists trained and registered in the UK and have them read scans from India.

The second firm we studied we call Firm B, which we mentioned earlier as the Indian company that the Singaporean Ministry of Health partnered with to target the global teleradiology market. It is headed by two US board-certified radiologists who returned to India for personal reasons after training in the USA. Since our interviews, a third radiologist trained and certified in the USA has joined the firm. The firm expects that more US board-certified

radiologists will join the practice in the near future. Firm B also employs a number of India-certified radiologists who assist US-certified radiologists in US work and work independently on images from countries other than the USA. Due to the privileges retained by the US-certified radiologists from their former American employers, the firm is covered by malpractice insurance. Thus, Firm B provides full reads to US hospitals rather than the customary preliminary reads. Firm B's model was a relatively high-profit generating model as compared with Firm A's.

Firm B charges its US clients half to two-thirds of what similar work would cost at a US hospital (Velloor 2005). It pays returning radiologists the lower end of US and UK salary scales, and it pays its India-trained radiologists roughly double what their compatriots earn. The pay, coupled with the opportunity for skills development, is cited by Indian radiologists as reasons for wanting to work there. As a result of its partnership with Singapore's National Health Group, Firm B has recruited 100 additional India-trained radiologists, and plans to provide diagnostic reads as well as 3D reconstruction services for markets as diverse as the UK, the Middle East, Singapore and other Asian countries.

9. Conclusion

This study contributes to the body of research on the characteristics of jobs that are 'offshorable' in a globalized world. We reviewed three reasons why one might expect the world to be less flat for offshoring professional work than for back office or conventional manufacturing work. These reasons are based, respectively, on theories of professional dominance, the structure of knowledge in professional work, and the nature of communication. We showed that in the case of diagnostic radiology, all of these factors were at play, but none of them explained the variation in the outcomes observed across the three countries we studied. Instead, the extent to which professional dominance was circumscribed by national institutions, and particularly the profession's relationship with the state, determined both the level of offshoring we observed, as well as the amount of control radiologists had over the process.

We further contribute to the body of work on offshoring by closely examining and problematizing the question of supply. Pundits and scholars in the developed world often depict offshoring as a low-wage threat to jobs in their part of the world. Seen from the point of view of the developing country, supply is not just a question of numbers, although the numbers themselves are often not adequate. Formal and informal training capacities complicate how many individuals will be qualified to supply these services. Acquiring institutional legitimacy in the client country via certifications distorts the incentives of the individual professionals who, upon acquiring certifications in the client countries, are then qualified to migrate to these destinations. Our study suggests, furthermore, that the controls put on professional work in the

course of offshoring can deskill the work, and makes it difficult for the professional worker in developing countries to continue to be motivated. Given the wage differentials and access to English speaking markets, India is the natural candidate for the type of low-cost offshoring predicted under conventional theories. That India's position as a supplier of these services is not guaranteed because of the limited supply of qualified professionals and difficulties of overcoming institutional barriers offers a stark contrast to developments in manufacturing, such as in the white goods trade, where initial regional product markets rapidly dissolved to reveal China as a dominant destination (Nichols and Cam 2005).⁵

The potential for offshoring to fundamentally or even partially change the nature of professional work is an important question that merits further study. In all three client countries in our study, the emergence of teleradiology led to a segmentation in radiologic work. In the USA, attempts to control teleradiology practices and deal with liability issues led to the consolidation of the two-step procedure of preliminary reads and final sign-offs, a procedure initially adopted in large hospitals to train medical residents. In the UK, the discrepancy between the types of work done by NHS doctors and non-NHS doctors was arguably made greater by large-scale outsourcing to the private sector. Singapore went the farthest in segmenting the work systematically, by location and also by the nationality of the people performing the work. The long-term impact of these different forms of segmentations on the practice of diagnostic radiology in these countries is difficult to foresee at this stage, yet it would be extremely valuable to understand.

Lastly, one should note that while our arguments about professionals' embedded agency contribute to building a nuanced theory of the offshoring of professional work that sets it apart from existing theories based on manufacturing settings, the details may vary across professions. In particular, whether professional dominance is supported by national or transnational markets may explain variations in the professions' strategies for controlling their work. This is analogous to Commons' theory of the emergence of national trade unions, where he argued that unions adopted the nationally federated organizational form in response to the expansion of product markets (Commons 1980 [1909]).⁶ Thus, accountants, for example, whose certification relies on international standards and whose practice has increasingly depended on global market expansion, may strategize to globalize their work. Organizational contexts may also matter for the professions' strategies *vis-à-vis* globalization. As Zucker (1988) pointed out, it may be that 'Professions do not create organizations; organizations create the professions they need' (pp. 39–40). Continuing with the accountants' example, accountants and financial analysts may adopt positive views towards establishing global standards for their profession as long as the organizations that employ them, typically consulting firms and multinational companies, spearhead the globalization drive. Hospitals have yet to adopt such globalizing strategies. As far as professional services in healthcare are concerned then, institutional barriers are real and useful for the professions. To the extent that

institutional frameworks differ across nations, globally integrated markets have yet to emerge for professional services in healthcare.

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Notes

1. National Health Expenditure Accounts compiled by the Center for Medicaid Studies, <http://www.cms.hhs.gov/NationalHealthExpendData/downloads/tables.pdf>
2. Notwithstanding the moderately high offshoring potential exhibited in the UK's professional bureaucracy model, an additional macro-institutional barrier in the UK proved to be EU regulations requiring patient consent prior to sending patient data to non-EU countries deemed to lack laws for protecting personal data. This institutional framework can act to deter offshoring outside of the EU in the future. However, as long as wage disparities exist among EU countries, a relatively low professional dominance in the professional bureaucracy would predict more offshoring from these countries than from countries with a managed exchange framework.
3. See <http://www.moh.gov.sg/mohcorp/mediaforums.aspx?id=4642>, 'Quality of Outsourced Radiology Assured'.
4. See Medical Council of India (<http://mciindia.org/>) and National Board of Examinations (<http://www.natboard.nic.in/>) websites. Diplomas in diagnostic radiology (the DMRE and the DMRD) were not considered by our informants to be qualifications acceptable to overseas clients.
5. We are grateful to BJIR editor Alex Bryson for calling this to our attention.
6. We thank Howard Gospel for this analogy.

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Appendix: List of organizations interviewed

India

All India Medical Sciences
Apollo Telemedicine Enterprises Limited
Apollo Telemedicine Networking Foundation
EValueServe
Firm A
Firm B
Government of India Division of Medical Education
Indian College of Radiology and Imaging
Indian Institute of Management, Bangalore
Indian Radiology & Imaging Association
Institute for Human Development
Institute of Economic Growth
Jawaharlal Nehru University
Ma Foi Consultants
Medical Council of India, Delhi Chapter
Medical Group A
Narayana Hrudayalaya Hospital Group
Sree Chitra Institute for Medical Sciences and Technology
V.V. Giri National Labor Institute

Singapore

Large Private Radiology Group X
National University of Singapore, Department of Diagnostic Radiology

UK

Cambridge University, Department of Radiology
Royal College of Radiologists

Teleradiology Firm X

Teleradiology Firm Y

USA

Brigham and Women's Hospital, Department of Radiology

Brookings Institution

Hospital A

Hospital B

Massachusetts General Hospital

Robert Wood Johnson Hospital, Department of Radiology

(For confidentiality reasons, we do not disclose names of individual interviewees.)