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India's Outsourcing Industry and the Offshoring of Skilled Services Work: A Review Essay

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1. Introduction

In both the popular and scholarly discourses regarding the nature and impact of offshoring of knowledge work from the advanced to developing nations and regions, there are two main diverging views on the employment impacts of globalization. These perspectives are perhaps best expressed by Blinder[1] and Leamer[2] on the question of whether the world is becoming "flat." On the one hand we have Blinder's accounting of occupations based on the trade-ability of the work itself, suggesting that a significant portion of work done in the developed world could in principle be offshored, creating a new industrial revolution as the developed economies change toward one where in-person services dominate. Blinder finds that many occupations and resulting employment are susceptible across the spectrum of skill content, pay, and occupational status; Thomas

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[1] A. Blinder, Alan S. "Offshoring: The next industrial revolution." *Foreign affairs* 2006, 85(2):113–128.

[2] E. Leamer, "Review: A Flat World, a Level Playing Field, a Small World after All, or None of the above? A Review of Thomas L. Friedman's 'The World is Flat'." *Journal of Economic Literature* 2007, 45(1):83–126.

Friedman's[3] book *The World is Flat* provides the most popular expressions of Blinder's viewpoint that offshoring presents a fundamental challenge to employability in developed nations, raising the possibility that only services which must be performed in-person are ultimately safe. Leamer, on the other hand, argues that education, innovation, and agglomeration economies will ultimately result in creative, complex, relationship based jobs being retained in the developed world while simple codifiable tasks go offshore. Analogizing from the original industrial revolution, he expresses the view that the work that can and will be offshored is likely to be mundane and will be performed by overseas helpers for the information age equivalent of craft workers in the developed world, and that such work constitutes a small and shrinking portion of jobs.

Thus, on the one side are those who view offshoring as a significant threat to the developed world, while on the other side are those who expect that the creative destruction of trade will create significant non-offshorable employment opportunities across the range of skill levels. In this review essay, we examine the premises of these divergent perspectives on offshoring, frame a series of fundamental questions on the phenomenon of intellectual services offshoring, and provide a preliminary framework for analyzing this type of offshoring. We consider the offshoring of computer services, an industry which involves a wide spectrum of work - from complex tasks that are difficult to offshore to simpler tasks – that allows for a nuanced examination of our questions of interest. This essay is also informed by 13 open-ended interviews with technology officers of US companies as well as the project managers of an Indian outsourcing company to which jobs have been offshored from these US firms; we use these to help develop the key questions going forward.

In reviewing the literature that has been published in the last decade, we see the debate as centered on the following questions: "what *can* be offshored[4]," "what *will* be offshored," and "what are the *limits* of offshoring[5]"? We therefore organize this essay around these questions. In addressing the question of what *can* be offshored, we examine the debate among researchers on what work can be done abroad, as well as raise new

[3] T. Friedman. *The World is Flat: A Brief History of the 21st Century*. New York: Farrar, Straus and Giroux, 2005.

[4] E.g. Blinder 2006, *op cit.* A. Blinder. "How many US jobs might be offshorable?" *World Economics* 2009, 10(2):41–78. Leamer 2007, *op cit.* M. Piore. "The Limits of the Division of Labor in Design and the Prospects for Off-Shore Software Development in Mexico." Pp. 20–22 in *The Software Industry in the Developing World Workshop, Yale University,* 2004.

[5] P. Jensen. "A learning perspective on the offshoring of advanced services." *Journal of International Management* 2009, 15(2):181–193.

questions about the feasibility of offshoring. We examine the literature on work practices in the IT industry and contrast what is known in high skill offshoring of computer services to what is known about call centers and other areas of offshore work. We focus on disaggregation, or the breaking down of tasks into smaller components as a critical theme for this question.

In terms of what *will* be offshored, we propose a framework for understanding the type of work and processes involved in offshoring that treats skills and wages as separate dimensions, and seeks to understand the transformation of work through offshoring. In contrast to many researchers who see offshoring as a static substitution process, we emphasize changes in work processes, which help us advance an understanding of offshoring as a dynamic process that does not merely reflect a change in the location of work. These results push us to think about offshoring as a potential change in occupational and industrial organization, and the nature of the work being done itself.

To address the question of the *limits* of outsourcing, we use our interview data to consider the nature of knowledge transfer and functional collaboration across distances and cultures, as well as the strategic, practical, and regulatory constraints. We see fundamental questions here regarding the existence and maintenance of a non-offshorable corporate strategic "core" and whether the movement of offshoring up the value chain ultimately gravely threatens that "core." This essay is organized as follows: after defining our terms within a discourse which is famously confused, we address each question in sequence, incorporating relevant literature and interviews. We conclude with a discussion of our findings, and raise some fundamental questions for future research.

1a. Definitions

We follow others in viewing the debate as suffering from definitional problems related to "muddled" constructions and different uses of key terms[6]. Thus, we focus on trade in services that is arm's-length, with buyer and seller remaining in separate physical locations not requiring geographical proximity, and call this offshoring where the separate locations are two different countries. We further restrict our focus to impersonally delivered and therefore tradable services, which Blinder[7]

[6] J. Bhagwati, A. Panagariya, and T.N. Srinivasan. "The Muddles over Outsourcing." *The Journal of Economic Perspectives* 2004, 18:93–114.
[7] Blinder 2009, *op cit.*

contrasts to those that are personally delivered[8]. We do not use the terms "outsourcing" and "offshoring" interchangeably. We use the term "offshoring" to refer to all arms-length cross-border trade in services, including when a firm offshores production to its own "captive" offshore arm, and reserve the term "outsourcing" to the special case where a firm hires a secondary firm (an outsourcer) to perform the work. Our examples of the Indian IT industry are therefore examples of "offshore outsourcing," which as used in this paper refers to the case where work has been outsourced to a secondary firm, which then performs the work overseas.

1b. Interview Methodology

We met with executives from companies that were engaged in outsourcing and offshoring work to India. In Appendix A, we present the background of thirteen individuals at both U.S. firms engaged in outsourcing and Indian offshore outsourcing firms across all levels of the organizational hierarchy that we interviewed. The titles of our interviewees include Chief Administrative Officer, Chief Information Officer, and Chief Operating Officer, and are listed in Appendix A. We also spoke at length to others in top management who were directly involved in outsourcing activities such as Executive Vice-President and Associate Vice-President and others across organizational hierarchy levels such as Senior Director, Senior Manager Principal Diversity Officer, Team Lead and Module Lead. Our interviews lasted between sixty and ninety minutes. We used semi-structured interviews addressing the question of what can and cannot be outsourced in their organization's specific context. We recorded and transcribed these interviews when we were given permission. For interviews in which the participants did not want to be recorded, we took extensive notes. We summarized these interviews after they were completed.

[8] We also discuss trade that involves the seller moving to the physical location of the buyer, as when workers engage in temporary migration, as this is often a pre-requisite and enabler of arms-length trade in the examples we use from the IT industry. This is commonly referred to as body-shopping.

2. What can be Offshored?

There is a strong division among those who have studied the potential impact of offshoring relatively high skill service-sector jobs from the U.S. to developing countries. On the one side are those who view it as a fundamental challenge to employability in developed nations, akin to the effects of globalization on manufacturing, where ultimately only services performed "in person" are safe from the offshoring threat (most notably, Blinder[9]). On the other side are those who see it as a more limited phenomenon, insignificant in terms of the volume of trade in the global economy, and easily understood in terms of traditional comparative advantage a la Smith and Ricardo.[10] Most researchers tend to think of jobs that are being offshored as those that are routine and can be broken down into simple tasks (See for example Acemoglu and Autor; Autor, Levy, and Murnane; Leamer[11]). Piore[12] further suggests that there are limitations in the divisibility of complex services work such as software. But in contrast to the notion that only simple jobs can be offshored, Autor[13] suggests that even high level executive jobs, and creative jobs can be offshored i.e., that overseas workers can perform these functions as much as anyone else, although that is not what is taking place. Consistent with this view, Blinder[14] finds no correlation between skill levels and the offshorability of jobs in his highly cited study.

Blinder's decision rule about whether a job is offshorable or not is whether the service requires to be personally done at a U.S. work location (e.g., barber, nurse) or whether the service can be delivered electronically, and if so whether its quality is degraded when delivered electronically. Based on this definition, Blinder[15] finds that between 28 and 42 million

[9] Blinder 2006, *op cit*. Blinder 2009, *op cit*.

[10] Bhagwati et al. 2004, *op cit*. Leamer 2007, *op cit*. G. Mankiw, and P. Swagel. "The politics and economics of offshore outsourcing." *Journal of Monetary Economics* 2006, 53(5):1027–1056.

[11] D. Acemoglu, and D. Autor. "Chapter 12 - Skills, Tasks and Technologies: Implications for Employment and Earnings." Pp. 1043–1171 in *Handbook of Labor Economics*, 2011, vol. Volume 4, Part B, edited by A. Orley and D. Card. Elsevier. D. Autor, F. Levy, and R. Murnane. "The Skill Content of Recent Technological Change: An empirical exploration." *Quarterly journal of economics* 2003, 118(4):1279–1333. Leamer 2007, *op cit*.

[12] Piore 2004, *op cit*.

[13] D. Autor. *The Task Approach*. National Bureau of Economic Research, 2013. (http://www.nber.org/papers/w18711).

[14] Blinder 2009, *op cit*.

[15] Blinder 2006, *op cit*.

jobs (30-40% of all jobs in the U.S.) are in principle offshorable. In a study using different methods, Blinder and Krueger[16] also find the concept of offshorability detached from skill and wage, estimate that 25% of U.S. jobs are offshorable, and find that 19% of workers say their jobs can be done from a remote work location. This research suggests that there is no connection between a job's "offshorability" and the skill level needed to perform it.

International trade researchers and organizational economists have emphasized additional factors that shape the decisions of firms to either vertically integrate or outsource functions. One focus has been on the transaction costs involved, including the number of vendors offering services, the difficulty of customizing relationships and contracts, the legal environment surrounding the enforceability of international service contracts, the size of firms and the ability to scale efforts[17]. Another indication of the importance of transaction costs is that a significant reduction in information and communications technology (ICT) costs increased the willingness of firms to offshore, leading especially to increased offshoring by more ICT intensive firms[18]. In knowledge intensive industries, there is an additional concern about the ability to retain control over knowledge assets. While physical capital is often excludable in that control of its use can be maintained by a firm, even if located overseas, knowledge capital can more readily be captured by others (is non-excludable). Firms that rely more on non-excludable knowledge capital are more likely to concentrate overseas investments through foreign direct investment rather than outsourcing arrangements[19].

Another perspective to understand the connection between skills and offshoring can be found in Leamer's[20] master-helper metaphor. Here, offshoring is akin to a master craft worker making all the decisions, and then parceling out simple and well-specified tasks to a variety of low

[16] A. Blinder, and A. Krueger. Alternative Measures of Offshorability: A Survey Approach. *Journal of Labor Economics*. 2013. Pp. 97-128.

[17] G. Grossman and E. Helpman. Outsourcing in a Global Economy. *The Review of Economic Studies*, 2005. Pp. 135-139. F. Merino and D. Rodríguez. Business Services Outsourcing by Manufacturing Firms. *Industrial and Corporate Change,* 2007. Pp. 1147-1173

[18] L. Abramosky and R. Griffith. Outsourcing and Offshoring of Business Services: How Important Is ICT? *Journal of the European Economic Association*, 2006. Pp. 594-601.

[19] Y. Chen, I. Horstmann, and J. Markusen. Physical capital, knowledge capital, and the choice between FDI and outsourcing. *Canadian Journal of Economics*, 2012. Pp. 1-15.

[20] Leamer 2007, *op cit*.

skilled helpers[21]. This view suggests workers who possess the greatest skill will maintain their jobs and emerge well compensated from globalized trade in services due to their comparative advantage, not that jobs with any skill level are offshorable.

In evaluating these perspectives, it might be useful to hearken back to the first industrial revolution. We venture that if we had looked at the dictionary of occupational titles in the mid-19th century (if it had existed), we might have seen a lot of master craft workers, whose jobs we likely would have concluded could be replaced by craft workers in another location, consistent with Blinder's view of offshorability. But if one adopted Leamer's perspective, these workers would be less threatened than workers whose jobs were lower skill, routine, and most threatened by market forces. This latter view would certainly have held up under early industrialization conditions, as craft workers hired apprentices and lower-skilled helpers.

We found that the perception of those in the companies in the U.S firms engaging in offshoring we interviewed is that the jobs they send away are routine and low skilled. The Chief Administrative Officer of a Bank that had offshored tasks to India observed "*Either you do it because it is cheaper or do it fundamentally because you don't want to do it or you don't want think about it. It is so non-core to your business that it is a management distractio*n." (Interview 1, Appendix A). Similarly, the routine-creative distinction was also embraced by the Chief Information officer of a US based online network company, who suggested: "*Business leaders will decide what to outsource autonomously. IT people will step in to decide what is better to do onshore and what is better to outsource offshore. It is a very ad-hoc decision and no rigid decision rules exist. One of the factors we look at is the extent to which routine or creative."* (Interview 2, Appendix A)

The Executive Vice President and Chief Operations Officer of a health care organization based on the U.S. offered support for Leamer's view: "*The jobs that we are looking to outsource for us fall into 2 categories may be 3 categories. One is just purely transactional, adjudicating and processing claims from the provider. They don't touch they don't talk on the phone; they are doing their work at the back or ensuring that the claim is processed correctly or enrolling the members... The second is application development... If you are really good about defining the requirements, defining it and giving it someone else who has actually established really good quality standards as some of the really good offshoring companies, they will program what you tell them to program with a very high level of accuracy. It puts the*

[21] Leamer also discusses wide-ranging limitations on offshoring such as agglomeration economies, transportation costs (broadly defined), and a broadened definition of the concept of "in-person."

onus back on the companies to be really good about their requirements… you have to be much more clearer about your requirements." (Interview 3, Appendix A)

To be sure, a lot of work that is offshored is consistent with this picture. For example, the offshoring of call center work, billing services, accounting, coding of legal documents and so forth are examples of simple routine tasks that have gone to India (see Kuruvilla and Ranganthan[22] for a more detailed list of such jobs). Offshoring of call center work is often on the lower end of customer service support, with little employee discretion and tight monitoring overhead[23]. Following call centers, the computer programmer occupation and the IT industry have seen a large amount of offshoring as well. Research on the Indian IT industry found that Indian IT companies in the late 1990s were "providing relatively simple software programming and coding services, exploiting its superior access to a supply of cheap software programmers, and with only limited degree of technical and managerial contribution[24]." Arora et al. concluded that Indian firms needed to move into higher value services and products, and improve their software development methodologies to realize their potential. Managers at U.S. firms reported, "the type of work outsourced was neither technologically very sophisticated nor critical to their business." Parthasarathy[25] writes that Indian firms continue to do lower value-added work, with few signs of innovation exemplified by Silicon Valley.

To return to the industrial revolution metaphor, there is some evidence that supports the view that work inside India's software factories increasingly resembles factories during the industrialization and proto-industrialization periods. Detailed case studies of the current labor processes in place in India's IT industry suggest that Indian IT firms utilize neo-Tayloristic management techniques that place a focus on measured productivity, implement quality processes that place an emphasis on documentation and process adherence, and "excel" at

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[22] S. Kuruvilla, and A. Ranganathan. "Economic Development Strategies and Macro and Micro-Level Human Resource Policies: The Case of India's Outsourcing Industry." *Industrial and Labor Relations Review* 2008, 62:39.

[23] R. Batt, U. Holtgrewe, and D. Holman. "The Global Call Center Report: International Perspectives on Management and Employment." *Research Studies and Reports* 2007. Retrieved (http://digitalcommons.ilr.cornell.edu/reports/13).

[24] A. Arora, V.S. Arunachalam, J. Asundi, and R. Fernandes. "The Indian software services industry." *Research Policy* 2001, 30(8):1267–1287.

[25] B. Parthasarathy. "India's Silicon Valley or Silicon Valley's India? Socially Embedding the Computer Software Industry in Bangalore." *International Journal of Urban and Regional Research* 2004, 28(3):664–685.

dividing work into small pieces[26]. Thus, even though the work is more circumscribed, the possibility exists that a new "industrial revolution" in services is also taking place[27]. This kind of industrial revolution, one brought about by changes in production and the nature of work, could lead to rapid increases in productivity as did the previous one, as the tools people used shifted away from craft and toward Fordist mass production.

Yet, there is some nuance here. Perhaps not surprisingly, rather than taking the view that they are providers of low skill services merely performing cost arbitrage, the perception of the outsourcing companies in India was very different. Not only are they cheaper, Indian IT firms and the offshore industry tend to believe that they provide a superior product through higher quality and greater predictability, as well as developing the ability to break down complex tasks into simpler components. Thus, in addition to taking on already well-specified methodologies, the Indian IT companies also see themselves as playing a role akin to industrial engineers, breaking down the complex functions of the client companies into ever simpler tasks that can be reasonably offshored. Their workers perform both the tasks of the master and the craft worker, the industrial designer and the factory producer. A senior manager at an Indian Offshoring company told us *""[IT is] the first of the so-called services which is very similar to manufacturing. You send out a spec, somebody makes it as per spec, you compare with spec, quality is cleared, you inspect it, you ship it. Same process is followed in IT, just that it's not physical. Therefore it's much faster, much more iterative, and much more real time."* (Interview 4, Appendix A).

The idea that routinization is replacing the craft worker can also be found in this observation by the Director of a large Indian Offshoring company *"[We have an] automated, factory approach, the same thing as an assembly line. And that is increasing quality and delivery. … I mean why is it that they [software development projects] go wrong so many times? It is because they are not focused on engineering, they are focused on individuals who are brilliant in doing coding. But here it has become a science of engineering. Engineering makes it much more predictable,*

[26] C. Upadhya. "Controlling offshore knowledge workers: Power and agency in India's software outsourcing industry." *New Technology, Work and Employment* 2009, 24(1):2–18.

[27] Our discussion here of a potential services industrial revolution brought about by changes in management practices and technology related to information (e.g. (U. Karmarkar. "The Industrialization of Information Services." Pp. 419–435 in *Handbook of Service Science*, 2010.) is distinct from Blinder's discussion of industrial revolution brought about by offshoring of services work. Blinder 2006, *op cit.* more broadly refers to a "third industrial revolution" whereby the scope of tradable services expands due to advances in information transmission per se. Our definition has more to do with the changes in management practices of services workers enables by technology.

maybe removes the fun, but it becomes much more predictable." (Interview 5,Appendix A). Finally, the idea that these type of jobs can be broken down into its smallest component parts and shipped overseas can be seen in the response of an Associate Vice President of Transportation & Services in a large IT offshoring firm. "*I believe that you have to break down the project into pieces. Today we are good at breaking down, okay this has to happen onsite and this can go offshore. If you follow this breakdown of the work into smaller pieces what requires client interaction, client approval, client review do that on-site. Once the sign off is done then take it to offshore. I always relate this to civil engineering. If the client wants a house, discuss the house with him. Once the design is discussed you don't need the client. We can do everything without the client."* (Interview 6, Appendix A).

To return to the historical metaphor, the movement to the factory in later periods of industrialization led to increased production and efficiencies through fully breaking down the tasks of the master craft worker, who was highly skilled and knew how to perform every stage of the production process, into much simpler, deskilled tasks which could be doled out to the less skilled workers. The ultimate outcome was the fully developed Fordist factory in the U.S., with many unskilled jobs, and a few industrial engineers who designed the work and broke down the tasks – but few skilled craft workers. The historical factory also increased the scale of production to allow a single plant to serve customers in national and international markets, separating the craft worker from the local community. In the context of offshoring, then, we might ask whether the breaking down of tasks and development of software factories similarly undermines the role of the craft worker / artisanal software programmer?

But if one looks at the offshoring landscape today, there is enough evidence to suggest that a range of jobs are being offshored (it is worth noting that there is very little reliable data regarding the number of jobs offshored). Not only are more complex jobs offshored, but the range of occupations and professions involved is multiplying rapidly. As Sako[28] points out "Tasks requiring high levels of skill that were formerly considered the sole province of the advanced economies are being performed offshore on behalf of corporate and individual consumers in advanced economies. These tasks involve reading X-rays, carrying out lab experiments for new drug discovery, developing engineering design, administering payroll for companies and preparing documents for filing

[28] M. Sako. "SASE Annual Meeting 2012, MIT, USA Professionals Between Market and Hierarchy: a Comparative Political Economy Perspective." *Socio-Economic Review* 2013, 11(1):185–212.

patents." Thus, it is common to see offshoring in many industries and occupations: video special effects and gaming, financial analysis, accounting and compliance, engineering services, and pharmaceutical research and development jobs. Other fields such as radiology are in very early stages or have been blocked by professional and quality concerns.[29]

There is also evidence that the nature of the work gets transformed in the offshoring process. In their case study of pharmaceutical R&D offshoring, Finegold, Erhardt, and Sako[30] find that the nature of the task is alterable in the course of offshoring. These studies suggest that offshoring is a dynamic activity. Thus although the dominant portrait is one of lower-skilled activities being offshored, there has been an acceleration in the offshoring of more highly-skilled activities including R&D, design, and data analysis to the Indian IT companies, which have grown their services to include much more than programming[31]. Jensen[32] found in his case studies that offshoring of advanced tasks was initially founded on the exchange of technical knowledge, but very soon moved to an exchange at strategic and systemic levels that stimulated changes in the client firm's strategy: the client firm went to India initially to access cheaper engineering and software talent but stayed for using offshoring as a tool for strategic transformation. Once technical knowledge is shared between client and subcontractor, the next step is the externalization of the tacit knowledge (judgments and other higher level tasks) that truly distinguishes advanced work from routine work.

What conclusions can we draw from the two perspectives discussed here about what can be offshored? The key missing element in the current debate, and an arena for future research is the disaggregation of jobs that occurs through the process of offshoring. If one had gone to a master craftsman (let's take Smith's pin maker) on the eve of the first industrial revolution and asked him about the advantages of lower-skilled helpers and the division of labor, he might well have said something like "sharpening the end of the needle is easy but somewhat dangerous, so not

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[29] K.H. Yu, and F. Levy. "Offshoring Professional Services: Institutions and Professional Control." *British Journal of Industrial Relations* 2010, 48(4):758–783.

[30] D. Finegold, N. Erhardt, and M. Sako. "Outsourcing of Knowledge Work: How Far Will it Go? Evidence from Drug R and D." in *Outsourcing, Team Work and Business Management*. Nova Science Publishers, Incorporated, 2009.

[31] R. Dossani, and M. Kenney. "The Next Wave of Globalization: Relocating Service Provision to India." *World Development* 2007, 35(5):772–791. R. Dossani, and M. Kenney. "Service Provision for the Global Economy: The Evolving Indian Experience." *Review of Policy Research* 2009, 26(1-2):77–104.

[32] Jensen 2009, *op cit.*

cost effective for me to do; I'll instruct my new unskilled helpers to do that." But the accumulation of such decisions eventually broke down the work of the skilled craftsman to the collection of unskilled jobs in the Fordist factory. So, might the ongoing division of tasks in intellectual services eventually threaten the role of far more knowledge workers in the developed countries? When viewed in this way, it is clear that the question of what jobs can be offshored is still largely unanswered, that the view that only routine jobs are offshorable does not fully take into account the implications of stripping away the routine aspects of existing jobs.

3. What will be Offshored?

Clearly, any answer to the question of what will be offshored must take into account the transformation in the work itself during the process, which we see as the dynamic process of separating skills and wages through the re-engineering of work. The interviews and the findings above suggest that what is being offshored includes both high wage and low wage work, both high skill and low skill work. We have become used to equating skill with wage: "High Wage-High Skill" and "Low Wage-Low Skill" have become standard in our lexicon. Offshore work in advanced IT services is an example of this. The work being done in IT is high wage by U.S. standards, and the skill level, as best as it can be ascertained, seems to be high, even by U.S. standards. Similarly, anecdotal evidence of jobs in the life sciences that have been offshored suggests that many of these are also high wage and high skill. A person with a Masters degree in chemistry working at a pharmaceutical company involved in the discovery of new drugs, for example, commands a salary of over $100K annually. In U.S. terms, this is a high skill high wage job. Yet how does the analysis change if we allow the possibility that not all high wage jobs require high skill levels?

Table 1 presents an attempt to consider skill and wages as separate dimensions, and to recognize how dynamic forces at the intersection of skill and cost affect the ability and willingness to offshore any particular piece of work. We believe that this framework provides a way of understanding what jobs – or the component tasks currently within any job – are most likely to actually be offshored in the future. High wage work is often difficult to offshore, because of skill requirements and agglomerations such as cultural geography, and this is recognized in the upper-right hand quadrant of Table 1. While there can be geographic shifts in the location of these jobs, the amount and the speed at which

these shifts can take place is limited because moving work with this level of tacit knowledge often also requires the physical movement of the human resources in possession of that knowledge. So work in this quadrant has a lower likelihood of being offshored. A classic example of such an activity is the work entailed in preparing a motion to dismiss a case before U.S. courts. For example, there is an instance where the comedian Sacha Baron Cohen engaged an India-based Legal process offshoring company to prepare a motion to dismiss (he was sued for defamation in California courts for an episode in the Ali G show). The India based LPO firm prepared the motion for a U.S. based lawyer to present in court. However, the lawyers in the LPO were trained by lawyers from the U.S. hired by the LPO for training purposes. Thus, high-skill high-wage work, like most jobs, can be offshored and is being offshored.

However, we posit that there also exists high wage work that does not carry the trait of being high skill, and it is precisely these jobs where offshoring is most likely to be growing fastest, as indicated in the top left quadrant of Table 1. Often, high wage work carries a mix of tasks of various skill levels, and there is potential that skilled work can be disaggregated into smaller unskilled tasks if forethought is given to the production process[33]. The quadrant in the top left corner of Table 1 illustrates high wage, low skill tasks that are undergoing rapid offshoring in the present. Several highly paid jobs have large elements of low skill work in them, and as firms move aggressively to cut costs, these elements are increasingly offshorable.

[33] For example, lawyers (especially first and second year associates) who do mostly routine tasks. There may be good reasons for not disaggregating such high skill work e.g. institutionalized norms, impact of training systems, belief in combining more and less complex work to provide high quality outcomes (avoid burnout), the nature of the interdependence, etc. One central question is the extent to which globalization will break down these constraints, whether structural or psychological.

Table 1: Offshorability of Services Work[34]

	Low Skill	High Skill
High Wage	Fastest growth areas for offshoring: these jobs are often seen as high skill because of high wages, but this will change as a learning process necessary to understand and break work down into less-skilled components begins. The process is complete when the maximum amount possible is done offshore and the job is likely to no longer be high wage – even in the destination country. Examples: Financial managers and analysts, budget analysts, insurance underwriters, credit authorizers, checkers, and clerks, technical writers, auditors and accountants.	Unlikely to be offshored: these jobs require de-mystifying and transforming the work process before they can be shifted to the upper left quadrant. It is possible, however, that the offshoring cycle begins with this work being done "onsite" by nationals or temporary migrants, and that the work can then shift "offshore" through expatriate assignments or reverse migration. Examples: Chief executives, Biomedical, aerospace, chemical, sales, and civil Engineers. public relations managers, marketing and sales managers, lawyers.
Low Wage	Mature areas for offshoring: these jobs are easy to offshore and commonly are, but there	Least likely to be offshored: these jobs require de-mystification as well as a

[34] Table 1 is based on an analysis of the O*NET 17.0 skills database, which contains detailed information on the tasks, abilities, and skills required of 974 occupations included in the Standard Occupational Classification's 2010 taxonomy. We build skill constructs for each occupational category and merge SOC 2010 codes to Census 2000 following D. Autor and D. Dorn. The Growth of Low Skill Service Jobs and the Polarization of the U.S. Labor Market. *American Economic Review*, 103(5), 1553-1597, 2013. (2010). The skill construct we use reflects a general factor for skill level, and combines many sub-items from the O-NET skills database into a single construct that is mean centered at zero. Occupations are "low skill" if they are below the mean, and vice versa. The residuals of a regression of wage on skill are used to assign occupations into wage categories, such that low/high wage refers to wages given the level of skill required.

	are lower returns to offshoring and firms decide purely based on cost-benefit where to source. Examples: Telemarketers, customer service representatives, library assistants and technicians, bill and account collectors, secretaries and administrative assistants, travel agents, computer operators.	rigorous cost-benefit evaluation. They are least threatened. Examples: Writers and authors, editors, librarians, wholesale and retail buyers, logisticians, advertising sales, insurance sales, architects.

Therefore jobs that today are in the top left quadrant, we predict, are likely to be split up and parts of those jobs will belong in the bottom left category in the future: low skill, and low wage. In theory, any job or work process can undergo a transformation from the top right quadrant to the bottom left. To refer again to an example from the IT industry, a possible re-interpretation of the master-helper analogy is that the corporate IT department's production function is progressively broken down into component parts, to be done more efficiently separately and elsewhere. Starting in the top right quadrant, jobs in the computer occupations – or significant portions of the work of the IT department – have moved from their high wage and high skill position into the top left quadrant over the last decade, effectively becoming less skilled in the process. In the future, we would predict these jobs are going to move firmly into the lower left quadrant. This is not to say all computer programmers will be low wage, but only that programmers in developed nations will continue to face direct competition, and will need to move up the value chain to retain high wages as previously rare knowledge and skills become widespread and routine. Finally, the low wage and high skill quadrant at the bottom right of Table 1include complex call centers such as travel reservations agents, statistical clerks and financial specialists. These jobs are less likely to be offshored except where cost considerations move them back toward high wage.

The framework presented above provides a logical rubric, taking into account the transformative powers of the offshoring process, to analyze the likelihood of work going offshore. Because it relies so heavily on understanding the nature of work, which requires a qualitative grasp of the work itself, one limitation is that it does not allow us to say specifically

which occupations are most at risk. Every occupation in the dictionary of occupational titles includes both high and low skill work – for now. For example, most academics must both perform the research and triple-check the citations. Moreover, every individual within an occupation will face unique bundles of work with pieces that fall in different quadrants within the framework. Nevertheless, we believe this is a valuable guide for anyone who wants to begin to get a sense of whether it is likely that work will move offshore in the future. That said, as with all forecasting tools, this framework will work best if everything continues as at present and is simply a linear projection based on the trends we see today. There are a number of potential roadblocks to this process, and below we cover what we see as possible limits to the future of offshoring.

4. What are the Limits of Offshoring?

There are several possible limits to offshoring discussed below, all arising from the variety of substantial frictions in the movement of work from the high wage and high skill quadrant of the framework to the low wage low skill quadrant: i.e., knowledge transfer. How, then, is knowledge, both explicit and tacit, transferred in offshore intellectual services? The knowledge transfer process has always been a weak point in the movement of programming work, even when done domestically and long before outsourcing to India became a phenomenon[35].

As in the industrial factory, one of the key potential limits involves the question of whether workers are willing to collaborate in the process of eliminating their own jobs through efficiency improvements. Along these lines, the outsourcing companies tend to express concern about the effect on cooperation and morale of the potential elimination of jobs through the outsourcing process. We found in our fieldwork that offshoring companies clearly think about – and push the clients to specify up-front – whether and how the employees whose jobs are eliminated will be redeployed. As an Associate Vice President of an Indian Software

[35] One of the challenges to the original concept of the "software factory," notably at a California IBM facility in 1975, was getting cooperation in knowledge transfer. That particular effort failed because managers at customer locations were reluctant to relinquish control over projects or give resources to the offsite location, while workers at the customer sites also felt threatened or dismissed the benefits of working with the offsite (not even offshore) location. M. Cusumano. "The Software Factory: a Historical Interpretation." *IEEE Software* 1989, 6(2):23–30.

company told us: "*I need to understand first how the application works, the technology and the architecture of the application, understand the working so that I can maintain, that is -make changes, make enhancements etc. This is possible only if the existing team tells me how they coded the existing program, what is design of the application all that. Sometimes these 10 people they are worried about their future. They want to know what happens to me once I give away all my knowledge to these folks what will happen to me. Will I lose my job? Will I move to something else within this company or will they ask me to leave? So that is – we tell the client that before we engage any outsourcing vendor make your plans very clear to your employees. This is so that they are aware. The uncertainty within employee community will create lot of problems for us."* (Interview 7, Appendix A).

But lack of cooperation can derive from the client companies as well. As the COO of the Health Care Company in the U.S. indicated *"Someone, a person making that decision, might say that it is the one thing that tips them on the negative side because they may say that I don't believe in companies that take jobs out of the country... A lot of companies we cover insurance have union and non-union populations and we are providing health insurance to the company not to the union or non-union workers but to the extent that the unions find out about that, it will be a bad thing for us. They would make sense why they would not want to do it with us.*" (Interview 8, Appendix A)

In some cases, local firms were able to articulate with a greater degree of specificity regarding what work will be done here. The CIO of an IT company told us "*Creative/ Prototyping more will be done here [in the U.S.]. The reason it will be done here is because user groups will test things, product managers will back to engineering and it will be an iterative design process that requires lots of interactions and answers to questions. It is difficult to send this offshore wait for 12 hours before getting a response due to time zone difference… it therefore boils down to the amount of communication required for a project. The vaguer that is – that is, higher the communication required and harder (more complex) the project – more is the interaction required."* (Interview 10, Appendix A). Thus, practical limits on the effectiveness of communication across time zones also come into play.

And, while the divisibility of software projects is controversial in the literature on software engineering[36], there are clearly limitations on the ability to divide and then offshore the work, some of which were

[36] F. Brooks. "No Silver Bullet Essence and Accidents of Software Engineering." *Computer* 1987, 20(4):10–19. J. Greenbaum. *In the name of efficiency: management theory and shopfloor practice in data-processing work*. Philadelphia: Temple University Press, 1979. P. Kraft. *Programmers and managers: the routinization of computer programming in the United States*. New York: Springer-Verlag, 1977.

discussed above. Piore[37], for example, focuses on the technological limits of offshoring in terms of the division of labor in software design, and what cannot be done at a distance. He finds that the division of labor is very different in design as compared to manufacturing, insofar as software integration requires close, in-person contact, what Piore calls "organic growth."[38] Another possibility is the interdependence between the tasks and the inherent complexity of the design: the higher the interdependence and complexity, the less likely is the possibility that these tasks can be successfully offshored. These considerations suggest the possibility of inherent technological limits on the extent of offshoring.

Some of these problems of cooperation, divisibility, and communication have been addressed in offshoring through considerable interaction between client and subcontractor, an interaction that results in the development of trust, often through a language community based on conversation. Jensen[39], for example, highlights in his study the need for interaction and coordination in knowledge work, noting that the employees of the Indian subcontractor had to work at the client company in Denmark for a considerable period in order to make later coordination easier. In the context of U.S. customers and Indian IT firms, both client and vendor interviews reveal that long term relations between vendors and clients lead to the vendor becoming "embedded" in the client organization and can thereby lead to sophisticated knowledge transfer that can be more subtle and indirect than directly asking workers to break down their own jobs[40]. Kumar, Fenema and Von Glinow[41], for example,

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[37] Piore 2004, *op cit*.

[38] He notes that designing software invariably has some division of labor (separate pieces of code can be written in different places), but also has an integration and coordination dimension, (the codes have to be combined together to create a program that works, and this process of integration often reveals bugs). He suggests, then, substantial technological limits to what can be outsourced, based on the technology of design.

[39] Jensen 2009, *op cit*.

[40] For example an Associate Vice President (Transportation & Services) at an Indian Software company said: "What we try to do is to rotate people from both the sides. A guy from here goes onsite stays for some months and comes back. An onsite spends some time here works with the team and goes back. Even today even clients are wiling to come here and stay with us for 3 months, in one of our clients in Hyderabad three people came to India stayed with us for 3 months, answered the questions, trained the team and a lot of clients are willing to come here. We try to send people to client sites and have people from client sites come here…we rotate people. Lot[s] of people go and come."

[41] K. Kumar, P. van Fenema, and M. von Glinow. "Offshoring and the Global Distribution of Work: Implications for Task Interdependence Theory and Practice." *Journal of International Business Studies* 2008, 40(4):642–67.

found that the traditional typology[42] was not enough to explain the nature of such work because it could not describe intense and repeated interaction between actors and work sites in both transactional (sequential and reciprocal) and parallel work found in globally distributed knowledge intensive work environments in offshoring.

Thus, institutional practices such as "embeddedness" have developed in the IT offshoring industry so as to facilitate the transfer of knowledge from workers to other workers both within their own firms and across contractors. This transfer of knowledge engages not only the workers in a one-to-one literal transfer of information, but they are gaining an understanding too of the nature of the problem as seen by the customer, in order to later be able to take autonomous action to resolve issues.

In sum, a key question as regards cooperation, divisibility, and communication is the extent to which these limitations might be overcome given the intensity of offshore firms' presence onsite, and the development of more practical tools for distance meeting. The extent to which this process can minimize cultural geographic distance is clearly also a crucial unanswered question; to what extent can the gap between the human tasks that can be performed by a computer program and those that require constant literal in-person contact be bridged?

When we asked our interview subjects directly about the limits of offshoring, we received a wide range of responses beyond cooperation, trust and communication or practical limits such as language, culture, politics or the need to be close to the same time zone; these responses essentially boiled down to (1) the existence of a meaningful "core" within a corporation that cannot or will not be outsourced, and is therefore unlikely to be offshored (at least by contractor firms) and (2) formal regulations such as those related to government security.

The concept of a corporate "core" seems central to the conceptions of outsourcing among those in the US based companies we interviewed. The Chief Administrative Officer of a U.S. based Bank suggests: "*As you look to what to outsource you don't outsource your core competencies. You outsource those things which you can do but you don't do as well as somebody else and if you find a vendor that has those competencies better than you, you know you are going to get lower costs*" (Interview 9, Appendix A).

It seems that "core" typically relates to corporate mission and the basic essence of how firms derive value, and that what gets outsourced is a

[42] A. Van De Ven, A. Delbecq, and R. Koenig. "Determinants of Coordination Modes Within Organizations." *American Sociological Review* 1976, 41(2):322–38.

strategic decision on which information to disclose and on who contributes to decision making. One key question is whether this strategic core can in fact be maintained as the offshoring process moves up the value chain. At what point then is the line drawn to stop this process from moving up into the core, if it in fact can?

Another significant limit to offshoring, is of course regulation. Several U.S. states have passed legislating limiting offshoring. Ohio passed in 2010 a "made in America Bill" to ensure that all products and services for the legislative branch be made in the U.S. or supplied from within the U.S. And federal regulations also clearly play an important role in many industries; as the CIO of a health care company indicated: "*The DOD will not allow us to offshore any jobs. So in that book of business we are just not allowed to. They will not allow anyone with access to computer but not a U.S. citizen… you need to have security checks and ... that business is also sort of off limits"* (Interview 11, Appendix A).

In sum, there seem to be a variety of apparent limits to the ultimate reach of offshoring, ranging from comparative advantage, to the inherent limitations on the divisibility of tasks in software development, to the politics and incentives of knowledge transfer, to other practical limits such as language and culture, to the existence and maintenance of a strategic "core," to formal regulations[43]. Any serious examination of the question of the extent of the growth of offshoring going forward would have to take into account these limits, as against the view of some of the offshoring companies that "we can offshore anything." As the scope of work being outsourced extends to ever more complex and high-level tasks, the larger question is whether the most essential knowledge ultimately will be transferred to India or other destinations, similar to manufacturing to China and engineering knowledge to Singapore, making technological/skills advantages of client companies irrelevant?

5. Discussion and Questions for Research

As noted by Sako[44] and others, the proliferation of global value chains away from manufacturing to the services sector has not attracted as much

[43] Questions have been raised regarding whether restrictions on offshoring are legal in the context of non-discrimination and "lowest-bidder" requirements on government contracting. M. Zuckerman. "The Offshoring of American Government." *Cornell Law Review* 2008, 94:165.

[44] Sako 2012, *op cit.*

research attention as it should. Additionally, those researchers who have analyzed the offshoring of services work have taken divergent approaches to the subject of offshoring that revolve around the questions we have considered here: "what *can* be offshored," "what *will* be offshored," and "what are the *limits* of offshoring?" This essay provides a review of major work in this area, reports from industry participants, and a preliminary framework for analyzing the future of this emerging phenomenon, and suggests some provocative questions for researchers to consider going forward.

The future extent of offshoring of services and the consequences for the advanced economies clearly remain open questions; our consideration of the phenomenon leads us to the following central questions. Can limits to offshoring related to the issue of knowledge transfer – what people are willing and able to transfer based on corporate and government views toward knowledge transfer and the effect of factors such as cultural geography on the process - be overcome? Will work seen as safely high skill / high wage today be susceptible to offshoring in the future, as jobs are broken into simpler component pieces? And, ultimately will the process of creative destruction associated with offshoring produce enough skilled yet non-offshorable jobs to sustain a significant middle class in the developed world rather than exacerbate the ongoing growth in income and wealth inequality?

Having full faith in the offshore methodology and the ability to perform work wherever cost is lowest, IT services companies are ambitious to replicate their success in further domains and to increase their profit margins and speed their growth through the movement of more work offshore. For example, IT companies have moved into other "business process outsourcing" (BPO) and "knowledge process outsourcing" (KPO) services, offering back office support such as call center, accounting, document review, research, and other knowledge-based services work. We see organizations that are already vendors to the largest corporations playing a disproportionately large role in the services offshoring phenomenon. Functions and processes that corporations are already accustomed to outsourcing, it seems, are more likely to go offshore, but where and how does this process stop? Some of the interviews suggest that this is all akin to peeling away an onion, where we can either define and defend an arbitrary core, or else peel it away to nothing. Does the "core" of the corporation ultimately exist, or will it peel away?

In looking toward what functions will be offshored, other frequently outsourced business processes already include finance and accounting,

legal, marketing, public relations, payroll and so on. Many organizations have already decided that these processes are "non-core" or have found outside organizations that better manage the process. Consultancies and other partnerships such as law firms are historically known for an "up or out" model of HR management with fundamentally pyramidal vacancy chains, fewer opportunities at the top and many low-level "helpers" below. This raises the question of how people in the developed world will rise when the lower rungs of the career ladders that are necessary for skill acquisition, talent recognition and advancement move offshore. With a shrinking number of lower-level helper jobs from the developed nations, where many people who have historically risen in to higher management get their start, how will workers in developed nations acquire the experience and knowledge and how will firms discover the potential human resources if workers are no longer "embedded" in firms.

Another set of key questions involves the affects of technology and social development on the limiting influences of cultural geography. To what extent do existing and emerging jobs require literal and constant in-person contact among culturally similar people for reasons such as efficiency of knowledge transfer and development of trust? One would think that any functional educational system in developing countries in particular will aim to flatten cultural geography in a globalizing world to complement what is happening more organically; does, for example, some combination of teleconferencing technology, comfort with the concept of trust-based communities online, homogenization of culture and the development of common shorthand electronic communication of acronyms and idioms through the use of Facebook and other "flattening" technologies ultimately loosen the limits on functional collaboration among people far apart geographically and (for now) culturally?

If routine jobs in fact exist at all levels of the labor market and if many of the more complex jobs contain routine aspects, what will come of the middle managers and professionals whose main skill/attribute is either a credential or unique knowledge of how things hold together (knowledge of the component parts of a complicated process, those whose self-definition is based on their knowledge of a particular process)? Are there enough jobs for craft workers to sustain the developed world side of the equation? Might the disaggregation of work, the stripping away of jobs that are entirely routine as well as the routine aspects of more complex jobs, both eliminate a large portion of the master craftsmen, as well as worsen prospects and shorten the employment relationship for everyone else? Will the impact on wealth and craft/creative job creation of intellectual and cultural globalization of developed world products

outweigh the loss of more routine work? And ultimately, will the interaction of globalization and technological advance concentrate wealth and employment among the creative few, or allow for broader growth in the post-industrial future?

We began this essay by offering two divergent views on what types of work can be offshored. Our analysis reveals that there are many layers to understanding the nature of work that can be offshored, given the limits of what can be offshored, and what organizations are willing to offshore. We hope that these insights will help to stimulate and re-frame the debate on these fundamental questions.

Appendix A

List of Interviewees

Interview Number	Description of the Interviewee	Description of the Organization
1, 9	Chief Administrative Officer	Savings and Loan Bank
2, 10	Chief Information Officer	Online network of websites for real estate, finance, moving and for home related information
3, 8, 11	Executive Vice President & Chief Operating Officer	Managed Health Care Company
4	Senior Manager	Indian Software Company
5	Director	Indian Software Company
6, 7	Associate Vice President (Transportation & Services)	Indian Software Company
Additional Interviews	Description of the Interviewee	Description of the Organization
A	Senior Director, Project Management	Specialty biopharmaceutical company
B	Senior Manager-Human Resources	Indian Software Company
C	Vice President	Indian Software Company
D	Module Lead (Telecommunication Sector)	Indian Software Company

E	Team Lead (Transportation & Services)	Indian Software Company
F	Associate VP (Human Resources)	Indian Software Company
G	Principal Diversity Officer	Indian Software Company

- Note: Interviews A- G do not feature in the text but informed our understanding of our phenomenon. Some interviewees are quoted multiple times.

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