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Abstract

Human capital is becoming more critical as the global economy becomes more information- and service-intensive. While IS researchers have studied some dimensions of human capital, the role of industry-specific human capital has remained understudied. The IT-enabled business process outsourcing (BPO) industry provides an ideal setting to study returns to human capital, because jobs in this industry are standardized and many professionals in this new industry have come from other industries. We build on IS and Economics literature to theorize returns to human capital in the BPO industry, and we test the theory using data for over 2,500 BPO professionals engaged in call center work and other non-voice services (e.g., accounting, finance, HR, etc.) in India during the 2006-2008 time period. We find higher returns to industry-specific human capital than to firm-specific and general human capital. We also find that junior-level professionals, whose jobs are relatively more standardized, have higher returns to industry-specific human capital than senior-level professionals. We discuss implications for further research and practice in the global economy where inter-industry transfers and migration of skills are becoming increasingly common.

Key words: Global disaggregation, human capital, BPO, outsourcing, professionals, wages, compensation.

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1. Introduction

The human capital of IT and business process outsourcing (BPO) professionals is one of the most important resources in the modern global economy, because it enables firms to create a platform for innovation and agility (Ferratt et al. 2005; Josefek and Kauffman 2003; Levina and Xin 2007; Moore and Burke 2002; Moore and Love 2005). IT-enabled changes in value chain activities have resulted in significant changes to occupational characteristics and human capital requirements across business processes and functional areas (Amiti and Wei 2009; Carmel and Agarwal 2002). These changes have led to significant growth in IT services and BPO, with the IT services market estimated at $650 billion and the BPO market at $300 billion in 2013 (HfS Research 2013). While prior IS and Economics research has studied some dimensions of human capital that affect wages (Ang, Slaughter and Ng 2002; Becker 1964; Lazear 2009; Levina and Xin 2007; Slaughter, Ang and Boh 2007), we have a limited understanding of transferability and migration of skills across industries as professionals change jobs, particularly in IT-enabled service environments such as BPO.[1]

The BPO industry provides a useful setting for our research, because it reflects the increasing process orientation of the broader economy (Whitaker, Mithas and Krishnan 2011). As the global BPO industry has codified and standardized entire sets of occupational processes, the importance of industry-specific human capital may have increased relative to firm-specific human capital, because industry-wide standardization makes human capital acquired at firm A also relevant for firm B in the same industry. While mobility of workers within a firm, across work settings and organizational contexts (e.g., Ang and Slaughter 2000, Slaughter et al. 2007), and across country borders has received significant attention in the IS literature, the mobility of workers across firms within the BPO industry has received limited attention. Davis-Blake and Broschak (2009) note the importance of studying mobility in the BPO industry "because it speaks to the longitudinal consequences of outsourcing for workers" (p. 336). We study the role of industry-specific human capital relative to firm-specific human capital, and the transfer of BPO skills in an industry that has modular and standardized work characteristics.

Examining compensation practices in BPO firms is relevant and timely in two ways. First, the BPO industry is IT-enabled, yet new and different compared to the more mature IT industry (Bapna et al. 2013; Kotlarsky, Scarbrough and Oshri 2014; Mani, Barua and Whinston 2010; Mithas, Whitaker and Tafti 2010), which suggests that management and compensation practices for BPO firms may differ from those in IT firms (Castanias and Helfat 2001). While most existing research on IT and BPO focuses on

[1] The BPO industry includes voice-based call center work and non-voice-based services such as accounting, finance, HR, etc. While the exact percentage of workers in our sample who are engaged in call center-related jobs is not known, we expect a large portion to be engaged in non-voice related BPO services because our sample is broadly representative of the Indian BPO industry in which the share of non-voice related BPO has increased over the past decade (the level of non-voice related BPO was about 60 percent in 2003-2004, see Greene 2006).

contracts and firm-level issues (Han and Mithas 2013; Mani et al. 2010; Whitaker et al. 2011), we know less about worker-level issues such as human capital and compensation. Second, the nature of work carried out by BPO firms is considerably different from that of IT firms. IT jobs are relatively more complex and involve technical work that requires analytical skills (Ang et al. 2002). IT jobs also require independent judgment, and knowledge of difficult and abstract concepts that are difficult to monitor and measure (Ang et al. 2011; Schmidt et al. 2013). In contrast, BPO jobs are highly standardized, regimented, modular and loosely-coupled (Tanriverdi, Konana and Ge 2007). BPO employers apply coercive and normative controls to deter employees from deviating from prescribed work procedures and from exercising independent judgment (Thite and Russell 2007). Together, these factors make the BPO industry an ideal setting to assess how firms reward firm-specific and industry experience of BPO professionals who perform relatively standardized, codified and modularized work.

In this paper, we study the role and impact of industry human capital on wages in the Indian BPO industry. This industry reflects the increasing information-/service-orientation and global disaggregation of the broader economy (Davis-Blake and Broschak 2009; Mithas and Whitaker 2007). We pose two research questions: (1) How do returns to industry-specific human capital in a standardized and codified industry compare with returns to firm-specific human capital? and (2) How do returns to industry-specific human capital change across career stages?

We make two contributions. First, we theorize that the nature of work characteristics in an industry is an important factor to explain returns on human capital. We argue that firms will value industry-specific human capital more than firm-specific human capital in settings where jobs and business processes are relatively standardized. We reinterpret the findings of prior research that identify the existence of industry-specific human capital and differences in wage premiums (Carrington 1993; Neal 1995; Parent 2000; Sullivan 2010) to provide a plausible explanation for relative returns to various types of human capital across industries. Our exploratory analyses indicate that industry-specific human capital is rewarded more for BPO-focused and Indian origin firms than for IT-focused and foreign origin firms respectively, and these findings highlight the role of institutional factors in returns to industry-specific human capital in the BPO industry.

Second, this is one of the first studies of the BPO professionals. Our work extends the recent work by Bapna et al. (2013) on returns to human capital from the IT context to the BPO context, and we focus on returns to industry experience in terms of compensation rather than performance rating. This study offers a reasonably complete picture of returns through career stages by examining returns to experience for junior- and senior-level positions within a single industry. From a managerial perspective, our results enhance understanding of the growing BPO profession by studying the structure of earnings over time, and the heterogeneity of returns across job levels and industry backgrounds (see Topel 1991).

2. Theoretical Framework

Our goal in this study is to understand the role and importance of industry-specific human capital in the BPO industry, which differs from the IT industry that has been the subject of prior studies (Truman and Baroudi 1994; Weiss and Landau 1981). Ang et al. (2002) test human capital by analyzing salary data for IT professionals in Singapore, and find that wages are determined by human capital factors such as education and experience. Levina and Xin (2007) and Mithas and Krishnan (2008) examine compensation of U.S. IT professionals, and find that while human capital is important, institutional differences also impact wages. Slaughter et al. (2007) show that firm-specific human capital influences compensation and moderates IT compensation-organizational tenure profiles. Mithas and Lucas (2010) find that after controlling for human capital, foreign IT workers in the U.S. earn a salary premium compared with American IT workers. More recently, Bapna et al. (2013) study the effect of employer-provided training on performance ratings in an Indian IT services firm, and find that employee performance ratings improve with general training but not firm-specific training, and high-experience employees reap higher returns from training compared with low-experience employees. While these studies shed light on the value of human capital for IT professionals, little is known about the relative importance of industry- and firm-specific human capital for employees in the BPO industry, a new but rapidly growing industry (Reinhardt et al. 2006).

We relate occupational characteristics with returns to human capital and highlight the importance of industry-specific human capital and heterogeneity of returns across career stages, drawing from research on outsourcing and skills and research on industry-specific human capital. Research on outsourcing and skills provides insights by examining how IT affects the skill composition of various occupations, and helps us understand the nature of BPO and other IT-enabled industries. This research emphasizes the characteristics that make occupations more vulnerable to offshoring, such as required personal interaction, geographic co-location, codification and routinization (Jensen and Kletzer 2006; Kotlarsky et al. 2014; Ramasubbu et al. 2008b; Apte and Mason 1995; Autor et al. 2003; Blinder 2009; Jensen and Kletzer 2005). Advances in IT make service occupations more vulnerable to offshoring by unbundling information and physical flows (Mithas and Whitaker 2007). While this literature helps us understand the nature of work performed by BPO professionals, the manner in which standardized work influences returns to industry-specific human capital remains an open question.

Research on industry-specific human capital guides us to examine the manner in which human capital may relate to a particular industry (Weinberg 2001). Most prior research uses human capital theory to explain differences in compensation based on work experience, because investments in experience create valuable productive capacity (Becker 1975). Human capital includes the skills, competences and knowledge that professionals can use to increase their productivity, and explains

significant variation in wage growth over the life cycle (Becker 1962). Human capital research typically divides experience into general experience that is valuable across all firms, and firm-specific experience (i.e., tenure or seniority) that is valuable only at a particular firm. Human capital is generally measured by years of work experience in the current occupation (e.g., IT experience for IT professionals), organizational tenure and total experience. Because the BPO industry is a relatively new industry, many current BPO professionals started in non-BPO positions, which allows us to decompose the total work experience of a BPO professional into firm-specific experience, BPO industry-specific experience, and general experience. Firm-specific human capital is acquired through tenure and training with a particular firm, industry-specific human capital is acquired through experience in an industry, and general human capital is acquired through total education and work experience (see Table 1).

- Insert Table 1 here -

We conceptualize these three dimensions on a continuum based on transferability across firms, with firm-specific human capital not transferrable across firms and general human capital transferable across all firms. There is general consensus among economists that firms are more likely to reward firm-specific human capital than general human capital. For example, Manning (2011) notes: "A key and eminently sensible idea in the specific human capital literature originating in Becker…is that specific human capital accumulates over time. This means that rents in the employment relationship are likely to be higher for those workers who have been in their current job for a long time-very few labor economists would dissent from this position" (p. 977). While most prior research has focused on human capital at either the firm-specific or general ends of the continuum (Gibbons and Waldman 2004; Lazear 2009), some research has begun to address the role of industry-specific human capital. Arguably, each industry values a different set of skills that are vital to its products and services, with some evidence that industries compete to attract the best talent (Peterson 2011). As professionals work in an industry, they have an incentive to invest in training and learning to develop relevant skills, and their employers are likely to have a favorable view of these skills to increase productivity and performance. As this human capital is developed, it becomes more valuable to the current industry and less valuable to other industries (Hatch et al. 2004).

Among prior studies on industry-specific human capital, Neal (1995) uses data from U.S. Census Displaced Worker Surveys (DWS) to compare the change in wages for workers who switch industries after displacement to wages of workers who stay in the same industry after displacement. This study finds that industry switchers suffer greater losses than similar workers who stay in the industry, which suggests that workers are rewarded for some skills that are neither firm-specific nor completely general. Parent (2000) uses data from the National Longitudinal Survey of Youth (NLSY) and Panel Study of Income Dynamics (PSID) to show that after controlling for industry-specific human capital, the returns to

tenure are severely reduced. Sullivan (2010) uses NLSY data to find that industry-specific human capital is important for wages, and that the importance of different types of human capital varies across occupations.

While these studies shed some light on the importance of industry-specific human capital, they have at least three limitations. First, these studies report differences in returns to industry experience across industries (Sullivan 2010; Zangelidis 2008), but do not theorize underlying reasons for the importance of industry-specific human capital. For example, a rationale is not given for negative returns to industry experience in the transportation/communications and engineering/vehicle sectors, compared with positive returns to industry experience in the banking/finance sector (Zangelidis 2008). Second, the findings vary across different types of workers (and sometimes across the same types of workers) without sufficient explanation for such differences. For example, the coefficient of industry experience for managers is positive in Sullivan (2010) and negative in Zangelidis (2008), and the coefficient of industry experience for clerical workers is positive in Sullivan (2010) and negative in Zangelidis (2008). Third, datasets for prior studies are mostly from the U.S. and prior to the year 2000. For example, Sullivan (2010) uses U.S. NLSY data from 1979–2000 and Neal (1995) uses U.S. DWS data from 1984–1990. The geographic and time location of these datasets limits the ability to address emerging industries such as BPO and emerging economies such as India. These datasets also have other disadvantages such as fewer observations on each industry for NLSY and PSID, and susceptibility to recall bias in DWS (see Table A1 in the appendix).

We extend prior research by theorizing that work and industry characteristics can explain the importance of industry-specific human capital, and by studying the BPO industry with granular data on industry experience that addresses some limitations of prior datasets. While prior studies paid little attention to returns across career stages, our study examines heterogeneity in returns to human capital between junior- and senior-level positions within an industry.

2.1 Returns to Industry-Specific Human Capital

As noted above, the relative importance of industry- and firm-specific human capital in the BPO industry is an open question. On one hand, findings from prior work on IT professionals suggest that BPO professionals with tacit knowledge of the firm's infrastructure and an understanding of the firm's customers may be more productive (Josefek and Kauffman 1999). On the other hand, there are at least four reasons why industry experience may be equally or more valuable in the BPO industry.

First, the industry has a distinct set of characteristics. The BPO industry requires a relatively high degree of process expertise and interaction with a client firm’s customers and suppliers (Levina and Su 2008; Mani, Barua and Whinston 2006), which translates into some BPO-specific skills (Batt et al. 2005). Client firms generally outsource when their business processes are loosely-coupled and standardized

enough to be performed separately from other business processes (Poppo and Zenger 2002; Tanriverdi et al. 2007). At the same time, successful execution of outsourced business processes requires close coordination between two parties, since BPO involves management of information-intensive inputs, outputs and work processes (Mani et al. 2010). Therefore, the unique nature may make BPO-specific skills more valuable than firm-specific skills, since standardized and modularized processes can be managed alongside similar processes for multiple clients. Increasing standardization of hardware, software and methodologies (e.g., CMMI, ISO) across firms makes firm-specific skills less relevant than they were a decade ago (Davenport 2005; Ramasubbu, Mithas and Krishnan 2008a). IT enables offshore BPO vendors to deliver services with more standardized processes (Rust and Tuck Siong 2006) and achieve economies of "mass service" (Lovelock 1983; Rust and Miu 2006), which make BPO professionals more interchangeable across firms. In contrast to the challenges of transferring expertise across industries, skills acquired in one firm may be more easily transferred to other firms in the industry (Saxenian 1996), making industry-specific human capital more important in the BPO industry.

Second, because required investments in training are lower for experienced BPO professionals than for professionals from other industries, firms are likely to pay a premium for BPO experience at other firms. Experienced BPO professionals bring in knowledge of business processes and work practices from their previous BPO firms. This learning or knowledge-based explanation for the value of industry experience is particularly important in high-technology fields where product lifecycles are short and knowledge depreciates at a fast rate (Daveri and Maliranta 2007; Mendelson and Pillai 1998), and one way to stay current is to hire experienced professionals.

Third, informal networks accumulated through industry experience may help BPO professionals identify job opportunities, and reduce uncertainty about job match between workers and employers (Loury 2006; Ozgen and Baron 2007). Better information from informal industry networks can reduce voluntary turnover and increase productivity, contributing to higher wages (Simon and Warner 1992). Research on labor markets in Silicon Valley suggests that informal social networks can be a powerful source of learning and productivity in dynamic industries that exhibit boundary-less careers, and can provide social capital and information signals to minimize search and switching costs otherwise associated with high rates of inter-firm mobility (Saxenian 1996).

Fourth, because the BPO industry is at an early stage, growing rapidly, and facing a shortage of professionals with sufficient skills, these factors generate a premium for industry-specific human capital (Castanias and Helfat 2001). Therefore, while we acknowledge the value of firm-specific human capital, we argue that BPO firms are likely to value industry-specific human capital more highly because of greater standardization of hardware, software and methodologies, training cost savings and learning

advantages from hiring experienced BPO professionals, informal industry networks, and shortage of industry-specific skills. Consistent with this discussion, we hypothesize that:

H1: Returns to industry-specific human capital are larger than returns to firm-specific human capital for BPO professionals.

2.2 How Returns to Industry-Specific Human Capital Vary by Career Stage: Junior-Level Positions versus Senior-Level Positions

We theorize that returns to industry-specific human capital will vary by career stage, based on differences between junior-level and senior-level positions in required skills, knowledge spillover, presence of capital, impacts of training, and hiring criteria. In the BPO industry, junior-level positions differ from senior-level positions in the type of skills required to increase productivity (Kuruvilla and Ranganathan 2008; Thite and Russell 2007). Junior-level positions such as call center personnel need to acquire customer service skills, such as the ability to follow scripts and update computerized records (Batt et al. 2005). This type of human capital is easily transferrable and highly valued by other firms in the BPO industry (Sako 2006).

The returns to industry experience of junior-level positions are reinforced by knowledge spillover effects within the industry (Lucas 1988). The BPO industry has high turnover rates (Kuruvilla and Ranganathan 2008), and professionals doing more standardized and digitized work are easily transferrable and highly valued by other firms in the industry (Sako 2006). This inter-firm mobility creates value for the receiving BPO firm, through increased productivity of junior-level workers and through knowledge spillovers that increase productivity for other junior-level workers (Fallick, Fleischman and Rebitzer 2006; Jaffe, Trajtenberg and Henderson 1993; Lazear and Shaw 2007). Thus, junior-level workers transferring to another firm may be rewarded more highly for knowledge that is useful across companies. Since junior-level positions are likely to do more standardized and modularized work than senior-level positions, this knowledge effect is likely to be stronger for junior-level positions.

Compared with junior-level positions, senior-level positions need to acquire more specific knowledge about firm culture to properly onboard new employees, more specific knowledge about firm policies and procedures to administer those policies, more specific knowledge of individual employees to effectively manage those employees, and more specific knowledge of the firm's clients to manage those customer relationships. This type of human capital may be less transferrable across firms and less valued by other firms in the Indian BPO industry. Junior- and senior-level positions also differ significantly in the extent to which interaction with other employees is required. For example, junior-level positions focus primarily on task-related activities, with no or few subordinates reporting to them. On the other hand, senior-level positions (particularly in large firms) have a large number of subordinates reporting to

them, requiring more interaction- and supervision-related activities (Kwon and Meyersson Milgrom 2004).

Junior-level positions also differ from senior-level positions in their economic, intellectual, social and symbolic capital (Levina and Vaast 2008), due to differences in required skills and interaction (Cummings 2007) and to differences in compensation and perceived status (Pfeffer and Langton 1993). For example, onshore senior managers have higher economic and symbolic capital; middle managers have sufficient economic, intellectual, social and symbolic capital; while offshore lower-level managers do not have enough of these types of capital. The definition of intellectual capital as competence in a practice or field (Levina and Vaast 2008) is similar to the definition of industry-specific human capital in this paper.

In addition to the difference in required skills and presence of capital, training can affect the productivity of junior-level and senior-level positions differently. Bapna et al. (2013) find that low-experience employees achieve higher performance gains from technical training, and high-experience employees achieve higher performance gains from general training, consistent with the premise that junior-level positions focus on customer service and senior-level positions focus on administration. Consistent with the findings by Bapna et al. (2013), we expect technical training to have a more positive effect on compensation for junior-level positions. Because the skills accumulated through technical training can be more easily transferred across firms in the BPO industry, such training should contribute to high returns to industry experience for BPO junior-level positions. On the other hand, senior-level positions will benefit more from general training, such as training in behavioral, communication or leadership skills. To the extent that general training could be used outside the industry, we expect senior-level positions to achieve relatively higher returns from general training than from technical training.

Junior-level positions also differ from senior-level positions in hiring criteria. When occupation-specific human capital is important in hiring, the returns to industry-specific human capital are larger than the return to firms-specific human capital for junior-level positions compared with senior-level positions (Kwon and Meyersson Milgrom 2004). Therefore, we expect returns on industry-specific human capital to be larger than returns on firm-specific human capital in cases where industry-specific human capital is more important to job performance, such as for junior-level positions in the BPO industry. Consistent with this discussion, we hypothesize that:

H2a: *Returns to industry-specific human capital are higher for junior-level positions than for senior-level positions among BPO professionals.*

H2b: *The returns gap between industry-specific and firm-specific human capital is higher for junior-level positions than for senior-level positions among BPO professionals.*

3. Method

3.1 Data

The context for our study is the Indian BPO industry, which accounts for a leading share of the global BPO industry (Kuruvilla and Ranganathan 2008). The Indian IT and BPO industries employ 2.8 million workers directly and 8.9 million workers indirectly, with an estimated $100 billion in total market size and $70 billion in exports in 2012 (Nasscom 2013). While this industry has grown significantly and has generated significant wage growth for Indian BPO employees, the human capital dimensions of this wage growth have not yet been studied.

We obtained the data for this study from a leading market research firm in India. The market research firm conducted an annual survey of Indian BPO professionals during the years 2006–2008. The surveys focused on employee compensation and HR practices at the current firm, and also included questions on prior work experience. Each year, the research firm used a similar questionnaire and approach to conduct the survey in two phases. Using 2007 as an example, in the first phase the research firm sent a detailed HR questionnaire to about 120 BPO companies in India. These companies included the BPO business units of Tata Consultancy Services (TCS) and Wipro, and multinational firms with a presence in India such as IBM Daksh. The research firm then selected the top firms based on firm size and growth for a second phase employee survey. The research firm worked to obtain an unbiased sample by taking steps to ensure that management did not influence the selection of respondents or their responses, and by promising confidentiality to respondents.

During the three years 2006–2008, over 2,500 Indian BPO professionals provided complete responses to the variables of interest for this study. Nineteen firms participated in the 2006 second-stage survey, 19 firms participated in the 2007 survey, and 17 firms participated in the 2008 survey.[2] The research firm provided us with the identity of 25 firms that participated in the 2007 and 2008 surveys (we do not have the identity of firms that participated in the 2006 survey). Of these 25 firms, 11 firms participated in both the 2007 and 2008 surveys, eight firms participated only in the 2007 survey, and six firms participated only in the 2008 survey. Twenty-three of these 25 firms are outsourcing vendors, one firm is a captive provider, and one firm provides both outsourced and captive services. As of March 2013, 22 of the 25 firms (or their parent company) are listed in the publicly-available National Association of Software and Services Companies (NASSCOM) member directory (www.nasscom.in).

[2] Although the exact response rate is not known, the research firm sampled employees from each level in locations covered by the survey, and employees were randomly picked based on employee ID (without names). We estimate a response rate of more than 90% from employees who were contacted to participate in the survey. We believe that because of random sampling and a high response rate from employees who were selected, this research design ensures representativeness and does not cause bias.

One firm was acquired by a larger outsourcing vendor during the period of our study, and two firms were acquired by larger outsourcing vendors after the period of our study.[3]

While financial data is not publicly-available for all 25 firms, the Centre for Monitoring the Indian Economy (CMIE) recorded financial data for some firms during the period of our study. For example, in 2007 CMIE recorded financial data for 11 of our 25 firms. Average revenues for these 11 firms were Rupees 3,221 crore (US$ 805 million at US$1=Rs.40 in 2006–2008), with a minimum of 56 rupees crore (US$ 14 million) and a maximum of 14,945 rupees crore (US$ 3,736 million). CMIE also recorded the ownership structure for 13 of our 25 firms, showing that 10 of the 13 firms were Indian-owned and 3 of the 13 firms were foreign-owned.[4] Based on information from the Indian research firm who conducted the survey, services offered by companies in the survey included call center services (such as outbound sales/marketing calls and inbound customer support) and non-voice services. According to one estimate, customer service (including call center) accounted for about 40 percent of total employment in the BPO sector in 2003-2004, while finance, HR and other services accounted for the other 60 percent (Greene 2006). Our review of the firm's websites indicates that these call center services include both technical and non-technical domains. Although many BPO workers in our sample may be engaged in call center-related jobs, we expect many others to be engaged in other BPO jobs related to accounting, finance, HR, etc. For example, TCS provides a variety of services including collections, customer interaction management, finance and accounting, HR, and supply chain management and procurement.[5] Genpact also provides diverse services such as contact center, HR, legal, and risk management.[6] Even though our data does not provide us with the precise nature of services for each BPO professional in our survey, we believe our sample of BPO workers performs a broader range of services beyond voice-based call-center services. With the large number of Indian BPO professionals and firms in our survey, our sample appears broadly representative of BPO professionals in India.[7] Because the surveys were answered by randomly selected respondents from participating BPO firms, and with high turnover of employees in the BPO industry, the overlap of respondents across years is likely to be negligible.[8]

[3] The list of 25 firms is available from the authors on request.
[4] We coded and classified the remaining 12 firms as Indian origin or foreign origin based on their national origin at the time they were started. In total, there are 16 Indian origin firms and nine foreign origin firms. We do not make a distinction between captive and captive/outsourced hybrid firms among the foreign origin firms in our data, and this does not bias our results because our models include dummy variables for each firm to account for firm-specific differences.
[5] http://www.tcs.com/offerings/business_process_outsourcing_BPO/horizontal_services/Pages/default.aspx
[6] http://www.genpact.com/home#
[7] According to the National Association of Software and Service Companies (NASSCOM), direct employment in India's BPO industry was 470,000 in 2005–2006.
[8] We conducted robustness checks by doing analyses separately for each year and obtained qualitatively similar results, as we report in Table A5.

Table 2 provides a description of variables in this study. Wages for the years 2007 and 2008 are deflated to 2006 Rupees using the Reserve Bank of India's Consumer Price Index for Urban non-Manual employees (see RBI publication Handbook of Statistics on Indian Economy, Table 40: Consumer Price Index – Annual Average)[9] and then log-transformed. Twelve percent of respondents in our data earned a four-year Bachelor of Engineering degree, 12% attained an MBA, 50% attained a three-year Bachelor degree, and remaining respondents attained a Master's degree.

- Insert Table 2 here -

To perform the analysis for Hypothesis 2, we isolated subgroups of junior-level positions (customer care and call takers) and senior-level positions (managers, group heads, and vice presidents) based on job titles. This classification is supported by the means of firm experience (1.57 years for junior-level positions and 3.63 years for senior-level positions), industry experience (2.10 and 5.32 years, respectively), and total experience (3.25 and 7.69 years, respectively). Our data provides support for the premise that hiring channels differ between junior-level and senior-level positions. In our data set, 24.7% of junior-level professionals are hired via the traditional walk-in application process, while only 1.5% of senior-level positions are hired through the walk-in process. The difference in hiring channels suggests a difference in hiring criteria by level.

Table 3 provides descriptive statistics for each year and for the total sample of Indian BPO professionals. The average annual wage is Rupees 2.31 lakhs ($5,800 at US$1=Rs.40 in 2006–2008). The mean age of workers in our sample is about 26 years old, just slightly lower than the mean age of 27 in Parent (2000) and 27.5 in Sullivan (2010).[10] Respondents have an average of 2.00 years of experience in the current firm, 2.72 years of experience in the BPO industry, and 4.00 years of total experience. Table A2 in the appendix compares average experience in our sample with that in other studies. The level of average experience reflects the recent founding and expansion of this industry in India, and the fact that this industry employs relatively young workers. Thirty-nine percent of respondents were working in their first job after graduation, 71% are male, and 23% are married.

- Insert Table 3 here -

Table 4 provides correlations for variables in this study. Firm experience, industry experience and total experience are all positively correlated with wages, consistent with theory on the role of human capital in wage growth. The correlation coefficient for industry experience is larger than the correlation coefficient for firm experience, which suggests that industry-specific human capital is relevant in the

[9] Available at http://www.rbi.org.in.

[10] Age appears as a bracketed variable in our dataset. The mean value of 2.57 lies just past midway between the scale value of 2.0 that corresponds to the 21–25 year range, and the scale value of 3.0 that corresponds to the 26–30 year range. We interpret this mean value to indicate that the mean age of workers in our sample is about 26 years old.

Indian BPO industry. Overall, these correlations are consistent with prior human capital research and the hypotheses in this study.

- Insert Table 4 here -

3.2 Empirical Models and Econometric Considerations

Following previous labor economics research, our econometric model uses the log-wage equation for Indian BPO professional *i* employed at firm *j*:

$$ln(Wage_{ij}) = \beta_1 ExpFirm_{ij} + \beta_2 ExpIndstry_{ij} + \beta_3 ExpTotal_{ij} + \gamma X_{ij} + \alpha_j + \varepsilon_{ij} \qquad (1)$$

where *Wage* represents the real annual wage of Indian BPO professional *i* at firm *j*, *ExpFirm* represents firm experience, *ExpIndustry* represents industry experience, *ExpTotal* represents total experience, the vector *X* includes explanatory variables such as education and job title, and α are firm dummies. Consistent with prior research, equation (1) also includes squared terms for current firm experience, industry experience and total experience. We omit these terms here for ease of presentation. β and γ are the parameters to be estimated, and ε is the error term associated with observation *i*. We estimate equation (1) using ordinary least squares (OLS), and report standard errors clustered at the firm level in all our models. The values of variance inflation factors (VIF) and condition index suggest that multi-collinearity is not a serious concern in our study (Cameron and Trivedi 2005). The highest VIF is 16.55 in model 5 of Table 5 and the condition index is 31.7, which is toward the lower end of the 30–100 range for moderate relations identified by Belsley, Kuh and Welsh (1980, p. 105), and well below the threshold of 100 suggested by Cameron and Triverdi (2005, p. 305). The higher VIFs are because of the squared terms for experience (not because of high correlations between firm and industry experience), particularly squared terms of firm experience and total experience. It is important to note that these squared terms are not statistically-significant in our models, and that our models without squared terms have reasonable VIFs. For example, Column (4) in Table 5 does not include squared terms for experience. For this model, the highest VIF is 3.37 and the average VIF is 1.41. To further alleviate any potential concerns with multi-collinearity, we mean-centered the experience variables and performed the same analyses as in Column 5 of Table 5. Our main findings still hold in the mean-centered model (the maximum VIF for the model with all experience mean-centered is 5.03 and the average VIF is 1.54), further suggesting that multi-collinearity is not a serious concern in our data. Overall, our main finding of higher returns to industry experience than to firm experience is robust to any potential concerns with multi-collinearity.

Because we use relatively objective measures such as education, gender, experience and wages (unlike subjective measures such as perceptions of organizational climate or policies), common-method bias is not likely to be a serious concern in this study. However, it is still useful to alleviate potential concerns for common-method bias. Podsakoff et al. (2003) suggest procedural and statistical remedies to

control and assess method biases. From a procedural standpoint, consistent with the recommendation of Podsakoff et al. (2003), our research site guaranteed response anonymity to reduce method bias. From a statistical standpoint, as suggested by Podsakoff et al. (2003), we conducted an exploratory factor analysis of our variables. The exploratory factor analysis revealed nine factors with eigenvalues exceeding one. Nine factors cumulatively explain 71.9% of variance in our data, with the first factor accounting for 17.5%. No single factor explained a majority of the variance, suggesting that common method bias is not a serious concern in our study.

One potential source of bias in estimating equation (1) may be that the job search process in a labor market leads to a better worker-firm match and thus a higher wage (Parent 2000). A higher return to industry experience may reflect a better worker-firm match, not an accumulation of industry-specific human capital. One way to assess the potential for endogeneity would be to employ the instrumental variables (IV) method, and instrument current firm (industry) tenure with deviations of current firm (industry) tenure from mean tenure on the current firm (industry) (Altonji and Shakotko 1987). Because the IV method requires panel data, and our data does not track wages of each worker over time, we use two approaches to assess the potential for endogeneity in our data.

First, we use proxy variables in our data, consistent with Woodridge (2010) who notes: "Omitted variable bias can be eliminated, or at least mitigated, if a proxy variable is available for the unobserved variable" (p. 63). Our survey data includes information on overall satisfaction and job satisfaction for each worker. Since better worker-firm match is likely to be associated with higher satisfaction, these variables could be a proxy for the level of worker-firm match. These satisfaction variables are highly associated with compensation, and are not statistically significantly associated with industry experience.[11] When we add the satisfaction variables to our wage equation, the coefficient and significance level for industry experience do not change significantly (Table A2), which suggests that more industry experience does not lead to better worker-firm match, and higher returns to industry experience are not attributable to better worker-firm match in our study.

Second, we assessed the robustness of our results by calculating the threshold at which the impact of an unobservable confounding variable would be large enough to make the focal variable become insignificant (Larcker and Rusticus 2010). Frank (2000) provides an index called the impact threshold for a confounding variable (ITCV), to capture the necessary impact for a confounding variable to alter the inference. For our model in column 4 of Table 5, the ITCV is 0.08. This means that the coefficient associated with industry experience would lose statistical significance only when the impact of an omitted confounding variable is greater than 0.08, or the partial correlation (after controlling for current

[11] The correlation coefficient of industry experience with overall satisfaction is 0.008 (*p* value 0.698) and with job satisfaction is −0.026 (*p* value 0.190).

covariates) between the confounding variable and industry experience is 0.27, and the partial correlation between the confounding variable and natural log of wages is 0.30. These partial correlations are quite large in comparison to the zero-order correlations between experience and other explanatory variables (except job titles which we control for in our models), and large enough to exclude the possibility that an omitted variable could significantly alter the importance of industry experience, because we already control for many typical variables in the literature (see Table A3 in the appendix).

We assess the potential for heterogeneity in human capital effects across career stages in two ways. First, for Hypothesis 2 we consider subgroups of junior-level positions and senior-level positions. Chow tests (Chow 1960) confirm that there is a statistically significant difference between the coefficients for junior-level positions and senior-level positions ($F_{73, 1901}$=12.233, p<.001). Second, we re-estimate wage equations for the pooled sample by including interaction terms of career stage with the polynomials of firm tenure, industry experience and total experience.

4. Results

Hypothesis 1 predicted a higher return to industry-specific human capital than to firm-specific human capital for Indian BPO professionals. We find support for Hypothesis 1, as shown in columns 4 and 5 of Table 5. The likelihood ratio test shows that the model with squared terms of experience is better at explaining wage determination than the model with only linear terms. Our findings show that the magnitude and significance of firm experience and total experience decrease when industry experience is added to the equation, and the effect of firm experience becomes statistically insignificant. This result suggests that industry-specific human capital plays an important role in wages for the Indian BPO industry. The Wald test rejects the hypothesis that the coefficients on industry experience and firm experience are the same, further confirming that industry-specific human capital generates higher returns than firm-specific human capital in the Indian BPO industry.[12]

- Insert Table 5 here -

We plotted wage trajectories of BPO professionals for different levels of work experience and find that the return to industry-specific human capital is higher than the return to other types of human capital for professionals with 0–10 years of work experience.[13] These results are consistent with recent research in developed economies suggesting the importance of industry-specific human capital for wages (Neal 1995; Parent 2000).

Based on results in Table 5, we calculated cumulative returns to industry experience. Table 6 shows an increase in wages from multiple years of industry experience, after controlling for other explanatory variables. For example, five years of industry experience leads to a cumulative wage

[12] When we conduct the Wald tests, we compare the coefficients of linear terms for experience.
[13] See Figure A1 in the appendix.

increase of 40.8%. Cumulative returns are also similar across years within our sample. These returns to industry experience are somewhat higher compared with those in prior research (Parent 2000; Sullivan 2010), and we recognize that some portion of these returns may be attributable to overall growth and wage increases in the Indian BPO industry (Kuruvilla and Ranganathan 2008; Zangelidis 2008). The returns to industry experience in the BPO industry are larger than those to total experience, which suggests that BPO industry characteristics discussed above may make industry-specific human capital relatively more valuable in that industry.

- Insert Table 6 here -

We find support for Hypothesis 2a, which predicted larger returns to industry-specific human capital for junior-level positions compared with senior-level positions. Columns 1 and 2 of Table 7 show that industry experience is positively associated with wages for junior-level positions, but does not have a statistically significant relationship with wages for senior-level positions. When we include interaction terms of industry experience and position levels, we find a negative coefficient for the interaction term of industry experience and senior-level positions (see column 3 of Table 7), which suggests that the return to industry-specific human capital is smaller for senior-level positions.

- Insert Table 7 here -

We find support for Hypothesis 2b, which predicted a larger returns gap between industry- and firm-specific human capital for junior-level positions compared with senior-level positions. Wald tests in Table 7 show significant differences between returns to industry experience and firm experience for junior-level positions, but not for senior-level positions. This finding is consistent with Zangelidis (2008), who finds that industry experience has limited impact on wages of senior-level positions.

In addition, our findings in Table 7 show that senior-level BPO professionals have high, positive and statistically significant returns on total experience (about 6.3% per year of general experience), and these returns are significantly higher than returns on firm-specific experience or industry experience (positive but statistically insignificant in Column 2 of Table 7).[14] This is in sharp contrast to junior-level BPO professionals for whom we observe very high returns to industry experience but much lower returns to general experience. These findings are interesting because human capital theory predicts higher returns for firm-specific and industry experience than general experience. Also, the return on general experience for senior-level BPO professionals is significantly higher than the returns on general experience for IT professionals of about 1.5% per year (see Mithas and Krishnan 2008). This finding may also be explained by the fact that senior-level positions in our sample have relatively less work experience compared to senior-level positions in developed economies, so do not have significant decreasing returns

[14] This return on general experience is slightly higher than the 6% per year reported by Zangelidis (2008), and significantly higher than the 4% per year reported by Sullivan (2010) for the "managers" group in their samples.

to total experience over time (see Column 5 of Table 5). Together, these findings suggest that IT professionals and BPO professionals face different labor markets. Even within these markets, returns to experience differ for junior- and senior-level professionals. It is likely that BPO firms value general experience of senior-level positions such as knowledge of principles for client and employee management, which may be easier to transfer across industries than the knowledge of IT professionals.

We observe some interesting findings for our control variables. Male professionals earn a higher wage compared with female professionals, particularly in junior-level positions. This may be partly related with work environments such as overnight shifts, where the participation level may be different between men and women. Such differences in work environments are less likely for senior-level positions. We also find that education has a differential effect on compensation between junior- and senior-level positions.

We conducted robustness checks and additional analyses. First, because mean total experience in our data is lower than in other papers (see Table A4 in the appendix), we conducted an additional analysis using only 2008 data, which has an experience profile more similar to Sullivan (2010). We still find a similar magnitude of returns to industry experience (see Table A5 in the appendix), which suggests that high returns to industry-specific human capital in our study are not due to different levels of total experience in our data. Second, we isolated subgroups of junior-level positions (customer care and call taker) and senior-level positions, and conducted a separate analysis for each level (see Table A6 in the appendix). These results suggest that junior-level positions have greater returns to industry experience than senior-level positions.

We conducted additional analyses to generate further insights. For example, we examined whether returns to industry experience are different between Indian origin and foreign origin firms. Prior research suggests that firm origin and imprint have significant and lasting influence on strategies and structure of firms through norms, culture and expectations (Bamford, Dean and McDougall 2000; Eisenhardt and Schoonhoven 1990; Kimberly 1979; Stinchcombe 1965). In response to the call to explore the role of firm origin to distinguish between compensation practices of developed economy MNCs and emerging economy firms (Levina and Xin 2007), columns (3)-(4) of Table 8 show that industry experience of junior-level positions is positive and statistically significant for Indian origin firms, while not significant for foreign origin firms. We achieve similar results when we expand this analysis to include more senior-level positions (see Columns (3)-(4) of Table A7 in the appendix).

- Insert Table 8 here -

One explanation for why Indian origin firms more highly value industry experience may be that Indian origin firms serve diverse customers with a more standardized approach, while the Indian sites of foreign origin firms may customize their operations when dealing directly with clients based outside of

India (see Dossani and Kenney 2007). While this explanation is supported by our empirical results, our additional research suggests two alternative explanations. First, foreign origin and Indian origin firms are likely to have different Human Resource (HR) policies. Foreign origin firms generally have more firm-specific HR policies and strong knowledge capabilities, which make the firms less likely to place a high value on BPO-specific skills (Lazear 2009). Foreign origin firms also tend to offer different training programs and longer career paths than Indian origin firms (Kuruvilla and Ranganathan 2008). For example, foreign origin firms frequently send selected personnel overseas (mainly to the U.S. and United Kingdom) (Budhwar et al. 2006) to train and make employees aware of country-specific knowledge such as culture, philosophy and values. The differences in HR policies between foreign origin and Indian origin are likely to lead to differences in returns to human capital (Levina and Xin 2007). Because more firm-specific training and career development may lead to higher returns to firm experience, different HR policies suggest that industry experience may be less valued by foreign origin firms than by Indian origin firms.

A second alternative explanation is that BPO-related knowledge is more encoded in the processes and systems of foreign origin firms, reducing the need to bring this knowledge from the outside (Srikanth and Puranam 2011; Srikanth and Puranam 2013). The success of large outsourcing firms is often based on "the 'recombination' of technology and organization and on learning-based processes including the pooling of skills through staff transfer from clients, the bundling of services, the use of distinctive processes and the increase of productivity through re-allocation of staff and reduced headcount" (Flecker 2007, p. 43). Many foreign origin firms are known to have long-established customers and enormous domain knowledge (Dossani and Kenney 2007). To the extent that foreign origin firms have sufficient knowledge capabilities from their units in developed economies, they would have less incentive to hire junior-level workers to acquire BPO-specific knowledge for their Indian business units. Again, this supports the notion that industry experience may be valued less by foreign origin firms than by Indian origin firms. These alternative explanations call for future research to study institutional characteristics along with human capital when examining compensation policies.

We also examined whether returns to industry experience are different between "BPO-focused" and "IT-focused" firms (Carmel, Gao and Zhang 2008).[15] Columns (1)-(2) of Table 8 show that industry experience of junior-level positions is positive and statistically significant only for BPO-focused firms, but not for IT-focused firms. This may be because junior-level positions for BPO-focused firms are likely to do more standardized and simple work than junior-level positions for IT-focused firms. IT-focused

[15] In addition to the reporting financial data for firms as described earlier, CMIE also categorizes firms as IT-enabled services firms (BPO-focused) or computer software firms (IT-focused). CMIE categorized 13 of our 25 firms, and an author categorized the remaining 12 firms in our data for this additional analysis. When we perform the analyses including only the 13 firms categorized by CMIE, we find qualitatively similar results.

firms belong to parent IT firms that perform business and software work as part of a full suite of services (Dossani and Kenney 2007). BPO was a strategic opportunity for Indian IT firms based on complementary assets such as contacts and credibility with potential clients, which were to some degree transferable across service areas within an organization (Hitt et al. 2001; Matsusaka 2001). For example, Dossani and Kenney (2007) note that "Infosys has emphasized back office work but only accepts call center work as part of larger package that includes back office work" (p. 786). Accordingly, junior-level positions for IT-focused firms are likely to do more customized and value-added work that leverages capabilities of the parent firm, and as a result their skills are less likely to be transferable across organizations. Since the jobs done by senior-level positions are less likely to be different between the two types of firms, we find a less significant difference in returns to industry experience between BPO-focused and IT-focused firms when we also include more senior-level positions (see Columns (1)-(2) of Table A7 in appendix).

5. Discussion

5.1 Main Findings

Our findings on human capital in the Indian BPO industry provide important new insights. First, for an industry that is highly standardized and codified, we find that industry-specific human capital has a larger impact on wages than firm-specific human capital or general human capital. This finding suggests the importance of industry-specific human capital for emerging industries that rely on routinized work procedures.

Our second finding indicates that the value of industry-specific human capital varies by career stage. Industry experience has a larger positive relationship with wages for junior-level professionals than with wages for senior-level professionals. This finding on returns to different dimensions of human capital between junior- and senior-level positions within an industry provides new insights, and extends prior research that studied returns to experience from the perspective of heterogeneity across occupations (Kambourov and Manovskii 2009; Sullivan 2010; Zangelidis 2008), rather than heterogeneity across career stages. It suggests that professionals may receive optimal returns by focusing on various forms of human capital at various points in their careers, such as industry-specific human capital for junior-level positions and firm-specific human capital for senior-level positions.

Our additional findings suggest that BPO-focused firms reward industry experience of junior-level positions more highly than IT-focused firms, and Indian origin firms reward industry experience of junior-level positions more highly than foreign origin firms. While BPO-focused firms and IT-focused firms offer BPO services, this exploratory finding suggests that a firm's 'DNA' may influence the manner in which the firm goes to market and competes against firms with different origins, and designs and staffs its job postings (Kumar, Mohapatra and Chandrasekhar 2009). To the extent that workers in junior-level

positions in BPO-focused firms and Indian origin firms are engaged in more standardized and routinized work (see Dossani and Kenney 2007; Hitt et al. 2001; Matsusaka 2001), these findings provide further confidence in our main results.

Our findings also suggest that the nature of competition among firms in an industry may influence how these firms compensate their employees. For example, we draw on Lazear's (2009) skill-weight explanation to argue that Indian origin firms may pay a high premium for industry experience compared with foreign origin firms, because Indian origin firms place a higher priority on industry experience compared with foreign origin firms. While we expect based on our theory development above that the standardization of skills within the BPO industry is the dominant explanation for high returns to industry experience, this skill-weights explanation can also help to explain our findings for heterogeneity across segments of the BPO industry.

Our contributions shed light on the role and importance of industry-specific human capital in the emerging BPO industry, in the tradition of other studies that focus on particular industries (e.g., Levina and Ross 2003; Levina and Su 2008). We make a theoretical contribution by drawing from literature on skill transferability and outsourcing to argue that work characteristics and industry characteristics can help explain variation in returns to industry-specific human capital. Our study brings a new unit of analysis to BPO research, drawing attention to worker-level issues such as compensation, compared with industry- and firm-level issues in prior BPO research, such as how firms make decisions to outsource business processes (Tanriverdi et al. 2007), how firms make decisions to outsource offshore rather than onshore (Whitaker et al. 2011), and how firms manage offshore vendors during the outsourcing process (Mani et al. 2006).

Overall, this study contributes to emerging literature on human capital of IT and IT-enabled service professionals by exploring the importance of industry experience across career stages in the BPO industry (see Table A8 for a summary). We contextualize labor economics theories to the domain of IS to test boundary conditions of theories in prior research, and shed light on important managerial concerns and policy issues that are sometimes under the radar for labor economists. For example, while labor economists study gender differences in compensation, they do not focus extensively on whether those arguments apply to emerging occupations such as BPO. Table A8 indicates that most studies (with the exception of Ang et al. 2002 in Singapore) across IT and BPO firms find that female professionals earn less than men, even after controlling for age, job level, education, work experience and other institutional factors. The finding of gender inequality in compensation is not new, several studies involving non-IT professionals (Dreher, Dougherty and Whitely 1985; Kalleberg and Van Buren 1996) and IT professionals (Levina and Xin 2007; Truman and Baroudi 1994) have documented the relatively lower compensation of women. However, it is disconcerting to note that the wage differential due to gender

applies to relatively younger BPO professionals who may not yet have experienced any interruptions due to family obligations that typically set in with age. It is possible that in the Indian context wage differences for gender may arise due to cultural or other factors that are unobserved to us, suggesting opportunities for further research to understand those factors.

5.2 Implications for Research

This study suggests several implications for research across other industries, occupational groups, career stages and firms. First, the finding that industry-specific human capital has a larger impact on wages than firm-specific or general human capital suggests that process standardization in an industry has implications for worker compensation. When processes are standardized in an industry, especially an emerging industry with a fast rate of knowledge depreciation, industry-specific human capital becomes more valuable for employees in that industry compared with firm-specific or general human capital. By providing evidence that industry-specific human capital is well compensated in the BPO industry that features routine work procedures, and even more so for junior-level professionals in the most standardized positions, this study suggests that work characteristics and industry characteristics can be factors to explain the importance of industry-specific human capital. A larger economy-wide implication of our work is that as firms disaggregate their processes and the outsourcing industry grows to further leverage economies of scale, scope and expertise, outsourcing professionals should invest in their industry-specific human capital until they move up to senior management positions. Many consulting firms already recognize this implication and structure their organizations and employees accordingly, by geography (e.g., North America, China), function (e.g., marketing or IT), and/or industry (e.g., retail, banking and financial services).[16]

We expect our theoretical arguments to generalize to other service industries in which tasks are explicit, standardized and repeatable, such as IT implementation consulting (Hansen, Nohria and Tierney 1999).[17] While our findings indicate that industry standardization may be a key factor to increase the importance of industry-specific human capital relative to firm-specific human capital, it will be necessary to more directly examine whether increasing levels of process standardization in other industries influence the relative importance of different types of human capital. Although standardized industries may value industry-specific human capital, industries involving more complex/interconnected work and more creative skills/independent judgment (such as music recording, development of complex enterprise software products, or strategy consulting) may require more intense interaction of workers and firm-specific skills, which may lead those industries to value firm-specific human capital over industry-specific human capital.

[16] We thank Natalia Levina (Senior Editor) and Rahul Jain (Boston Consulting Group) for this discussion.
[17] We thank Natalia Levina for this insight.

There is a need to study whether industry-specific human capital is more important in other emerging technology-related industries compared with more mature industries. For example, professionals in the mobile application ('app') industry may be more likely to do standardized and routine work, because platforms provide shared tools that allow developers to write, test and deploy applications into the target environment. App developers for the Android platform will share the same development environment and have a similar knowledge base with other Android developers, implying that their knowledge may be more transferable across Android app companies. It is likely that IT development skills that are consumed in isolation (e.g., technical skills) may benefit more from industry-specific investments compared with skills that need to be applied in teams (e.g., IT project management or development of complex enterprise software products) (Huang, Tafti and Mithas 2012). Also, to the extent mobility of professionals across firms and countries is higher in emerging technology-related industries (Levina and Kane 2009; Mithas and Lucas 2010), and inter- and intra-organizational boundary spanning is more necessary in these industries (Levina and Vaast 2005), there is a need to explore these industries, roles of professionals in these industries, and mobility of professionals across these industries. Based on this discussion, we formulate propositions 1a and 1b to motivate future research in this area:

> *P1a*: Standardized industries (such as IT implementation consulting) will value industry-specific human capital more than firm-specific human capital.
>
> *P1b*: Industries involving more complex/interconnected work and more creative skills/independent judgment (such as music recording and strategy consulting) require more intense interaction of workers and firm-specific skills, which will lead those industries to value firm-specific human capital more than industry-specific human capital.

Second, we expect our findings on BPO professionals to apply to other occupational groups that exhibit similar occupational characteristics (Mithas and Whitaker 2007), such as positions with similar levels of standardization including engineers, scientists and technicians. The unique characteristics of BPO jobs, particularly those in Indian origin BPO firms, require employees to follow prescribed work procedures with relatively less independent judgment (Thite and Russell 2007). As the BPO industry continues to increase its level of standardization, this will require BPO firms to find ways to increase workers' commitment and mitigate some of the adverse consequences of working in a highly standardized and regimented environment. As Levina and Ross (2003) note, "concerns about motivation" can be a key issue in retaining employees in jobs in more structured environments (p. 354). Galunic and Anderson (2000) show that investments in general human capital can increase commitment of employees, particularly when workers care about their mobility. The findings from the Bapna et al. (2013) may reflect this phenomenon in the IT industry, by showing that employee performance ratings in an Indian IT services firm improve with general training but not firm-specific training. An alternative way to increase

workers commitment may be to provide them with greater autonomy (Drucker 1999; Tafti, Mithas and Krishnan 2007), while using process templates such as CMMI or agile methodologies to retain some discipline and control (Kude et al. 2014). In other words, firms may need to develop ambidextrous capabilities for disciplined autonomy as they move up the value chain (Gibson and Birkinshaw 2004).

More broadly, the finding that once industry experience is taken into account, firms do not value tenure or work experience at the current firm provides a boundary condition for theories that emphasize the value of firm-specific skills. This finding is intriguing because much of the literature argues for the importance of firm-specific skills. For example, the resource-based view argues that firm-specific skills (Mata, Fuerst and Barney 1995) may be the most important to provide sustainable competitive advantage. Similarly, transaction cost economics argues that four sources of job idiosyncrasy (equipment, processes, informal team accommodations, and communications) make firm-specific skills more valuable than general skills (Williamson, Wachter and Harris 1975). These premises were also important to explain the existence of internal labor markets within firms, although Leonard's (1989) empirical work does not find much support for internal labor markets. There is a need for further research to verify our finding of low returns to firm-specific experience in other high clock-speed industries such as high tech and pharmaceuticals.

While it is necessary to be aware of differences in the relative importance of different forms of human capital across occupations, it is also important to recognize heterogeneity across career stages or job titles within an occupation. The finding that industry experience has a larger positive relationship with wages for junior-level positions than with wages for senior-level positions provides indirect support that the level of standardization for a job is positively associated with returns to industry-specific human capital, because jobs done by junior-level positions are likely to be more standardized than those done by senior-level positions. This finding could also be interpreted in terms of differential returns on technical and managerial skills across career stages.[18] Senior-level positions require more managerial skills, while junior-level positions require more technical skills. Senior managers focus on strategic activities such as leadership and motivation, boundary-spanning and interactional responsibilities, negotiation and enforcement of contracts, coordinating and cultivating relationships with partners, and analyzing options and planning for contingencies (Davis-Blake and Broschak 2009), which requires firm-specific human capital such as an understanding of the firm's corporate strategy, organizational structure, and executive decision-making processes and biases (Slaughter et al. 2007). In return, this firm-specific human capital for senior managers is rewarded at a higher level by BPO firms. On the other hand, junior-level positions are rewarded less highly for firm-specific skills, because the standardization of hardware and software

[18] We thank an anonymous reviewer for this discussion.

platforms have reduced the need for firm-specific language and communications (Davenport 2005). Based on this discussion, we formulate propositions 2a and 2b.

> *P2a*: Occupational groups with higher levels of occupational characteristics such as standardization, codification and modularization (such as engineers, scientists and technicians) will value industry-specific human capital more than firm-specific human capital.

> *P2b*: Occupational groups with lower levels of occupational characteristics such as standardization, codification and modularization, and high clock-speed occupations (such as high tech and pharmaceuticals) will value firm-specific human capital more than industry-specific human capital.

Third, our additional analyses demonstrate that there can be worker-level differences based on the national origin and strategy of firms. For example, Indian-origin BPO vendors often had the CMMI Level 5 credential to signal their standardized process quality at low cost (Arora and Gambardella 2006; Gao, Gopal and Agarwal 2010; Ramasubbu et al. 2008b), while U.S.-based BPO vendors may use more direct and long-standing client relationships to pursue a differentiation-based strategy. National origin may also impact the strategy of IT and BPO firms, shown by research that places Chinese IT services firms into separate categories based on whether they are multi-national, a China-based legacy provider of IT services, or a China-based startup provider (Carmel et al. 2008). It will be necessary to study the manner in which the national origin of IT and BPO firms impact the roles and compensation of professionals in those firms. Based on this discussion, we formulate proposition 3 for future research.

> *P3*: BPO service providers with an origin in an emerging economy will value industry-specific human capital more than foreign origin firms.

5.3 Implications for Practice

The study also has implications for practice. BPO firms can use our findings to improve their management of human capital. For example, our findings suggest that BPO firms reward junior-level positions relatively more highly for industry-specific human capital, and senior-level positions relatively more highly for total experience. In cases where human capital could create a competitive advantage, firms should invest in and reward this human capital so their valuable employees do not switch firms (Hatch and Dyer 2004). In addition, our study implies that because BPO firms appear to benefit from knowledge-spillovers through labor mobility, managers should be proactive to insource knowledge and know-how by adopting appropriate compensation practices (Tambe and Hitt 2013). As shown in the Silicon Valley, labor market flexibility and modularized business processes can spur regional knowledge spillovers and improve the productivity of firms (Fallick et al. 2006; Saxenian 1996). As such, BPO firms may find it desirable to locate in places such as the Silicon Valley, even though this may increase labor and facility costs for those firms.

BPO professionals can use our findings to make decisions related to career, education and training. Junior-level professionals should maintain their focus on developing industry-specific skills to

maximize their compensation in the BPO industry. At the junior-level, professionals should not expect to be rewarded for significant investments in firm-specific skills. It may be particularly important for professionals who have switched into the BPO industry to enhance their industry-specific skills, because they face a compensation deficit compared with professionals who began and stayed in the BPO industry. Once a BPO professional reaches the senior level, to maximize their compensation they will need to shift their focus from industry-specific skills to general skills such as policy administration and employee supervision.

For institutions such as NASSCOM (National Association of Software and Service Companies) and universities in India, our findings suggest the need to invest in education for BPO industry-specific skills. India will need to provide college education for 50 million students between 2011-2020, and will add 120 million working age people during this period (Livemint 2013). In addition to the challenge of large numbers of college students and workers, India will be further challenged by the limits of its past education investment levels, which are currently one-half of those in China and one-fifth of levels in the U.S. (Anand 2011; Silverstein and Singhi 2012). One way for India to overcome these challenges might be to develop specific and tailored courses for students and workers who want to pursue a BPO career, through partnerships with firms such as TCS, Infosys and NIIT who have developed significant expertise in training professionals for the BPO industry (FICCI 2012). From a policy perspective, high returns to industry-specific human capital would suggest that during an economic downturn, interventions such as job search services may be more effective (than training programs to upgrade depreciating skills) to find jobs in the same industry, or to create a better match if BPO professionals get displaced from their jobs (Hu 2006).

5.4 Limitations and Suggestions for Further Research

This study has limitations that can be overcome by further research. First, this study used cross-sectional survey data collected by a market research company, which makes it difficult for us to precisely assess the within-firm response rate. It would be useful to study panel archival data directly from employers that includes job- and industry-switching history, to enrich our understanding of linkages and mechanisms for career management in the IT and BPO professions. Second, this study does not address how skills transfer across industries other than the BPO industry, including when professionals transfer out of the BPO industry. One useful direction for further research would be to include data of workers who leave the BPO industry for other industries, to explore generalizability of our findings. In addition to overcoming the above data limitations, future studies should test and extend propositions we developed in section 5.2. For example, it will be useful to compare returns on human capital by collecting detailed task-level data (see Blinder 2009) and wage data from firms in various segments of the IT and BPO industry.

To conclude, this research studies the relationship between industry-specific human capital, firm-specific human capital, and general human capital and wages for over 2,500 professionals in the Indian BPO industry. We find that industry-specific human capital has a stronger relationship with wage growth than firm-specific human capital or general human capital. We also find that this relationship is stronger for junior-level positions than for senior-level positions. Our findings provide important insights for firms and professionals as the global economy shifts toward information and services, and as industries transition to more standardized processes and boundary-less careers.

References

Altonji, J.G., and Shakotko, R.A. "Do Wages Rise with Job Seniority?" *Review of Economic Studies* (54:179) 1987, p 437.

Amiti, M., and Wei, S.-J. "Service Outsourcing and Productivity: Evidence from the U.S.," *World Economy* (32:2) 2009, pp 203-220.

Anand, G. "India Graduates Millions, but Too Few are Fit to Hire," *Wall Street Journal*, April 5, 2011, pp. A1, A12.

Ang, S., Banker, R.D., Bapna, R., Slaughter, S.A., and Wattal, S. "Human Capital of IT Professionals: A Research Agenda," *International Conference on Information Systems*, Shanghai, 2011, Paper 5.

Ang, S., Slaughter, S.A., and Ng, K.Y. "Human Capital and Institutional Determinants of Information Technology Compensation: Modeling Multilevel and Cross-Level Interactions," *Management Science* (48:11) 2002, pp 1427-1445.

Arora, A., and Gambardella, A. *From Underdogs to Tigers: The Rise and Growth of the Software Industry in Brazil, China, India, Ireland, and Israel* Oxford University Press, New York, 2006.

Bamford, C.E., Dean, T.J., and McDougall, P.P. "An Examination of the Impact of Initial Founding Conditions and Decisions Upon the Performance of New Bank Start-Ups," *Journal of Business Venturing* (15:3) 2000, pp 253-277.

Bapna, R., Langer, N., Mehra, A., Gopal, R., and Gupta, A. "Human Capital Investments and Employee Performance: An Analysis of IT Services Industry," *Management Science* (59:3) 2013, pp 641-658.

Batt, R., Doellgast, V., Kwon, H., Nopany, M., Nopany, P., and Costa, A.D. "The Indian Call Centre Industry: National Benchmarking Report Strategy, HR Practices, & Performance," School of Industrial and Labor Relations, Cornell University, 2005.

Becker, G.S. *Human Capital* University of Chicago Press, 1964.

Becker, G.S. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, (2nd ed.) National Bureau of Economic Research, Cambridge, MA, 1975.

Blinder, A.S. "How Many US Jobs Might be Offshorable?" *World Economics* (10:2) 2009, pp 41-78.

Cameron, A.C., and Trivedi, P.K. *Microeconometrics: Methods and Applications* Cambridge University Press, New York, NY, 2005.

Carmel, E., and Agarwal, R. "The Maturation of Offshore Sourcing of Information Technology Work," *MIS Quarterly Executive* (1:2) 2002, pp 65-78.

Carmel, E., Gao, G., and Zhang, N. "The Maturing Chinese Offshore IT Services Industry: It Takes 10 Years to Sharpen a Sword," *MIS Quarterly Executive* (7:4) 2008, pp 157-170.

Carrington, W.J. "Wage Losses for Displaced Workers: Is It Really the Firm that Matters?" *Journal of Human Resources* (28:3) 1993, pp 435-462.

Castanias, R.P., and Helfat, C.E. "The Managerial Rents Model: Theory and Empirical Analysis," *Journal of Management* (27:6) 2001, pp 661-678.

Chen, M.-H., Lyu, M.R., and Wong, E. "Effect of Code Coverage on Software Reliability Measurement," *IEEE Transactions on reliability* (50:2), June 2001 2001, pp 165-170.
Chow, G.C. "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," *Econometrica* (28:3) 1960, pp 591-605.
Cummings, J. "Leading Groups from a Distance: How to Mitigate Consequences of Geographic Disperson," *Leadership at a Distance: Research in Technology-Supported Work*, S. Weisband (ed.), Lawrence Erlbaum Associates, New York, 2007, pp. 33-50.
Davenport, T.H. "The Coming Commoditization of Business Processes," *Harvard Business Review* (83:6) 2005, pp 100-108.
Daveri, F., and Maliranta, M. "Age, Seniority and Labour Costs: Lessons from the Finnish IT Revolution," *Economic Policy* (22:49) 2007, pp 117-175.
Davis-Blake, A., and Broschak, J.P. "Outsourcing and the Changing Nature of Work," *Annual Review of Sociology* (35:1) 2009, pp 321-340.
Dossani, R., and Kenney, M. "The Next Wave of Globalization: Relocating Service Provision to India," *World Development* (35:5) 2007, pp 772-791.
Dreher, G.F., Dougherty, T.W., and Whitely, B. "Generalizability of MBA Degree and Socioeconomic Effects on Business School Graduates' Salaries," *Journal of Applied Psychology* (70:4) 1985, pp 763-773.
Drucker, P.F. "Knowledge-Worker Productivity: The Biggest Challenge," *California Management Review* (41:2) 1999, pp 79-94.
Dutta, A., and Roy, R. "Offshore Outsourcing: A Dynamic Causual Model of Counteracting Forces," *Journal of Management Information Systems* (22:2) 2004, p 2005.
Eisenhardt, K.M., and Schoonhoven, C.B. "Organizational Growth: Linking Founding Team, Strategy, Environment, and Growth among U.S. Semiconductor Ventures, 1978-1988," *Administrative Science Quarterly* (35:3) 1990, pp 504-529.
Fallick, B., Fleischman, C.A., and Rebitzer, J.B. "Job-Hopping in Silicon Valley: Some Evidence Concerning the Microfoundations of a High-Technology Cluster," *The Review of Economics and Statistics* (88:3) 2006, pp 472-481.
Ferratt, T.W., Agarwal, R., Brown, C.V., and Moore, J.E. "IT Human Resource Management Configurations and IT Turnover: Theoretical Synthesis and Empirical Analysis," *Information Systems Research* (16:3) 2005, pp 237-255.
FICCI "Mega Trends of the Emerging Third Industrial Revolution in India," *A Collaborative report by the initiative of FICCI young leaders (FYL) and the office of Jeremy Rifkin in Washington DC*, 2012.
Flecker, J. "Network Economy or Just a New Breed of Multinationals? Relocation of eWork as a Window to the Restructuring of Value Chains," *Work Organisation, Labour and Globalisation* (1:2) 2007, pp 36-51.
Frank, K.A. "Impact of a Confounding Variable on a Regression Coefficient," *Sociological Methods & Research* (29:2) 2000, pp 147-194.
Galunic, D.C., and Anderson, E. "From Security to Mobility: Generalized Investments in Human Capital and Agent Commitment," *Organization Science* (11:1) 2000, pp 1-20.
Gao, G., Gopal, A., and Agarwal, R. "Contingent Effects of Quality Signaling: Evidence from the Indian Offshore IT Services Industry," *Management Science* (56:6) 2010, pp 1012-1029.
Gathmann, C., and Schönberg, U. "How General Is Human Capital? A Task-Based Approach," *Journal of Labor Economics* (28:1) 2010, pp 1-49.
Gibbons, R., and Waldman, M. "Task-Specific Human Capital," *American Economic Review* (94:2) 2004, pp 203-207.
Gibson, C., and Birkinshaw, J. "The Antecedents, Consequences, and Mediating Role of Organizational ambidexterity," *Academy of Management Journal* (47:2) 2004, pp 209-226.

Greene, W. "Growth in Services Outsourcing to India: Propellant or Drain on the U.S. Economy?" *Office of Economics Working Paper, U.S. International Trade Commission*, Washington, DC, 2006, pp. 1-64.

Han, K., and Mithas, S. "Information Technology Outsourcing and Non-IT Operating Costs: An Empirical Investigation," *MIS Quarterly* (37:1) 2013, pp 315-331.

Hansen, M.T., Nohria, N., and Tierney, T. "What's Your Strategy for Managing Knowledge?" *Harvard Business Review* (77:2) 1999, pp 106-116.

Hatch, N.W., and Dyer, J.H. "Human Capital and Learning as a Source of Sustainable Competitive Advantage," *Strategic Management Journal* (25:12) 2004, pp 1155-1178.

Helper, S., and Sako, M. "Supplier Relations in Japan and the United States: Are they Converging?" *Sloan Management review* (36:3), Spring 1995, pp 77-84.

HfS Research "Finance and Accounting BPO Market Landscape, 2013: Market Evaluation, Forecast and Competitive Analysis," available at http://www.kpmginstitutes.com/shared-services-outsourcing-institute/insights/2013/hfs-finance-accounting-outsourcing-study-2013.aspx.

Hitt, M.A., Biermant, L., Shimizu, K., and Kochhar, R. "Direct and Moderating Effects of Human Capital on Strategy and Performance in Professional Service Firms: A Resource-Based Perspective," *Academy of Management Journal* (44:1) 2001, pp 13-28.

Hu, X. "Technology and Displaced Workers' Earnings Losses," *Working paper, University of Maryland*, 2006.

Huang, P., Tafti, A., and Mithas, S. "Knowledge Contribution in Online Network of Practice: The Role of IT Infrastructure, Foreign Direct Investment and Immigration," Proceedings of the 32nd International Conference on Information Systems (Dec 16-19), Association for Information Systems, Orlando, Florida, 2012.

Jaffe, A.B., Trajtenberg, M., and Henderson, R. "Geographic Localization of Knowledge Spillovers as Evidenced by Patent Citations," *Quarterly Journal of Economics* (108:3) 1993, pp 577-598.

Jensen, J.B., and Kletzer, L.G. "Tradable services: Understanding the Scope and Impact of Services Offshoring," *Brookings Trade Forum 2005, Offshoring White-Collar Work*, S.M. Collins and L. Brainard (eds.), Brookings Institution Press, Washington, DC, 2006.

Josefek, R.A., and Kauffman, R.J. "Nearing the Threshold: An Economics Approach to Pressure on Information Systems Professionals to Separate from their Employer," *Journal of Management Information Systems* (20:1) 2003, pp 87-122.

Josefek, R.A.J., and Kauffman, R.J. "Five Degrees of Separation: A Human Capital Model of Employment Related Decision Making in the Information Technology Workforce," Proceedings of the 32nd Hawaii International Conference on System Sciences, IEEE, Hawaii, 1999, pp. 1-13.

Jovanovic, B. "Firm-Specific Capital and Turnover," *Journal of Political Economy* (87:6) 1979, pp 1246-1260.

Kalleberg, A.L., and Van Buren, M.E. "Is Bigger Better? Explaining the Relationship Between Organizational Size and Job Rewards," *American Sociological Review* (61) 1996, pp 47-66.

Kambourov, G., and Manovskii, I. "Occupational Specificity of Human Capital," *International Economic Review* (50:1) 2009, pp 63-115.

Kimberly, J.R. "Issues in the Creation of Organizations: Initiation, Innovation, and Institutionalization," *Academy of Management Journal* (22:3) 1979, pp 437-457.

Kotlarsky, J., Scarbrough, H., and Oshri, I. "Coordinating Expertise Across Knowledge Boundaries in Offshore-Outsourcing Projects: The Role of Codification," *MIS Quarterly* (38:2) 2014, pp 607-627.

Kude, T., Schmidt, C.T., Mithas, S., and Heinzl, A. "Disciplined Autonomy and Innovation Outcomes: The Role of Team Efficacy and Task Volatility," *University of Mannheim, Working Paper*, Mannheim, Germany, 2014.

Kumar, N., Mohapatra, P.K., and Chandrasekhar, S. *India's Global Powerhouses: How They Are Taking On the World* Harvard Business School Press, Boston, MA, 2009.

Kuruvilla, S., and Ranganathan, A. "Economic Development Strategies and Macro-and Micro-Level Human Resource Policies: The Case of India's 'Outsourcing' Industry," *Industrial & Labor Relations Review* (62:1) 2008, pp 39-72.
Kwon, I., and Meyersson Milgrom, E. "Boundaries of Internal Labor Markets: The Relative Importance of Firms and Occupations," Stanford University Graduate School of Business, 2004.
Larcker, D.F., and Rusticus, T.O. "On the Use of Instrumental Variables in Accounting Research," *Journal of Accounting and Economics* (49:3) 2010, pp 186-205.
Lazear, E., and Shaw, K.L. "Personnel Economics: The Economist's View of Human Resources," *The Journal of Economic Perspectives* (21:4) 2007, pp 91-114.
Lazear, E.P. "Firm-Specific Human Capital: A Skill-Weights Approach," *Journal of Political Economy* (117:5) 2009, pp 914-940.
Leonard, J.S. "Wage Structure and Dynamics in the Electronics Industry," *Industrial Relations* (28:2) 1989, pp 251-275.
Levina, N., and Kane, A.A. "Onshore Immigrant Managers as Boundary Spanners on Offshored Software Development Projects: Partners or Bosses?" *Working paper, NYU Stern School of Business*, New York, 2009.
Levina, N., and Ross, J.W. "From the Vendor's Perspective: Exploring the Value Proposition in Information Technology Outsourcing," *MIS Quarterly* (27:3) 2003, pp 331-364.
Levina, N., and Su, N. "Global Multisourcing Strategy: The Emergence of a Supplier Portfolio in Services Offshoring," *Decision Sciences* (39:3) 2008, pp 541-570.
Levina, N., and Vaast, E. "The Emergence of Boundary Spanning Competence in Practice: Implications for Implementation and Use of Information Systems," *MIS Quarterly* (19:2) 2005, pp 335-363.
Levina, N., and Vaast, E. "Innovating or Doing as Told? Status Differences and Overlapping Boundaries in Offshore Collaboration," *MIS Quarterly* (32:2) 2008, pp 307-332.
Levina, N., and Xin, M. "Comparing IT Workers' Compensation Across Country Contexts: Demographic, Human Capital, and Institutional Factors," *Information System Research* (18:2) 2007, pp 193-210.
Livemint "Educators from Foreign Shores in India," *Wall Street Journal*, September 12, 2013, available at http://www.livemint.com/Opinion/b82DDgagdkBmv4p0w891aJ/Educators-from-foreign-shores-in-India.html.
Loury, L.D. "Some Contracts are More Equal than Others: Informal Networks, Job Tenure, and Wages," *Journal of Labor Economics* (24:2) 2006, pp 299-318.
Lovelock, C.H. "Classifying Services to Gain Strategic Marketing Insights," *Journal of Marketing* (47:3) 1983, p 9.
Lucas, R.E. "On the Mechanics of Economic Development," *Journal of Monetary Economics* (22:1) 1988, pp 3-42.
Mani, D., Barua, A., and Whinston, A.B. "Successfully Governing Business Process Outsourcing Relationships," *MIS Quarterly Executive* (6:1) 2006, pp 15-29.
Mani, D., Barua, A., and Whinston, A.B. "An Empirical Analysis of the Impact of Information Capabilities Design on Business Process Outsourcing Performance," *MIS Quarterly* (34:1) 2010, pp 39-62.
Manning, A. "Imperfect Competition in the Labor Market," *Handbook of Labor Economics* (4) 2011, pp 973-1041.
Mata, F.J., Fuerst, W.L., and Barney, J.B. "Information Technology and Sustained Competitive Advantage: A Resource-Based Analysis," *MIS Quarterly* (19:4) 1995, pp 487-505.
Matsusaka, J.G. "Corporate Diversification, Value Maximization, and Organizational Capabilities," *The Journal of Business* (74:3) 2001, pp 409-431.
Mendelson, H., and Pillai, R.R. "Industry Clockspeed: Measurement and Operational Implications," *Manufacturing & Service Operations Management* (1:1) 1998, pp 1-20.
Mithas, S., and Krishnan, M.S. "Human Capital and Institutional Effects in the Compensation of Information Technology Professionals in the United States," *Management Science* (54:3) 2008, pp 415-428.

Mithas, S., and Lucas, H.C. "Are Foreign IT Workers Cheaper? U.S. Visa Policies and Compensation of Information Technology Professionals," *Management Science* (56:5) 2010, pp 745-765.
Mithas, S., and Whitaker, J. "Is the World Flat or Spiky? Information Intensity, Skills and Global Service Disaggregation," *Information Systems Research* (18:3) 2007, pp 237-259.
Mithas, S., Whitaker, J., and Tafti, A. "Information Technology, Foreign Revenues and Foreign Profits: Theory and Evidence," *Workshop on Information Systems and Economics*, St. Louis, MO, 2010.
Moore, J.E., and Burke, L.A. "How to Turn Around 'Turnover Culture' in IT," *Communications of the ACM* (45:2) 2002, pp 73-78.
Moore, J.E., and Love, M.S. "IT Professionals as Organizational Citizens," *Communications of the ACM* (48:6) 2005, pp 89-93.
Nasscom "Indian IT-BPO Industry," National Association of Software and Service Companies, New Delhi, available at http://www.nasscom.org/indian-itbpo-industry.
Neal, D. "Industry-Specific Human Capital: Evidence from Displaced Workers," *Journal of Labor Economics* (13:4) 1995, pp 653-677.
Ozgen, E., and Baron, R.M. "Social Sources of Information in Opportunity Recognition: Effects of Mentors, Industry Networks, and Professional Forums," *Journal of Business Venturing* (22:2) 2007, pp 174-192.
Parent, D. "Industry-Specific Capital and the Wage Profile: Evidence from the National Longitudinal Survey of Youth and the Panel Study of Income Dynamics," *Journal of Labor Economics* (18:2) 2000, pp 306-323.
Peterson, K. "Battle for Tech Geeks: Street vs. Silicon Valley," *Wall Street Journal*, January 18, 2011, p. C8.
Pfeffer, J., and Langton, N. "The Effect of Wage Disperson on Satisfaction, Productivity, and Working Collaboratively - Evidence from College and University Faculty," *Administrative Science Quarterly* (38:3) 1993, pp 382-407.
Poppo, L., and Zenger, T. "Do Formal Contracts and Relational Governance Function as Substitutes or Complements?" *Strategic Management Journal* (23:8) 2002, pp 707-725.
Ramasubbu, N., Mithas, S., and Krishnan, M.S. "High Tech, High Touch: The Effect of Employee Skills and Customer Heterogeneity on Customer Satisfaction with Enterprise System Support Services," *Decision Support Systems* (44:2) 2008a, pp 509-523.
Ramasubbu, N., Mithas, S., Krishnan, M.S., and Kemerer, C.F. "Work Dispersion, Process-Based Learning and Offshore Software Development Performance," *MIS Quarterly* (32:2) 2008b, pp 437-458.
Reinhardt, A., Kripalani, M., Smith, G., Bush, J., Balfour, F., and Ante, S.E. "Angling to be the Next Bangalore," *BusinessWeek*, New York, Bloomberg, 2006.
Rust, R.T., and Miu, C. "What Academic Research Tells Us About Service," *Communications of the ACM* (49:7) 2006, pp 49-54.
Rust, R.T., and Tuck Siong, C. "Marketing Models of Service and Relationships," *Marketing Science* (25:6) 2006, pp 560-580.
Sako, M. "Outsourcing and Offshoring: Implications for Productivity of Business Services," *Oxford Review of Economic Policy* (22:4) 2006, pp 499-512.
Saxenian, A. "Beyond Boundaries: Open Labor Markets and Learning in Silicon Valley," *The Boundaryless Career*, M.B. Arthur and D.M. Rousseau (eds.), Oxford University Press, Oxford, UK, 1996, pp. 23-39.
Schmidt, C.T., Kude, T., Tripp, J., Heinzl, A., and Spohrer, K. "Team Adaptability in Agile Information Systems Development," *Proceedings of the 33rd International Conference on Information Systems*, Association for Information Systems, Milan, Italy, December 15-18, 2013.
Silverstein, M.J., and Singhi, A. "Can U.S. Universities Stay on Top?" *Wall Street Journal*, September 29-30, 2012, p C3.
Simon, J.C., and Warner, J.T. "Matchmaker, Matchmaker: The Effect of Old Boy Networks on Job Match Quality, Earnings, and Tenure," *California Management Review* (49:3) 1992, pp 27-44.

Slaughter, S.A., Ang, S., and Boh, W.F. "Firm-Specific Human Capital and Compensation-Organizational Tenure Profiles: An Archival Analysis of Salary Data for IT Professionals," *Human Resource Management* (46:3) 2007, pp 373-394.
Srikanth, K., and Puranam, P. "Integrating Distributed Work: Comparing Task Design, Communication, and Tacit Coordination Mechanisms," *Strategic Management Journal* (32:8) 2011, pp 849-875.
Srikanth, K., and Puranam, P. "The Firm as a Coordination System: Evidence from Software Services Offshoring," *Working Paper*, INSEAD, 2013, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1534632.
Stinchcombe, A.L. "Social Structure and Organizations," *Handbook of Organizations*, J.G. March (ed.), Rand McNally, Chicago, 1965, pp. 142-193.
Sullivan, P. "Empirical Evidence on Occupation and Industry Specific Human Capital," *Labour Economics* (17:3) 2010, pp 567-580.
Tafti, A., Mithas, S., and Krishnan, M.S. "Information Technology and the Autonomy-Control Duality: Toward a Theory," *Information Technology and Management* (8:2) 2007, pp 147-166.
Tanriverdi, H., Konana, P., and Ge, L. "The Choice of Sourcing Mechanisms for Business Processes," *Information Systems Research* (18:3) 2007, pp 280-299.
Thite, M., and Russell, R. "India and Business Process Outsourcing," *Globalization & Work in Asia*, J.a.C. Burgess, J (ed.), Oxford: Chandos Publishing, 2007.
Topel, R. "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority," *Journal of Political Economy* (99:1) 1991, pp 145-176.
Truman, G.E., and Baroudi, J.J. "Gender Differences in the Information Systems Managerial Ranks: An Assessment of Potential Discriminatory Practices," *MIS Quarterly* (18:2) 1994, pp 129-142.
Weinberg, B.A. "Long-Term Wage Fluctuations with Industry-Specific Human Capital," *Journal of Labor Economics* (19:1) 2001, pp 231-264.
Weiss, A., and Landau, H.J. "Wages, Hiring Standards, and Firm Size," *Journal of Labor Economics* (2:4) 1981, pp 477-499.
Whitaker, J., Mithas, S., and Krishnan, M.S. "Organizational Learning and Capabilities for Onshore and Offshore Business Process Outsourcing," *Journal of Management Information Systems* (27:3) 2011, pp 11-42.
Williamson, O.E., Wachter, M.L., and Harris, J.E. "Understanding the Employment Relation: The Analysis of Idiosyncratic Exchange," *Bell Journal of Economics* (6) 1975, pp 250-280.
Wooldridge, J.M. *Econometric Analysis of Cross Section and Panel Data* MIT Press, Cambridge, MA, 2010.
Zangelidis, A. "Occupational and Industry Specificity of Human Capital in the British Labour Market," *Scottish Journal of Political Economy* (55:4) 2008, pp 420-443.

Table 1. Summary of Human Capital Dimensions

	Characteristics	Relevant literature
Firm-specific human capital	• Stock of skills, competences and knowledge for a specific firm, acquired through training and firm tenure • Useful to explain wage progression and job mobility across firms • Makes job switch more costly for an individual worker	Becker (1964) Lazear (2009) Mincer (1974)
Industry-specific human capital	• Stock of skills, competences and knowledge for a specific industry, acquired through education and industry experience • Useful to explain career mobility and differences in human capital investments across industries	Neal (1995) Parent (2000) Sullivan (2010) Weinberg (2001) Zangelidis (2008)
General human capital	• Stock of skills, competences and knowledge completely transferable across jobs, acquired through education and work experience • Useful to explain effect of education on wages and differences in average wages by gender or race	Becker (1964) Mincer (1974)

Table 2. Variable Definition

Variable	Definition
Ln(Wage)	Natural log of annual gross salary. Includes gross take home pay plus other allowances, and does not include stock options and other non-monetary benefits. Wages are reported in intervals, so values are defined as midpoints of intervals. Wages for all years measured in 2006 Rupees using the Reserve Bank of India's Consumer Price Index.
Firm experience	Years of experience at the current firm, to operationalize firm-specific human capital.
Industry experience	Years of experience in the BPO industry, to operationalize industry-specific human capital.
Total experience	Years of total work experience, to operationalize general human capital.
Male	Gender (1=male, 0=female).
Married	Marital status (1=married, 0=single).
Bachelor's business	Highest educational degree is Bachelor's degree in Business (1=yes, 0=no).
Bachelor's engineering	Highest educational degree is Bachelor's degree in Engineering (1=yes, 0=no).
Graduate	Highest educational degree is Bachelor of Arts or Bachelor of Commerce (1=yes, 0=no).
MBA	Highest educational degree is Master's degree in Business (1=yes, 0=no).
Master's computer	Highest educational degree is Master's degree in Computer Applications (1=yes, 0=no).
Master's technology	Highest educational degree is Master's degree in Technology (1=yes, 0=no).
Post-graduate	Highest educational degree is Master of Arts or Master of Commerce (1=yes, 0=no).
Junior-level position	Includes job title of customer care executive or call taker (1=yes, 0=no).
Senior-level position	Includes job title of manager, group head or VP (1=yes, 0=no).

Table 3. Descriptive Statistics

Variables	**2006** (N=1,228)		**2007** (N=605)		**2008** (N=693)		**Total** (N=2,526)	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Wage in Rs lakhs per year (U.S. Dollars per year)	2.31 (5,775)	1.70	2.10 (5,250)	1.29	2.48 (6,200)	1.84	2.31 (5,775)	1.66
Firm experience (in years)	1.63	1.29	2.13	1.44	2.55	1.69	2.00	1.50
Industry experience (in years)	2.39	1.67	2.72	1.75	3.31	1.98	2.72	1.82
Total experience (in years)	3.88	3.23	3.67	2.59	4.49	3.06	4.00	3.06
Male (%)	69	46	72	45	75	43	71	45
Married (%)	22	41	20	40	28	45	23	42
Bachelor's business (%)	3	16	3	17	4	19	3	17
Bachelor's engineering (%)	12	32	11	31	13	34	12	33
Graduate (%)	47	50	31	46	33	47	39	49
MBA (%)	12	32	13	34	14	35	13	33
Master's computer (%)	3	18	4	19	4	20	4	19
Master's technology (%)	1	8	0	7	0	7	1	7
Post-graduate (%)	6	24	5	22	7	26	6	24
Junior-level position (%)	76.2	42.6	73.4	44.2	66.4	47.3	72.8	44.5
Senior-level position (%)	6.4	24.5	6.0	23.7	13.3	34.0	8.2	27.4

Table 4. Correlations

		1	**2**	**3**	**4**	**5**	**6**
1	Ln(Wage)	1.00					
2	Firm experience	0.42***	1.00				
3	Industry experience	0.60***	0.73***	1.00			
4	Total experience	0.49***	0.47***	0.63***	1.00		
5	Male	0.09***	0.03	0.06***	0.11***	1.00	
6	Married	0.30***	0.27***	0.34***	0.44***	−0.04	1.00

Variables for education and job title omitted for ease of presentation.
*** significant at 1%

Table 5. Returns to Human Capital

Dependent variable is Ln(Wage)

	(1)	(2)	(3)	(4)	(5)
Panel A					
Industry experience				0.084***	0.120***
				(0.007)	(0.018)
Industry experience squared					-0.005*
					(0.003)
Firm experience		0.044***	0.082***	-0.006	0.018
		(0.008)	(0.014)	(0.008)	(0.023)
Firm experience squared			-0.007***		-0.004
			(0.002)		(0.003)
Total experience		0.034***	0.057***	0.020***	0.030***
		(0.006)	(0.006)	(0.005)	(0.006)
Total experience squared			-0.001***		-0.001
			(0.000)		(0.000)
Male	0.070***	0.052***	0.048***	0.053***	0.053***
	(0.017)	(0.017)	(0.016)	(0.015)	(0.016)
Married	0.168***	0.059***	0.050***	0.056***	0.054***
	(0.019)	(0.015)	(0.014)	(0.014)	(0.013)
Bachelor's business	-0.019	-0.020	-0.023	-0.049	-0.052
	(0.037)	(0.038)	(0.039)	(0.035)	(0.035)
Bachelor's engineering	0.013	0.044**	0.053**	0.046**	0.052**
	(0.024)	(0.021)	(0.020)	(0.020)	(0.019)
Graduate	-0.016	-0.026	-0.026	-0.042**	-0.042**
	(0.014)	(0.015)	(0.016)	(0.015)	(0.015)
MBA	0.022	0.027	0.026	0.018	0.017
	(0.024)	(0.024)	(0.024)	(0.019)	(0.019)
Master's computer	0.069*	0.081*	0.081*	0.058	0.058
	(0.037)	(0.040)	(0.040)	(0.042)	(0.042)
Master's technology	0.324***	0.263**	0.335***	0.234***	0.311***
	(0.064)	(0.092)	(0.069)	(0.076)	(0.063)
Post-graduate	-0.029	-0.048	-0.057*	-0.045	-0.052
	(0.040)	(0.038)	(0.038)	(0.038)	(0.038)
Observations	2,526	2,526	2,526	2,526	2,526
R-squared	0.584	0.630	0.639	0.657	0.664
Likelihood ratio statistic of improvement in model fit (p-value)			62.84 (0.000)		50.76 (0.000)
Panel B					
Wald test difference in coefficients of industry and firm experience (p-value)				57.70***[1]	7.09**[1]

All models include an intercept term, and dummy variables for job title and firm.
[1]To conduct Wald tests, we compare coefficients for linear terms of experience.
Clustered standard errors at firm-level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table 6. Cumulative Returns to Industry Experience

	Parent (2000)[1]		Sullivan (2010)[2]	Zangelidis (2008)[3]	This Paper
	NLSY	PSID			
2 years	0.0823	0.0378	0.0828	0.0080	0.1809
5 years	0.1546	0.0792	0.0997	0.0170	0.4080
Sample industries	Entire economy	Entire economy	Entire economy	Entire economy	BPO industry

1. Returns obtained from one-digit and continuous spells specification (see Table 7 of Parent 2000).
2. Returns obtained from OLS estimates with the additional variable, occupation experience (see Table 4 of Sullivan 2010).
3. Returns obtained from GLS estimates with the additional variable, occupation experience (see Table 4 of Zangelidis 2008).

Table 7. Returns to Human Capital by Career Stage

Dependent variable is Ln(Wage)

	(1) Junior-level positions	(2) Senior-level positions	(3) Junior-level and Senior-level
Panel A			
Industry experience	0.171***	0.101	0.174***
	(0.019)	(0.096)	(0.018)
Industry experience × Senior position			-0.143**
			(0.066)
Firm experience	0.015	0.065	0.012
	(0.028)	(0.054)	(0.029)
Firm experience × Senior position			0.035
			(0.052)
Total experience	0.022***	0.063**	0.020***
	(0.006)	(0.030)	(0.006)
Total experience × Senior position			0.095***
			(0.027)
Male	0.038**	0.194	0.045***
	(0.015)	(0.143)	(0.015)
Married	0.012	0.221***	0.045**
	(0.017)	(0.069)	(0.019)
Bachelor's business	-0.017	-0.232	-0.046
	(0.037)	(0.210)	(0.034)
Bachelor's engineering	0.028	-0.054	0.040
	(0.026)	(0.112)	(0.024)
Graduate	-0.034**	0.006	-0.031**
	(0.015)	(0.113)	(0.014)
MBA	-0.008	0.053	0.007
	(0.022)	(0.081)	(0.023)
Master's computer	0.051	0.007	0.062
	(0.042)	(0.178)	(0.044)
Master's technology	0.382***	0.102	0.316***
	(0.094)	(0.204)	(0.079)
Post-graduate	-0.013	-0.299*	-0.021
	(0.033)	(0.147)	(0.035)
Observations	1,840	207	2,047
R-squared	0.422	0.689	0.682
Panel B			
Wald test for difference in coefficients of industry and firm experience	16.81***[1]	0.17 (NS)[1]	4.27*[2]

All models include an intercept term, squared terms for experience (and their interactions with senior-level position in Column 3), and dummy variables for job title and firm.

[1]To conduct Wald tests, we compare the coefficients for linear terms of industry and firm experience.

[2]To conduct Wald tests, we compare the coefficients of two interaction terms, industry experience × senior-level position and firm experience × senior-level position.

Clustered standard errors at the firm-level in parentheses.

*** significant at 1%; ** significant at 5%; * significant at 10%

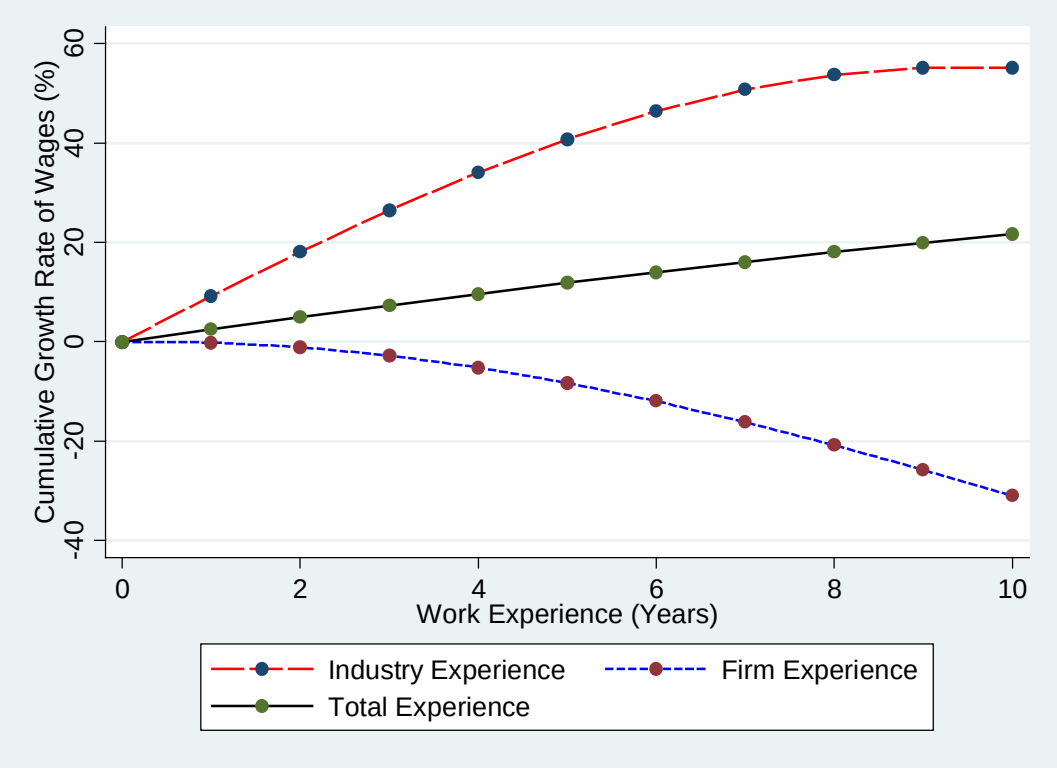
Table 8. Returns to Human Capital for Junior-level Positions (2007 and 2008): Comparison of BPO-focused vs. IT-focused Firms, and Indian Origin vs. Foreign Origin Firms

(Dependent variable is Ln(Wage))

	(1) BPO-focused firms	(2) IT-focused firms	(3) Indian origin firms	(4) Foreign origin firms
Industry experience	0.076***	0.022	0.081***	0.040*
	(0.019)	(0.030)	(0.024)	(0.019)
Firm experience	0.045*	0.029	0.026	0.081***
	(0.024)	(0.046)	(0.029)	(0.020)
Total experience	0.007	0.039	0.015*	0.003
	(0.006)	(0.021)	(0.008)	(0.009)
Male	0.024	0.029	0.044*	-0.038
	(0.019)	(0.078)	(0.023)	(0.044)
Married	0.014	-0.106***	-0.062**	0.088
	(0.033)	(0.019)	(0.027)	(0.057)
Observations	726	157	612	271
R-squared	0.351	0.407	0.375	0.328

Analysis based on all 25 BPO firms in our data, for the years 2007 and 2008. All models include an intercept term, and dummy variables for job title, education, and firm. Clustered standard errors at firm-level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Figure 1. Wage Profiles by Different Types of Work Experience



Plot based on results in Table 5, Column 5 for each type of experience. This Figure shows results for the first 10 years of career, because the age of the Indian BPO industry suggests that most professionals in this industry have up to 10 years of industry-specific and firm-specific experience.

Appendix

Table A1. Comparing Datasets and Findings Across Studies

	Our data	National Longitudinal Survey of Youth (NLSY)	Panel Study of Income Dynamics (PSID)	Displaced Worker Surveys (DWS)
Sample	• Sample of 2,519 Indian BPO workers from 2006-2008.	• Nationally representative sample of 12,686 respondents (incl. unemployed) in the U.S. who were 14-21 years old as of 01/01/79.	• Nationally representative sample of over 18,000 individuals in the U.S. starting from 1968.	• Nationally-representative sample of displaced workers. Biennial survey as a special supplement to Current Population Survey, sample of 60,000 households.
Key variables	• Wage, labor market experience, gender, marital status, age, education and occupation.	• Wage, labor market experience, gender, marital status, age, education, occupation, job turnover and race.	• Wage, labor market experience, gender, marital status, age, education, occupation, job turnover and race.	• Wage, labor market experience, gender, marital status, age, education, occupation, industry, type of displacement.
Advantages of data	• More comprehensive sample for a single industry.	• Longitudinal data provides better information about career switching history.	• Longitudinal data provides better information about career switching history. • Compared with NLSY, provides access to a worker's sequence of job descriptions over entire career.	• Contains information about job switching for displaced workers.
Disadvantages of data	• Cross-sectional data for each year, not panel data.	• Fewer observations on each industry, does not include emerging industries such as BPO. • Measurement error in wages and occupational coding (Gathmann and Schönberg 2010).	• Fewer observations on each industry, does not include emerging industries such as BPO. • Measurement error in wages and occupational coding (Gathmann and Schönberg 2010).	• Suffers from "recall bias" because workers are asked about events that happened up to five years prior to survey date. • No data for industry experience, though does include pre-displacement job tenure.
Key findings on industry-specific human capital	• Higher returns to industry experience than to firm or total experience. • Higher returns to industry experience for standardized and routine jobs.	• Significant returns to industry experience (Parent 2000). • Variation in returns to industry experience across occupations or across industries (does not theorize source of variation) (Sullivan 2010).	• Significant returns to industry experience (Kambourov and Manovskii 2009; Parent 2000). • Variation in returns to industry experience across occupations or across industries (does not theorize source of variation) (Sullivan 2010).	• Significant returns to industry experience (Neal 1995).

Table A2. Returns to Human Capital in Models Including Satisfaction Variables

(Dependent variable is Ln(Wage))

	(1)	(2)	(3)	(4)
Industry experience		0.122***		0.121***
		(0.019)		(0.019)
Industry experience squared		-0.005*		-0.005*
		(0.003)		(0.003)
Firm experience	0.084***	0.019	0.083***	0.019
	(0.013)	(0.023)	(0.013)	(0.023)
Firm experience squared	-0.007***	-0.004	-0.007***	-0.004
	(0.002)	(0.003)	(0.002)	(0.003)
Total experience	0.057***	0.030***	0.057***	0.030***
	(0.006)	(0.006)	(0.006)	(0.006)
Total experience squared	-0.001***	-0.001	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Overall satisfaction	Yes	Yes		
Satisfaction with job content			Yes	Yes
Observations	2,519	2,519	2,519	2,519
R-squared	0.643	0.668	0.643	0.667

Models include an intercept, and dummy variables for job titles, education, gender, marital status and firm.
Clustered standard errors at the firm-level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table A3. Matching Variables Used in Related Work

Study	Covariates
Ang, Slaughter and Ng (2002)	Gender, education, IT work experience, occupation level, industry, organization size.
Levina and Xin (2007)	Gender, education, IT work experience, occupation type, industry, organization size.
Mithas and Krishnan (2008)	Age, gender, education, IT work experience, tenure at current firm, industry, firm type, organization size, hours of work, headhunter contact.
Neal (1995)	Education, tenure at current firm, years of schooling, occupation type, race, marital status, weeks unemployed.
Parent (2000)	Tenure at current firm, experience in current industry, total experience, years of schooling, region, union coverage, marital status, occupation type, industry.
Sullivan (2010)	Age, tenure at current firm, experience in current industry, total experience, years of schooling, occupation, industry.
This paper	Education, tenure at current firm, experience in current industry, total experience, occupation type, gender, marital status.

Table A4. Means of Work Experience Across Data Sources

	Parent (2000) (NLSY)	Sullivan (2010) (NLSY)	This paper	
			Total	Year 2008
Firm experience	3.00	1.95	2.00	2.55
Industry experience	n/a	3.35	2.72	3.31
Total experience	7.20	5.44	4.00	4.49

Table A5. Returns to Human Capital for Each Year

(Dependent variable is Ln(Wage))

	2006		2007		2008	
	(1)	(2)	(3)	(4)	(5)	(6)
Industry experience		0.110**		0.138**		0.127***
		(0.024)		(0.048)		(0.031)
Industry experience squared		−0.004		−0.006		−0.006*
		(0.003)		(0.006)		(0.003)
Firm experience	0.059*	0.002	0.119**	0.046	0.112**	0.053
	(0.030)	(0.036)	(0.043)	(0.054)	(0.044)	(0.054)
Firm experience squared	−0.007	−0.005	−0.010*	−0.006	−0.009**	−0.007
	(0.005)	(0.006)	(0.005)	(0.007)	(0.004)	(0.006)
Total experience	0.054***	0.029***	0.080***	0.021	0.059***	0.019
	(0.008)	(0.006)	(0.026)	(0.030)	(0.015)	(0.017)
Total experience squared	−0.001***	−0.001***	−0.004*	−0.000	−0.001	0.001
	(0.002)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)
Firm dummy variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,228	1,228	605	605	693	693
R-squared	0.628	0.654	0.634	0.658	0.669	0.689

The models include an intercept, dummies for job titles, education, gender and marital status.
Clustered standard errors at the firm level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table A6. Returns to Human Capital by Position Levels

(Dependent variable is Ln(Wage))

	(1) Junior-level positions		(2) Senior-level positions	(3) All positions
	(A) Customer care executive	(B) Call taker		
Industry experience	0.150***	0.232***	0.101	0.157***
	(0.020)	(0.047)	(0.096)	(0.019)
Industry experience × Senior				−0.143**
				(0.068)
Firm experience	0.028	-0.032	0.065	−0.004
	(0.033)	(0.053)	(0.054)	(0.025)
Firm experience × Senior				0.051
				(0.050)
Total experience	0.019**	0.020	0.063**	0.022***
	(0.007)	(0.012)	(0.030)	(0.005)
Total experience × Senior				0.095***
				(0.028)
Observations	1,228	612	207	2,526
R-squared	0.469	0.459	0.689	0.679

The models include an intercept, and dummy variables for job titles, education, gender, and marital status.
Clustered standard errors at the firm level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table A7. Returns to Human Capital for All Positions (2007 and 2008): Comparison of BPO-focused vs. IT-focused Firms, and Indian Origin vs. Foreign Origin Firms

(Dependent variable is Ln(Wage))

	(1) BPO-focused firms	(2) IT-focused firms	(3) Indian origin firms	(4) Foreign origin firms
Industry experience	0.089***	0.039*	0.085***	0.067***
	(0.015)	(0.019)	(0.019)	(0.021)
Firm experience	0.002	0.000	-0.007	0.015
	(0.017)	(0.010)	(0.015)	(0.019)
Total experience	0.023***	0.051***	0.032***	0.019*
	(0.007)	(0.012)	(0.009)	(0.010)
Male	0.055**	0.065	0.061**	0.047
	(0.022)	(0.034)	(0.021)	(0.042)
Married	0.041	-0.071	-0.040	0.129**
	(0.031)	(0.041)	(0.023)	(0.042)
Observations	1,032	244	867	409
R-squared	0.648	0.700	0.694	0.590

Analysis based on all 25 BPO firms in our data, for the years 2007 and 2008. All models include an intercept term and dummy variables for job title, education, and firm. Clustered standard errors at firm-level in parentheses.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table A8. Studies of Human Capital and Wages in IS Literature

Study	Sample	Effect of education and training	Effect of experience	Effect of industry experience	Effect of career stage	Association with immigration	Effect of firm-type, industry and sector	Effect of gender
Truman and Baroudi (1994)[2]	1,413 senior IT professionals in the U.S., from Society for Information Management surveys in 1989, 1991, 1993.	Effect of education was NS, did not study effect of training.	Work experience positively associated with salary.	—	Job level positively associated with salary.	—	—	Males earn more than females.
Ang, Slaughter and Ng (2002)	1,576 junior- and middle-level IT professionals from 39 organizations in Singapore in 1997.	BA degree holders earn more than AA degree holders, IT majors earn more than non-IT majors, did not study effect of training.	IT work experience positively associated with compensation.	—	Senior positions have higher compensation.	—	Education effect more pronounced in large and information-intensive firms.	NS.
Levina and Xin (2007)	2,104 IT professionals in the U.S., from U.S. Bureau of Labor Statistics Current Population Surveys (CPS) in 1997, 2001, 2003.	BA degree holders earn more than AA degree holders, did not study effect of training.	Proxy for IT work experience positively associated with salary.	—	—	—	Experience effect more pronounced in information-intensive firms (partly supported).	Males earn more than females.
Mithas and Krishnan (2008)	54,453 IT professionals in the U.S., from *InformationWeek* surveys 1999-2002.	MBA degree holders earn more than other degree holders, did not study effect of training.	IT experience at other firms positively associated with compensation, IT experience at current firm positively associated with compensation.	—	—	—	MBA effect less pronounced for professionals employed by IT vendors.	Males earn more than females.
Mithas and Lucas (2010)	51,316 IT professionals in the U.S., from *InformationWeek* surveys 2000-2005.	Education positively associated with compensation, did not study effect of training.	IT experience at other firms positively associated with compensation, IT experience at current firm positively associated with compensation.	—	—	Non-U.S. citizens and workers on work permit earn a salary premium	IT vendor, IT-intensive, and dot.com industries positively associated with compensation.	Males earn more than females.

(table continued on next page)

Study	Sample	Effect of education and training	Effect of experience	Effect of industry experience	Effect of career stage	Association with immigration	Effect of firm-type, industry and sector	Effect of gender
Bapna et al. (2013)[3]	7,918 IT professionals from one IT outsourcing firm in India 2002-2007.	Did not study effect of education, training positively associated with performance.	IT experience at firm positively associated with performance, total experience associated with performance after 4.5 years.	—	—	—	—	—
This study	2,526 BPO professionals from BPO firms in India, surveyed by a leading research firm 2006-2008.	Education positively associated with compensation, did not study effect of training.	BPO experience at current firm and total experience positively associated with compensation.	BPO industry experience positively associated with compensation.	Junior-level professionals have higher returns on industry experience than senior-level professionals.	—	—	Males earn more than females.

Notes: 1. "—" means not applicable or did not study. NS means not statistically significant.
2. Because Truman and Baroudi (1994) report MANOVA results that combine all correlates, we based information in this table on correlations from that study.
3. Bapna et al. (2013) use performance rating as the dependent variable, and note that the focal firm bases compensation decisions on performance rating.