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Offshoring of Information-intensive Services: Structural Breaks in Industry Life Cycles

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Abstract

The emergence of widespread offshoring of information-intensive services is arguably one of the more impactful phenomena to transform business in the last ten years. A growing body of research has examined the firm-level drivers and location factors (i.e., the why's and where's) of services offshoring. However, little empirical research has examined the maturation sequencing (or when's) of services offshoring. Adopting industry life cycle theory as a framework, the key research questions examined in the paper are: when do different categories of offshoring services provision change from being emergent sectors to more mature ones, and how does the timing of this sequence relate to the type of service offshored. Using a database of 1420 offshore services FDI projects, we find that the value-add as well as the information sensitivity of the service category are related to when the service categories progress through the industry life cycle. Implications for future waves of service offshoring are discussed.

1. Introduction

The offshoring of services is arguably one of the more wide-ranging and impactful phenomena to transform business worldwide in the last 10 years. The confluence of extreme competitive pressures and rapid technological advances has led to exponential growth in this area (Parkhe, 2007). Services offshoring is particularly well-suited for what can be termed information-intensive services (Apte & Mason, 1995). While some services inherently require a physical presence (e.g., dentistry), large economic sectors including many business-to-business and business-to-consumer transactions are largely or almost exclusively information-based. Correspondingly, information-intensive services can be rendered in other countries, including ones far from end-consumers. Countries such as India, the Philippines, and Ireland have emerged as destinations for lower-cost provision of offshored services for clients in other parts of the world. This separation capability allows firms to rethink the value chain of services (e.g., Grote and Täube, 2007).

A growing body of theoretical and empirical work has begun to examine a number of the fundamental drivers of this phenomenon. For example, Metters and Verma (2007) discussed the facilitating role of government regulation and tax abatements. Ellram et al. (2007) and Grote and Täube (2007) examined the role of transaction costs associated with services offshoring. Bunyaratavej et al. (2007) examined the trade-offs firms make with regard to costs vis-à-vis labor quality and found firms seek quality at higher costs as long as wage costs are discounted to the host country. From the perspective of the developing country partner, the motivation to acquire tacit knowledge is found to be positively related to the choice of firm control mechanisms in Sino-foreign offshore outsourcing (Li et al.,

2007). At the broader country level, the impact of human capital factors and firm-specific objectives on the location decision was examined by Graf and Mudambi (2005) while the differential efficiency considerations associated with different offshore locations was examined by Bunyaratavej et al. (2008). Thus, initial progress has been made on theoretical understandings of the drivers (i.e., the "whys") of offshore outsourcing of information-intensive services, as well as the location advantages (or "wheres") of offshore outsourcing.

However, relatively less attention has been given to what might be termed the "whens" of offshoring, particularly from an empirical perspective. This is unfortunate as it is likely that the reasons for offshoring ("whys") and the timing of the implementation of offshoring ("whens") are likely to be interrelated. In the current paper, we examine the evolution of different sectors of offshore outsourcing. In particular, we adopt industry life cycle theory as a framework and seek to explain when different sectors reach watershed changepoints in which they transform from being nascent or emerging sectors to more established ones. Thus, the key research questions examined in the paper are: when do different categories of offshoring services provision change from being emergent sectors to more mature ones, and how does this industry life cycle maturation sequence relate to the type of service offshored. Note that this study is not a study of outliers (e.g., Andriani & McKelvey, 2007) in that we do not seek to examine the timing sequences of the specific cases of a few extremely early entrants. Rather we look at the broader mass of the sectors considered and seek to examine if and when there are major shifts in the aggregate trend.

We first review the life cycle theories which are used as a basis for our framework. We also examine services offshoring theory as it pertains to industry life cycle theory. Then, we explain the data and methodology used in the paper. We next present results, and in the final section our discussion and conclusions.

2. Literature Review

2.1 Life Cycle Theories

Several important business theories identify the life cycles of business activities wherein time is featured as an important component. For example, in the context of FDI processes in the international business literature, Vernon (1966) explained that new products are often first developed in the U.S. or developed countries. Production later switches to other developed countries as products become more mature and home markets become less attractive. At the general level, this work presages offshore outsourcing and Doh and Pearce (2003) used this general theory as a basis to develop a more specific framework to explain international trade of services.

In the strategy literature, product life cycle theory (Hofer, 1975) has broad implications across numerous business functions, including marketing, operations and R&D. As summarized in Figure 1, product life cycle theory indicates that products go through four primary stages: an emergence or initial development stage where demand is low, a growth stage with more rapidly expanding demand, a maturation stage, and a declining stage

where interest in the product begins to dissipate. Here, demand for the product (as indicated by the y-axis) is a function of time. An understanding of what stage of the life cycle a product is in is important to the firm because of the numerous possibilities for business-enhancing strategies which change over the life cycle. For example, Anderson and Zeithaml (1984) find the relationship between profitability and efficiency becomes stronger in the maturity phase, while best practices for early phases often involve capital expenditures on expanding market share, initializing resources, and establishing market position.

More specific to the current work is the parallel notion of an industry life cycle. Ansoff and Stewart (1967) provided an early perspective on how industries themselves change over time. In particular, firms could be innovative ("first to market"), early entrants ("follow the leader"), later entrants, or develop "me too" products. In early phases, few firms enter the market but as conditions become more favorable, the number increases considerably. After some time, the long-term profit potential of the market begins to become increasingly utilized and so in the maturity phase the number of firms stabilizes. Toward the end of an industry life cycle, industry shake-outs (Willard & Cooper, 1985, Christensen et al., 1998) occur as a result of falling prices and dwindling demand. Hence, Figure 1 describes the industry life cycle as well, with the distinction of the y-axis now representing the number of firms in the industry at a given point in time. Similar to Ansoff and Stewart (1967), Strebel (1987) specifies a four-stage industry life cycle typology, with the stages being emergence/development, growth/differentiation, maturity, and lastly decline/ rejuvenation. Agarwal et al. (2002) review the extant industry life cycle literature in detail

and indicate that "a common theme throughout these theoretical expositions is the *discontinuous* transformation of competitive conditions at a particular point in an industry's evolution. This watershed is an integral aspect of evolutionary literature" (p. 976, emphasis added). Hence, at some point, there is a relatively marked and abrupt change such that industry conditions are no longer what they used to be (and may be more favorable or less favorable depending on the point in the industry life cycle).

Figure 1 – Four-Stage Life Cycle

I. Emergence   II. Growth   III. Maturation   IV. Decline

Time
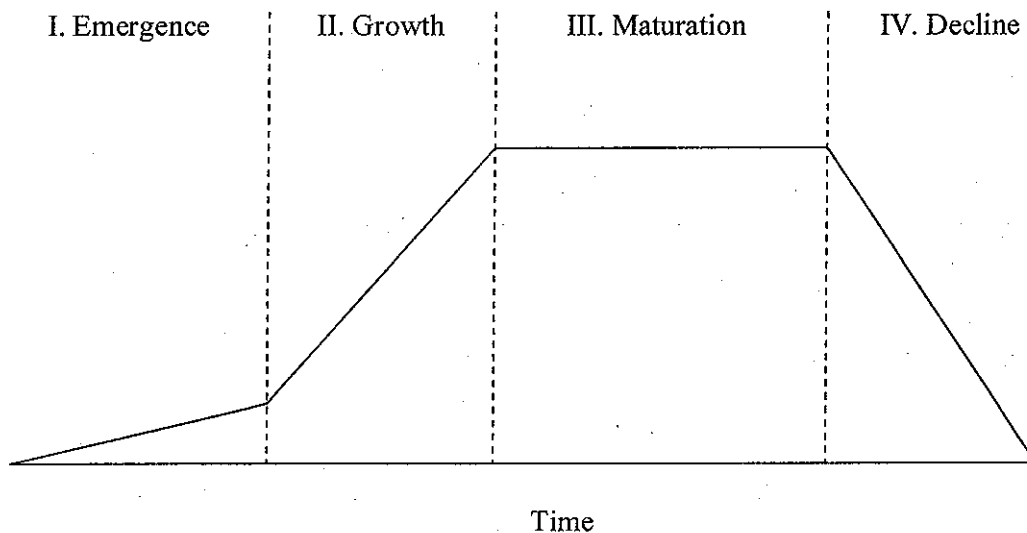
Position on *y*-axis: Demand: Product life cycle (Hofer, 1975); Number of firms: Industry life cycle (Strebel, 1987).

In industry life cycle theory, the position on the *y*-axis indicating the number of firms in the industry at a particular point in its life cycle can be further decomposed into an examination of the number of entering and exiting firms per unit of time (e.g., Agarwal et al., 2002). Consider Stage I where the number of exits is likely to be negligible as generally firms will prefer to remain in the sector until at least the maturation period to ensure that return on investment has been maximized. Then, as indicated by Figure 1, the

number of entering firms per unit of time is $(y_1 - y_0)/(t_1 - t_0)$, where $t_0 < t_1$ are arbitrary time points within Stage I and y_m is the value of y at time m. Hence, the number of entering firms per unit of time (entry rate) is constant throughout the interval as is indicated by the linear rise of the slope. Accordingly, Figure 2 shows the entry rate corresponding in time to that of Figure 1. Here, the number of new firms entering in a particular time frame $(y_1 - y_0)/(t_1 - t_0)$ extends horizontally. Consider next Stage II where again the number of exits is likely to be negligible (again, given entrant firms' expectations of future increases in return on investment). By the same logic, a constant entrant rate is observed although here the Stage II rate is greater than that of Stage I. Hence, by the model $(y_1 - y_0)/(t_1 - t_0) < (y_3 - y_2)/(t_3 - t_2)$ as indicated in Figure 2 where $t_2 < t_3$ occur in Stage II. In Stage III where maturation occurs, it is likely that the exit rate is no longer negligible and so the above mechanism changes. Note that for the horizontal line to be observed in Figure 1, the entry and exit rates must be equivalent. Since it is too early in the life cycle for the bulk of the exits to occur (as this happens in the decline stage), the exit rate must be moderate. Accordingly by equivalence the entry rate must be moderate as in Figure 2. Finally, in the decline in Stage IV, the firm entry rate is likely to be essentially negligible as the future profit potential of the industry becomes exhausted and the bulk of the firms seek profits elsewhere. To summarize, when conceptualized in terms of entry rates as indicated in Figure 2, industry life cycle theory posits the existence of discontinuous watershed events at which rates exhibit a clear break. In particular, industry life cycle theory provides specific guidance regarding the relationship among the rates such that if r_s is the entry rate at stage s, then $r_1 < r_2 > r_3 > r_4$.

Similar considerations as those for Figure 2 lead to the exit rate appearing as in Figure 3 which, while we include for completeness, in the context of the current paper is not explored in any detail. In part this is due to the newness of the information-intensive services offshoring phenomenon (i.e., relatively speaking at the times we consider the exit rates are likely to be less appreciable compared to the entry rates), as well the current paper's emphasis on examining the important earlier stages in the industry life cycle where the future profit potential is greatest.

Figure 2 – Four-Stage Life Cycle in Terms of Entry Rate

| I. Emergence | II. Growth | III. Maturation | IV. Decline |

Time
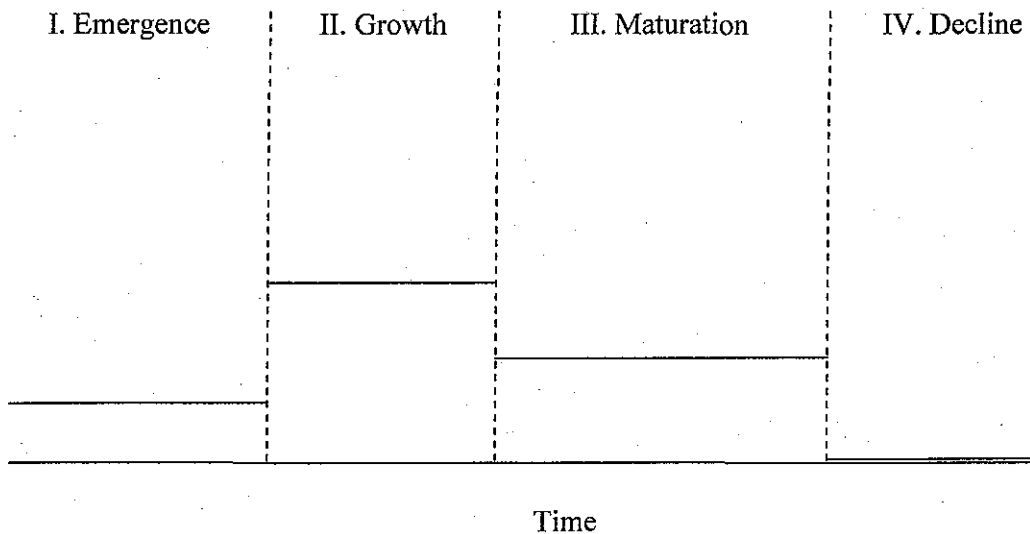
In summary, companies must behave strategically at each point in the industry life cycle to avoid negative outcomes such as the phenomenon of the winner's curse in outsourcing (e.g., Kern et al., 2002). In recent decades, this has involved determinations regarding retaining production in-house versus outsourcing production. It has been recognized that the sourcing decision itself has become a crucial strategic issue (Kotabe and Murray, 2004). As such, we review key features of services offshoring theory.

Figure 3 – Four-Stage Life Cycle in Terms of Exit Rate

| I. Emergence | II. Growth | III. Maturation | IV. Decline |

Time
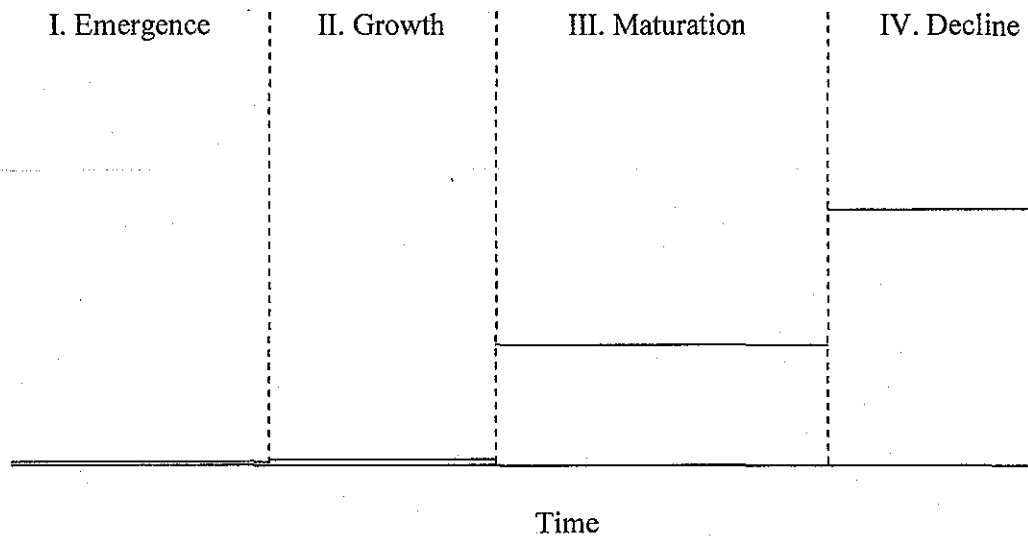
2.2 Services Offshoring Theory

The dynamics of offshore outsourcing of information-intensive services at a broad level are driven by the same competitive efficiency pressures as those of manufacturing outsourcing. However, several distinctive features are present in information-intensive services offshoring which lead to important differences (Apte and Mason, 1995, Seidmann and Sundarajajan, 1997, see Karmarkar & Apte, 2007, for a review). These include: the electronic provision of services, the ability to readily relocate services provision around the world given that appropriate information/communication linkages are in place, the crucial importance of highly educated and commensurately skilled labor, and the particular relevance of language commonalities and culture. Kotabe and Murray (2004) report that much of the offshore outsourcing literature has explained increased levels of outsourcing

activities by using a core competency concept, that is, firms seek to shed their non-core functions through offshoring – captive or contracted. In 2005 Marlin also reported that executives at financial services firms indicated that the offshoring of low value-added services was well underway, with higher value-added services expected to increasingly follow. An important offshoring-specific distinction is that, compared with Vernon's (1966) product life cycle theory, many of the services themselves that are offshored are not completely new or radically innovative by nature. Rather, in most cases what is new is a relocation of the activities that were previously performed in the home countries and in most cases these services are already largely standardized. When the standardized stage is reached, it means the product (and associated production processes) are well-established in the market. In essence, the product or process has arrived and has been accepted by the industry.

In addition, according to international business product life cycle theory (Vernon, 1966), initially market-seeking considerations push firms to relocate products to developed countries. Firms need to achieve economies of scale through mass outputs (Vernon, 1966) and hence seek new locations to do so. On the other hand, services initially move abroad because of resource-seeking considerations as can be witnessed by the fact that initially firms typically offshore activities that employ qualified lower-wage workers (Farrell, 2005). This is not to say that firms look for resources that are not available in the home countries. However, firms search for resources that are on parity with what is available in the home country but at a lower price, resulting in job losses in the home countries (Bunyaratavej et al., 2007). This resource-seeking is a result of the fact that these

offshored services are relatively standardized. During this more mature stage of standardization, according to Vernon (1966) and the life cycle theories, competition is intensified. As a result, broad-based competitive pressures will likely drive firms to offshore to locations where they are able to produce services at a lower cost.

Nevertheless, one could argue that firms should then offshore the range of standardized services altogether at the same time. However, given the information-intensive nature of these services, and the fact that firms are cognizant that information is an important asset (e.g., the developing country firm motivation to acquire tacit knowledge of Li et al., 2007), we propose that the *information sensitivity* of the services will also have a bearing on when offshoring occurs. We discuss this as follows.

Services with high information sensitivity involve key intellectual property or enterprise-wide tools such as software designed to run mission-critical business functions, to support or constitute products sold by the firm, and/or facilitate decision-making regarding important business activities. If these assets are inadequately handled or secured, damage to the firm is likely to be swift and extensive. For example, the firm may be partially crippled without vital functions or in contrast competitors may be able to directly obtain important insights regarding firm functioning, facilitating asset appropriate. Note that information that is both exclusively *internal* to the firm and highly strategically valuable is that which has high information sensitivity. Firm activities with moderate information sensitivity involve processes that are again internal to the firm but have less extensive strategic value. This may include more day-to-day administrative tasks required for the

continuing maintenance of firm functioning. Loss or theft of such information, while damaging, would be somewhat less crippling and hence less problematic. Lastly, firm activities with reduced information sensitivity involve information that is at least partly external to the firm itself or data that can be reconstituted. At the extreme, public domain information would have virtually no sensitivity to the firm, as if lost it could be easily recovered or newly retrieved. Firm activities with low information sensitivity might also therefore include those activities from interaction with mass market consumers, each of which could be considered to operate largely independently of one another (perhaps due to customers' inability to access information about each other). For example, the loss of a single individual (mass market) customer's order history would likely have minimal effect on the primary functioning of the firm. Alternatively, loss of such information in a technical support context could even be recovered through the question-and-answer process with the customer, or through a customer re-registering with the firm.

Hence, in bridging the influences of broader life cycle factors tempered by new concerns in the area of information-intensive services, we argue the broader industry-wide dynamics likely follow a trend of offshoring low value-added service activities and then later high value-added activities. However, within this and *ceteris paribus*, services with low information sensitivity will likely be offshored earlier while services with high information sensitivity will likely be offshored later due to intra-firm concerns about the security of information assets. If this is so, the watershed events of different sectors of information-intensive services' industry life cycles would occur not all at once but at different times. Again, in part as a result of the fact that widespread offshoring is a relatively recent

phenomenon, we do not focus on the decline phase. We instead focus on the earlier parts of the industry (sector) life cycle and accordingly propose:

Proposition 1: in the aggregate, the stage shifts (e.g., emergence-to-growth, growth-to-maturation watershed events) for the offshore outsourcing of lower value-added service activities will occur earlier than the stage shifts for the offshore outsourcing of higher value-added service activities

Proposition 2: in the aggregate, the stage shifts for the offshore outsourcing of service activities with lower information sensitivity will occur earlier than the stage shifts for the offshore outsourcing of service activities with higher information sensitivity.

In the following section we describe our data and the methodologies we use to assess when the stage shifts (as indicated by breaks in entry rates in Figure 2) of the different sector life cycles occur.

3. Data and Models

3.1 Data

The data for the study were extracted from the LOCOmonitor database of over 36,000 worldwide foreign direct investment projects. LOCOmonitor is developed by the firm OCO Consulting and the FDI project information contained in the database is generated from daily search-string queries on nearly 9,000 global media sources. We selected projects in the years 2002 to 2006 (the last full year of the data). FDI projects involving manufacturing and other non-services-based activities were excluded in order to retain only projects involving the provision of services. We retained projects involving three major sectors of services offshoring indicated in UNCTAD (2004): customer support centers (e.g., customer technical support, help desks, customer relationship management,

and information services), IS services centers (e.g., software design, software development, and applications testing), and shared services centers (e.g., claims and payroll processing, transaction processing, and data processing). There were 1420 such projects worldwide in the period 2002-2006. While we retained all projects regardless of home country (40 such home countries worldwide in the current data), the U.S. and the U.K. accounted for the majority of the projects (55% and 8% respectively), with Germany, France and Sweden rounding out the top five services offshoring nations (7%, 5%, and 3% of the sample respectively) during the time period. The complete listing of home countries is as follows: Australia, Austria, Belarus, Belgium, Bermuda, Canada, China, the Czech Republic, Denmark, Egypt, Finland, France, Germany, Hong Kong, Hungary, India, Ireland, Israel, Italy, Japan, Jordan, Kuwait, Malaysia, Mexico, the Netherlands, Norway, Portugal, Qatar, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Turkey, the U.A.E., the U.K., and the U.S.A. There were 86 destination (or host) countries in the data set (which we do not list for reasons of brevity): the top 5 host countries were India, Canada, the U.K., Ireland, and the Philippines (20%, 8%, 7%, 5%, 5% respectively). As for the global distribution of host countries for services offshoring projects, we have not encountered published academic figures; however, Carmel and Agarwal (2002, p. 75) provided an assessment of where U.S.-based firms conducted services offshoring. In other research we have conducted using a U.S.-based sample, our distribution generally corresponded well with their independently generated distribution. Having discussed the dependent variable, we note here that it is conventional in management empirical research to include descriptive statistics and correlation matrices for X (the predictor variables). It is important to note however here the model specification is such that X (the location of the

changepoints) is *a priori* unknown and effectively latent and hence must be estimated from the data. Accordingly, no *a priori* descriptive statistics for X are available and the corresponding table is omitted.

3.2 Models

A Bayesian framework (see Hahn and Doh, 2006) is adopted in part to facilitate model comparison as the models utilized here are non-nested, precluding the use of formal classical methods for hypothesis testing. In addition, the Bayesian framework permits simultaneous model comparison of an arbitrary number of models as opposed to the pairwise model comparison of classical methods. This capability is used below wherein four models per sector are simultaneously compared (see Table 1). We employ structural break Poisson models with unknown changepoints (e.g., Chib, 1998). The Bayesian framework requires the specification of the likelihood and priors. Accordingly, we have:

$$y_i \sim \text{Poisson}\,(\lambda_j), \tag{1}$$
$$\lambda_j \sim \text{Gamma}\,(\alpha,\,\beta), \tag{2}$$
$$p_{jj} \sim \text{Beta}\,(\delta,\,\varepsilon). \tag{3}$$

Here, y_i is the count of the number of entering or initiated projects in month i where i ranges from 1 to N while λ_j is the estimated rate given that y_i is in state (or stage) j. There is a total of $J = H + 1$ states where H is the number of structural breaks or changepoints estimated in the model. A transition matrix P is specified such that the probability of remaining in state j is p_{jj} while the probability of moving to the next greater state is its complement. The location of the break(s) is deducible from P. In specifying the priors in (2), reasonably vague priors were used such that $\alpha = 1$ and $\beta = 0.1$. Alternative prior

specifications (e.g., $\alpha = N^{-1} \Sigma y_i / \beta$ and $\beta = 0.1$) made little appreciable difference in the results. For (3), the priors suggested by Chib (1998) were used.

4. Results

We report results for models with $H = \{0, 1, 2, 3\}$ changepoints corresponding to the maximum possible number of changepoints indicated by industry life cycle theory (see Figure 2); additional analyses with $H = 4$ provided very little evidence for this category of model. Estimation was via Markov chain Monte Carlo. Results here are based on runs of 10,000 iterations of the Markov chain after a 1,000 iteration burn-in had transpired. Additional runs with larger numbers of iterations provided substantively identical results. Table 1 shows the posterior model probabilities for the models based on equivalent model prior probabilities. Each row of the table displays the results for a particular sector. The posterior model probabilities were obtained via the marginal likelihood method of Chib (1995).

Table 1 – Posterior Model Probabilities by Sector and Number of Changepoints

	No break	1 break	2 breaks	3 breaks
Call Centers	0.9468	0.0342	0.0190	0.0040
Shared Service Centers	0.0000	0.7308	0.2692	0.0630
IT Service Centers	0.0000	0.5709	0.4291	0.1127

Results for call centers, a low tech, low value-added services sector, suggest clearly that no break occurred (see also Figure 4a). The posterior odds-ratio for the no break model as

compared to the next most likely model, the 1 break model, was 27.7:1. Given the equivalent model prior probabilities, we may interpret this ratio as a Bayes factor (Kass & Raftery, 1995). This ratio constitutes strong evidence on Jeffreys' (1961) scale (see Kass & Raftery, 1995). By contrast, we see clear evidence of at least one break for shared services centers and for IT services centers. For example, the Bayes factor for the 1 break model versus the no break model was over 23,000:1 in both the shared service center and IT service center sectors, constituting decisive rejection of the no break model. The best supported model for shared service centers was the 1 break model (see Figure 4b); similar though less clear-cut results were obtained for IT service centers. One interpretation for this pattern of results is that the evidence is clearer for shared services centers that there has been a more distinct break between an initial emergent phase and a more stabilized elevated later phase. IT service centers, while definitively exhibiting at least one break, appear to have a more fitful trajectory after the initial period (see Figure 4c), characterized by either possible retrenchment and rebounding or otherwise by stability subject to a higher level of noise (the slightly more probable outcome according to Table 1).

We also discuss the 95% posterior probability intervals for the locations of the breaks. For shared services centers, the 95% posterior probability interval ranges somewhat more widely from December 2002 to May 2004, reflecting greater uncertainty associated with the location of the break in the data. The most probable location for the break is June 2003 (as indicated by a vertical dashed line in the figure). For IT services centers, the 95% posterior probability interval ranges from December 2003 to July 2004. The most probable location for the break is March 2004.

Table 2 – Entry Rate Parameter Estimates

	Initial Rate			Subsequent Rate		
	Mean	S.D.	95% Interval	Mean	S.D.	95% Interval
Call Centers	12.09	0.454	(11.21-13.01)	—	—	—
Shared Service Centers	3.98	0.582	(2.96-5.32)	7.99	0.478	(7.09-8.98)
IT Service Centers	1.67	0.269	(1.19-2.24)	7.19	0.480	(6.27-8.15)

Table 2 displays the parameter estimates of the entry rates by sector; these are indicated with dashed horizontal lines in the corresponding Figures. For call centers, the posterior mean of the distribution of the rate parameter is 12.09, which can be used as the point estimate of the monthly entry rate for offshore FDI projects in this sector. There is only one rate throughout the series given the previous evidence favoring the no-break model. Hence, as corroborated by Figure 4a, the entry rate across the time period 2002-2006 for offshore call centers appears to be adequately described as constant at roughly 12 per month subject to random fluctuation. For shared services centers, the point estimate for the initial rate is 3.98, while after the structural break the subsequent rate nearly doubles to the value of 7.99. For IT service centers, the change is even more pronounced. The initial rate is estimated as 1.67 offshore IT service center FDI projects per month, while after the break it is 7.19 per month.

In reviewing the findings, the evidence strongly suggests that call centers remained in a single stage of the industry life cycle throughout the period 2002-2006. Determination of what phase this sector was in is therefore not completely unambiguous because the entirety of the life cycle and the associated breaks are unavailable for examination. However, it is common in the changepoint literature to refer to events contemporaneous to the study so as to identify possible causes and to better place the results in context (see for example Whittaker and Fruhwirth-Schnatter, 1994, Chen and Gupta 1997, Friedlin and Gastwirth, 2000). We therefore examine the patterns observed with respect to the sectors.

Given the 2002-2006 time period of the study it seems somewhat more likely that the offshore call center sector had passed the slow-moving emergence stage and entered the growth stage (which is associated with more elevated entry rates as in Figure 4a). Hence, the break from emergence to growth would appear to have occurred before January 2002 in advance of the study period available here. Again, with regard to shared services centers and IT service centers, interpretation of the initial and subsequent stages is not unambiguous. Nevertheless, given the considerably lower rates associated with the initial stage versus the subsequent stage, in both cases we observe $r_1 < r_2$ which is consistent with the first stage being emergence and the second being growth. Moreover, we observe that the most probable location for the shared services center sector break being in June 2003, whereas that for the IT services center sector being March 2004. Thus, the breaks can be ordered as follows: Call center sector – before 2002, shared services sector – June 2003, IT services center sector – March 2004. Given this sequence and with call centers being the

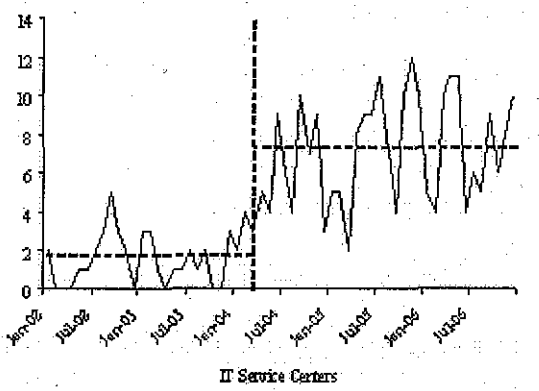Figure 4 – Monthly Offshore FDI Project Counts by Sector: 2002-2006

Call Centers

(a)
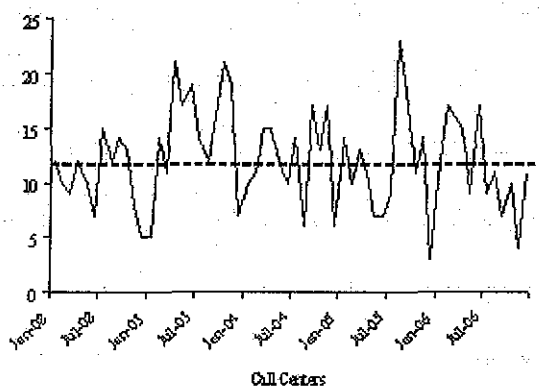
Vertical dashed line – estimated changepoint; horizontal dashed line – estimated entry rate.

Shared Service Centers
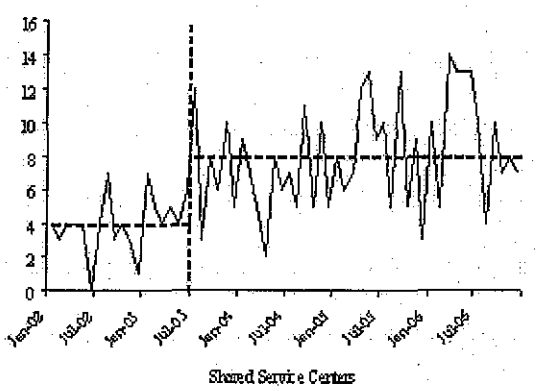
(b)

Vertical dashed line – estimated changepoint; horizontal dashed lines – estimated entry rates.

IT Service Centers

(c)

Vertical dashed line – estimated changepoint; horizontal dashed lines – estimated entry rates

lowest value-added sector considered and IT service sectors being the highest value-added sector, support for Proposition 1 is obtained. Similarly, with call centers being the sector with the lowest information sensitivity and IT service sectors being that with the highest information sensitivity, support for Proposition 2 is obtained.

5. Discussion and Conclusions

In this paper, we have explored the stages of three types of information-intensive services offshoring using industry life cycle theory and explained the determinants of the sequencing of these stages via services' information sensitivity levels. Although advances in technology allows firms to break apart the services value chain and rethink where they may perform services most efficiently, firms also clearly need to consider the risks of offshoring above and beyond the relevant traditional offshoring decision factors such as wages, quality of workers, and the impact of culture that have been discussed to date in the offshoring literature. Consistent with our Propositions, the life cycle stages associated with the offshoring of less sensitive and lower value-added services appears to occur earlier while the offshoring stages for services which have moderate/higher sensitivity and higher value-add occurs later. Hence, the current research contributes to the offshoring literature by bridging industry life cycle theory with services offshoring theory to generate what appears to be the first such theoretical linkage that has been empirically examined, as well as the first such theory explaining sector-specific evolution in services offshoring. At the methodological level, the research introduces a methodology new to the literatures discussed (Bayesian structural break models for Poisson data) that allows for testing of existing theories in new ways while permitting formal model comparisons for the assessment of life cycle stages. Our formulation of industry life cycle theory in terms of

step-function breaks associated with entry rates is well matched to such structural break models. At the practitioner or the firm level, the study offers an understanding of the mechanisms by which different sectors of a broader industry evolve, which in turn enhances the firm to position itself more optimally by entering markets at more opportune times. As for the sectors we examine here, elevated entry rates were observed for all three sectors by the end of 2006, suggesting that growth stage was in progress and that long-term profit potential for these sectors was still being observed by firms globally. However, firms should expect the maturation phase of the call center sector to occur earliest, and so looking toward the long-term investment in other higher-valued added sectors may be more rewarding assuming that relevant risks are mitigated. Our research also has implications for later-arriving offshore outsourcing firms. To be able to compete with existing firms, they will likely need to move up the value chain and attract high-value added services since it is likely that increasingly high value-added services will be offshored. An alternative approach would be to provide wide range of services from low to high value-added since the future profitability of the low value-added portion of the sector may already have been increasingly utilized.

Considering the limitations of the research and future avenues for research, the time period of 2002-2006 associated with the data source offers limited insight into the emergent phase of the call center sector. Future research should also examine offshoring as it moves into the maturation stage and decline stages, which also are unavailable at the present. One possible limitation of the study is that the entry rates may not be truly constant over time, although this seems not too implausible in the current context as Figures 4a-4c display. Nonetheless, future research could examine whether the change in the rate is itself

changing, namely, as to whether rates are accelerating or decelerating. Additional possibilities for future inquiry would involve the interaction of particular sectors in particular countries. While we have examined global activity here, different evolutionary trajectories are likely to be found within particular countries. For example, in Vietnam the call center sector may still be in an emerging, or even pre-emerging, stage.

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