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Shirish C. Srivastava  
National University of Singapore

Thompson Teo  
National University of Singapore

Partha Mohapatra  
Morgan State University

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Shirish C. Srivastava
National University of Singapore
Singapore
shirish@nus.edu.sg

Thompson S. H. Teo
National University of Singapore
Singapore
bizteosh@nus.edu.sg

Partha S. Mohapatra
Morgan State University
Baltimore, USA
pmohapat@morgan.edu

Abstract

Despite the growing importance of IT enabled offshoring in the present day business, there is little academic research devoted to the subject. Moreover, to our knowledge, research on the impact of offshoring on firm performance is virtually non-existent, which is the prime motivation for this study. In this research, using resource-based view and resource dependence theory we conceptualize offshoring as a strategic resource sourcing decision for enhancing firm performance. Specifically, we assess the short term impact of offshoring event (OE) and offshoring intensity (OI) on financial performance metrics of the firm, which include revenue performance, cost performance, profitability performance, productivity performance, and market performance. Results, suggest offshoring as a viable strategic option for improving firm performance. Through this research, we make some important contributions and offer implications for research and practice.

Keywords: Offshore, outsourcing, event, intensity, number of jobs, financial metrics, compustat
Introduction

The last decade has witnessed a revolution in information and communication technologies (ICTs) enabling the sourcing of services and business processes from distant countries. In the present day business, offshore sourcing has assumed great importance as a strategic option for many firms. An increasing number of business processes and other activities are being offshored from developed countries like US and UK to relatively cheaper destinations like India, China, Russia and the Philippines. According to Gartner research, 5% of information technology (IT) jobs in the US have gone overseas, and 25% will be “offshored” by 2010 (Gugliemo, 2004). Forrester Research estimates that by 2015, about 3.3 million jobs will be offshored. Another estimate by Goldman Sachs puts this figure at 6 million by 2010 (Hirschheim et al., 2005). Recent news reports confirm that this trend is continuing at an accelerated pace (Gardner, 2006; Ribeiro 2006; Watson, 2005).

Though primarily driven by cost considerations, offshoring firms hope to achieve other benefits, which will improve their overall performance. For instance, offshoring firms may be looking for access to better skills and markets, or simply for sales and market growth (Rost, 2006). Similar to the antecedents for information systems (IS) outsourcing (Smith et al., 1998; Dibbern et al., 2004), motivations driving offshoring decisions may be aimed at enhancing the overall performance of the firm in terms of their revenue performance, profitability performance, productivity performance or even market performance. Although there is some research which has focused on the antecedents of offshoring, there is currently little work that has explicitly studied the performance impacts of offshoring decisions.

Clearly, offshoring in the present day context is not a simple routine decision for the firm. Similar to the outsourcing decision, offshoring is a highly complex decision involving commitment of large amounts of resources (Teng et al., 1995). In addition, the risks involved in such decisions are very high, as the client firm is shifting chunks of its business processes to distant unfamiliar nations having different cultures, political climate, etc (Aron et al., 2004; Aron & Singh, 2005; Rost, 2006). Further, offshoring decision involves a large amount of initial fixed costs, making the reversibility of such a decision difficult. Hence it is essential for firms making offshore decision to understand the impacts that offshoring will have on firm performance.

Motivated by the importance of understanding the performance outcomes of offshoring decisions and a perceptible paucity of current literature which deals with the subject, we investigate the impact of offshoring decisions on firm performance. The two aspects of offshoring impact that we specifically analyze are the offshoring event (OE) and the offshoring intensity (OI). Offshoring event (OE) signifies the event when offshoring was first adopted by the incident firm and offshoring intensity (OI) is the cumulative number of jobs offshored during the specified period.

The two specific research questions for this study are:

1. Does offshoring event (OE) improve the performance of a firm?
2. Is the performance of an offshoring firm associated with its offshoring intensity (OI)?

Past research investigating the performance outcomes in the context of IS outsourcing has primarily focused on perceptual measures of performance such as satisfaction with strategic, economic and technological benefits (Grover et al., 1996; Lee & Kim, 1999; Saunders et al., 1997), cost benefits (Aubert et al., 1999; Marcolin & McLellan, 1998) and also relationship benefits (Marcolin & McLellan, 1998; Lee & Kim, 1999). In contrast to these studies, we measure the impact of offshoring on objective financial measures of firm performance. Objective financial measures of performance have been used to measure the impact in numerous IS studies in contexts other than offshoring e.g. IT capability (Bharadwaj, 2000; Santhanam & Hartono, 2003); IT spending (Mitra & Chaya, 1996; Rai et al., 1997), IT stock (Brynjolfsson & Hitt, 1996; Tam, 1998).

1 In this paper we have used the definition and matrix as described by Srivastava et al. (2008). We have considered both outsourced offshoring as well as insourced offshoring.

2 Event studies, which are quite common in finance and accounting, are increasingly becoming popular in MIS research, e.g. Richardson et al. (2003). Though, offshoring, based on the number of processes being offshored may take some time, it is reasonable to assume that some processes are completely offshored at the start of the event.
We develop and test our hypotheses examining the relationship of OE and OI with the financial measures of firm performance by analyzing data from 168 offshoring firms collected from secondary sources. There are three primary contributions of our analysis. First, to the best of our knowledge, there is no published research analyzing the impact of offshoring on firm performance, especially financial performance. We contribute to this literature by conceptualizing and providing an analysis of impact of offshoring on firm performance. Second, we explicitly link the five important measures of firm performance: revenue performance, cost performance, profitability performance, productivity performance, and market performance to OE and also to OI. There is again little empirical work in the offshoring domain which has addressed the impacts of OE and OI; our work is the first to provide some evidence of this relationship. Third, by conceptualizing the impact of the two offshoring dimensions of offshoring event (OE) and offshoring intensity (OI), we reiterate the need for considering offshoring not merely as an event in the course of actions taken by the firm but explicitly considering it as an ongoing phenomenon, where the cumulative number of jobs offshored over the years, may be related differently to firm performance. In the next section, we review the background literature on offshoring and resource based view in order to motivate the research propositions and hypotheses. Subsequently, we present the method and results of this study and finally discuss the implications for research and practice.

Theory and Hypotheses

Strategic decision is one that defines the long term goals of an enterprise and involves consequent adoption of courses of action and allocation of resources for carrying out these goals (Chandler, 1962; Quinn, 1980). Sourcing decisions are some of the most critical decisions that a firm has to make. “The unprecedented magnitude and the potential irreversibility” (Teng et al., 1995, p77) of offshoring decisions (as in the case of outsourcing decisions) make them strategic decisions, having performance implications for the firm.

Offshore sourcing, as a strategic option, has added new dimensions to the business conduct of firms in three major ways. First, through sourcing of resources (including relatively cheaper skills and talents) from distant countries, offshoring can result in dramatic cost savings for the firms (Rao, 2004). Second, offshore sourcing can help firms acquire and use resources (skills and talents) normally not available in their home country (Rost, 2006). Third, offshore sourcing may indirectly help firms tap into new market resources thereby helping firms build a wider market base (Rost, 2006). All these three impacts of offshore sourcing may result in a competitive advantage for the firm, thereby enhancing their performance.

Viewing from the resource based perspective, offshore sourcing is a strategic arrangement to channel resources required for gaining a competitive advantage by the firm (Rost, 2006). Resource based view of the firm has been extensively used in the IS literature (Wade & Hulland, 2004). Some research in outsourcing has also been done using resource based view (Espinoo-Rodríguez & Padrón-Robaina, 2006). The resource based view (RBV) conceptualizes a firm as collection of resources. Wade & Hulland (2004) define these resources as assets and capabilities that are available and useful in detecting and responding to market opportunities. Within the definition of capabilities they include skills such as technical or managerial abilities. These unique resources which are accumulated and/or learnt over time are the source of its competitive advantage (Barney, 1991; Dierickx & Cool, 1989; Mahoney & Pandian, 1992; Penrose, 1959). Further, the causal ambiguity (distributedness in the case of offshoring) of these heterogeneous “unique resources” makes them inimitable, leading to a sustained competitive advantage for the firm (Peteraf, 1993). Offshoring, like outsourcing, can affect the resources allocated to business units as also improving the focus on core competency (Quelin & Duhamel, 2003). Argyres (1996) argues that organizations outsource those capabilities for which they do not have a higher capability. Instead of creating these resources, it may be better to obtain these resources from the market (Espinoo-Rodríguez & Padrón-Robaina, 2006).

Internationalization can also be regarded as an effort to exploit particular resources that the firm may possess (Espinoo-Rodríguez & Padrón-Robaina, 2006). In such cases, some of the resources (or capabilities) which a firm requires for gaining a competitive advantage are not internally or proximately available to the firm, the firm may decide to strategically source them from the ‘open offshore market’. Developments in information and communication technologies (ICTs) in the last decade have enabled effective and efficient delivery of digitized information across borders, thereby expanding the definition of ‘open market’ to include all those countries from where information can be smoothly exchanged. Along with this, deregulations and removal of trade barriers have further spurred the development of IT enabled offshoring. Firms now have convenient, real time access to the skills of knowledge workers from countries across the globe. These factors have lead to better management and planning of offshored business processes.
Extending the discussion on RBV, resource dependence theory (RDT) in general states that organizations are dependent on some elements of their external environments to varying degrees due to the control these external environments have on the resources (Pfeffer & Salancik, 1978; Thompson, 1967). As already discussed, external environments are not limited to firms within the same country but also firms in other countries. For example, India has a large pool of trained software engineers, or China has a large number of manufacturing workers, etc. In the case of offshore arrangements, firms may be dependent for cheaper and/or better quality labor skills on vendor firms from other countries. The success of such sourcing arrangements, in the present day world, depends on the capability of the focal firm to manage these ‘resource dependent’ offshore relationships.

As previously highlighted, an offshore sourcing arrangement has multifarious benefits for the firm such as cost savings, access to skilled knowledge workers, access to new markets, etc. Based on resource based view theory, the firm would be able to better manage its resources and improve capabilities because of offshoring. Hence we posit that there will be a significant change in firm performance after it first offshores (offshore event). This leads us to our first research proposition,

**Proposition 1:** The performance of an offshoring firm, after the offshoring event will be significantly better compared to its performance before the offshoring event.

We now understand that offshore sourcing may lead to an enhancement of firm performance on various parameters. Loh & Venkatraman (1992) in their analysis had shown the importance of considering the volume of outsourced work (degree of outsourcing). Similarly, Srivastava et al. (2008) reiterated the additional insights that can be got about the offshoring phenomenon by explicitly considering the volume of work offshored. Following the same strand of argument, if a firm offshores more work then the benefits it derives in terms of enhanced performance will also be more. Therefore we put forth the following research proposition,

**Proposition 2:** The offshoring intensity (cumulative number of jobs offshored) will be positively associated with the firm performance.

Based on the two research propositions presented in the last section, a research model is proposed relating the two aspects of offshore sourcing decision considered in this study: offshoring event (OE) and offshoring intensity (OI) with the seven firm level financial performance measures associated with five different performance attributes viz. revenue performance (total sales), cost performance (operating cost), profitability performance (ROA and ROE), productivity performance (employee productivity and asset productivity), and market efficiency performance (dividend yield).

In the next section, we will hypothesize first for performance change before and after the offshoring event (OE) and then relate the offshoring intensity (OI) to firm performance.

**Impact of Offshoring Event (OE) on Firm Performance: Hypotheses**

Past studies on the impact of information systems have studied the benefits at the level of nation, organization and individual (Brynjolfsson & Hitt, 1996; Chan 2000; Srivastava & Teo, 2007). Though some studies have analyzed the impact of IS outsourcing on firm performance, not many studies have examined the impact of IT enabled offshoring on organizational performance (Lewin & Peters, 2006). Moreover, as indicated in the previous section, studies on the impact of IS outsourcing and offshoring have mostly restricted themselves to the use of perceptual measures of performance. In contrast to this, we use objective financial measures of performance to assess the impact of offshoring on firm performance. The financial performance measures analyzed in this study have been taken from past relevant studies mostly from contexts other than offshoring.

The first proposition states that the performance of the firm will improve after the “offshore event”. Examples of some past IS studies analyzing the impact of an “IS related event” have been used in the context of e-commerce announcements (Subramani & Walden, 2001), IS outsourcing (Smith et al., 1998), implementation of knowledge management systems (Feng et al., 2004), etc. We posit that the performance of a firm will be significantly improved after the offshore event.

As discussed in the earlier sections, offshoring will improve the accessibility of the firm to markets in multiple locations (Rost, 2006). In addition to this, due to cost savings from offshoring decision, firms may have enhanced resources to expand their operations, thereby increasing their sales. Hence, we hypothesize for revenue performance.
Hypothesis 1a: The total sales of an offshoring firm after the offshoring event will be significantly higher than the total sales before the offshoring event.

IS offshoring has often been regarded as a means to reduce the transaction costs for the firms (Hirschheim et al., 2005; Pfannenstein & Tsai, 2004). Though traditional outsourcing reduces costs, offshoring purports to bring about greater reduction in costs because of significant cost arbitrage across national boundaries (Rao, 2004). For instance, cheap labor in India helps companies like American Express to reduce costs to the extent of millions of dollars (Agrawal et al., 2003). Thus, offshoring is one of the options which firms may exercise for reducing their operating costs. Hence, we hypothesize for cost performance,

Hypothesis 1b: The operating expenses of an offshoring firm after the offshoring event will be significantly lower than the operating expenses before the offshoring event.

The effect of improving the revenue and cost performance of a firm as a result of offshoring would tend to improve the overall profitability of the firm. The two profitability measures that we consider in this study are return on assets (ROA) and return on equity (ROE). ROA is the ratio of the income available to common shareholders from continuing operations and the average total assets. Past studies have shown that ROA is one of the best measures of overall performance as it incorporates both business profitability and efficiency (Feng et al., 2004; Hung et al., 2002; Skousen et al., 1998). ROE is the ratio of the net income and the total equity. It signifies the profitability of the firm in relation to its equity base and is considered an important profitability criterion (Mahmood & Mann, 1993; Palepu, 1986; Smith et al., 1998). We posit that an increase in income from operations brought about by offshoring would result in an increased ROA and ROE. Thus we hypothesize for profitability performance,

Hypothesis 1c: The ROA of an offshoring firm after the offshoring event will be significantly higher than the ROA before the offshoring event.

Hypothesis 1d: The ROE of an offshoring firm after the offshoring event will be significantly higher than the ROE before the offshoring event.

Offshoring may not only improve the profitability, but may also enhance the firm productivity in two ways. First, the firm offshores its inefficient activities, thus reducing the number of employees related to such tasks. This reduction in the number of employees may result in an increase in the employee productivity. Second, offshoring firms may reduce their total lesser assets as some of their operations after the offshoring event are conducted at the premises of the vendor. This reduction in the total assets of the firm will increase its asset productivity. Clearly, a decrease in the number of employees and the total assets would bring about an increase in the employee productivity and the asset productivity of the offshoring firms after the offshoring event. Hence we hypothesize for productivity performance,

Hypothesis 1e: The employee productivity of an offshoring firm after the offshoring event will be significantly higher than the employee productivity before the offshoring event.

Hypothesis 1f: The asset productivity of an offshoring firm after the offshoring event will be significantly higher than the asset productivity before the offshoring event.

An increase in sales, profitability, productivity, coupled with a decrease in the cost of operations should increase the dividend yield of the offshoring firm after the OE. Thus, we hypothesize for the market performance,

Hypothesis 1g: The dividend yield of an offshoring firm after the offshoring event will be significantly higher than the dividend yield before the offshoring event.

Impact of Offshoring Intensity (OI) on Firm Performance: Hypotheses

Some past IS adoption studies in different contexts have stressed the importance of considering the ‘intensity or degree’ of adoption to assess the true impact. For example, Rai & Patnayakuni (1996) advocate that there might be different degrees of IS adoption rather than just conceptualizing adoption as a dichotomous yes/no variable, Srivastava et al. (2008) in their study on business related determinants of offshoring highlight the importance of considering the intensity of offshoring from the client firm. Rathaermerl et al. (2006) found that a firm’s degree of strategic outsourcing positively affects firm performance. Following a similar logic, in our study we not only consider the offshoring event (OE) but also explicitly consider the impact of offshoring intensity (OI) on firm performance.
The arguments supporting the research proposition 2, which states the offshoring intensity (cumulative number of jobs offshored) by a firm will be positively associated with the firm performance, are based on a similar rationale as the ones in the previous section. A firm that offshores more will derive greater advantages in terms of increased revenues, increased profitability, increased productivity, increased market performance, and decreased cost. As in the previous section we hypothesize for revenue performance, cost performance, profitability performance, productivity performance, and market performance.

Hypothesis 2a: The greater the offshoring intensity of a firm, the higher will be its sales revenue.

Hypothesis 2b: The greater the offshoring intensity of a firm, the lower will be its operating cost.

Hypothesis 2c: The greater the offshoring intensity of a firm, the higher will be its ROA.

Hypothesis 2d: The greater the offshoring intensity of a firm, the higher will be its ROA.

Hypothesis 2e: The greater the offshoring intensity of a firm, the higher will be its employee productivity.

Hypothesis 2f: The greater the offshoring intensity of a firm, the higher will be its asset productivity.

Hypothesis 2g: The greater the offshoring intensity of a firm, the higher will be its dividend yield.

Methodology

Data and variables

There are two sets of hypotheses that need to be tested in this study: offshoring event (OE) hypotheses and offshoring intensity (OI) hypotheses. For testing both sets of hypotheses, we depend on secondary sources of publicly available data on offshoring and firm financial performance. The unit of analysis is the firm.

Offshoring event has been considered as the year in which the company has announced to offshore some of its processes. The data on the year of offshoring event (OE hypotheses) and also the number of jobs offshored (OI hypotheses) have been collected fromTechsUnite website database (TechsUnite, 2006). TechsUnite is a union for high-tech workers whose objective is to safeguard the interests of technical workers. The TechsUnite website (TechsUnite, 2006) provides firm level offshore information for US firms aggregated from media reports. The website has data from 645 US firms (presumably all the important offshoring firms in the US), which is the sampling frame of our study. In our study we restricted our sample to those firms for which data on the ‘offshoring event year’ and the ‘number of jobs offshored’ were available. This reduced our sample to 172 firms.

For testing the validity of the data collected from this website, we followed a two fold analysis. First, we corroborated and checked the names of the firms listed in the website, whether they really offshore or not. This we checked by comparing with the list of offshoring firms available at CNN website on “Exporting America”4. Second, we explored the various newspaper reports referenced as the source of offshoring information on the TechsUnite website for 10% of firms in the dataset and found the information to be generally correct and updated. Following this two step process gave us confidence about the validity of our independent variable defining the degree of offshoring. The use of this website is also justified by the fact that there are relatively few secondary sources of information, which provide data related to offshoring firms in the US, because of the political sensitivity of offshoring5. Further, data from this website has been successfully used in recent offshoring related studies such as Srivastava et al. (2008).

3 Techsunite.org (http://www.Techsunite.org) is the nationally-oriented web site of WashTech/CWA, the nation's leading union for high-tech workers. Techsunite is a project of the Communications Workers of America, AFL-CIO, in collaboration with the following site partners, supporters and stakeholders: Alliance@IBM, Carol-Trevelyan Strategy Group (CTSG), Center on Wisconsin Strategy, CWA National Education and Training Trust, Washington Alliance of Technology Workers, and Working Today.

4 http://www.cnn.com/CNN/Programs/lou.dobbs.tonight/popups/exporting.america/content.html

5 The US press and media are replete with articles or shows debating the offshoring activity, example: CNN’s Lou Dobbs show on Exporting America.
The data on the performance related variables are based on firm level financial data available in Compustat. Compustat had data for only 168 firms (out of the 172 firms identified from the TechsUnite database). Hence, our sample size was further reduced to 168 offshoring firms. For operationalizing the performance related variables, we measure seven firm-level performance figures related to five different performance attributes viz. revenue performance (total sales), cost performance (operating cost), profitability performance (ROA and ROE), productivity performance (employee productivity and asset productivity), and market efficiency performance (dividend yield).

Revenue performance is a very important criterion as it signifies the growth in company’s sales revenue. Sales growth is akin to growth strategy has been used as an important performance metric in past studies such as Smith et al. (1998), Brown et al. (1995), and Dess & Davis (1984). Sales revenue has also been used explicitly as a performance measure in studies such as Rai et al. (1997) and Rothaermel et al. (2006).

Offshoring is often chosen as a sourcing option to bring about a reduction in cost (Rost, 2006). Hence in the context of offshore sourcing, cost performance is an important performance indicator. For operationalizing cost performance we use the operating expense, which is the sum of cost of goods sold (COGS), and selling, general, and administrative expenses (SG&A) \[COGS+SG&A\]. The figure as used in our analysis is expressed as ratios of sales to enable us compare firms of different revenues. Similar measures have been used in past studies like Smith et al. (1998) and Mitra & Chaya (1996).

Profitability is perhaps the most important traditional measure for evaluating a firm’s performance. It measures the return which owners receive from their investments (Smith et al., 1998). Past research has used profitability performance metrics for evaluating firm performance (Bharadwaj, 2003; Dehning & Stratopoulos, 2002; Hitt et al., 2002; Santhanam & Hartono, 2003). In our study, we use two of the profitability metrics namely, return on assets (ROA), and return on equity (ROE).

Productivity performance metrics represent the ratio of outputs and inputs. We use sales of the company as output and two inputs that we consider are the number of employees and total assets (employee productivity and asset productivity). These measures have been used in past research (Brown et al., 1995; Dehning & Stratopoulos 2002; Kaplan, 1989; Kettinger et al., 1994; Poston & Grabski, 2001).

For market efficiency performance, we use dividend yield which is the dividend paid per share expressed as a percentage of the share price. Past studies using this measure for market efficiency include Smith and Watts (1992) and Smith et al. (1998). A brief description of dependent variable measures used in this study and their past references are given in Table 1.

 Insert Table 1 about here

For drawing meaningful conclusions about the association of the independent variable (offshoring intensity) with the dependent variables (performance related), several control variables have to be suitably incorporated in the regression equations (in the case of OI hypotheses). Controlling for important variables in our analysis gives us confidence about the hypothesized association. In our analyses for the OI related hypotheses, we adopted some of the important controls that have been used in similar performance and offshoring related studies (e.g. Whitaker et al., 2005). We controlled for industry fixed effects, age of the firm, and size (as measured by total firm assets). To control for industry sector, we divided firms into five sectors based on the North American Industry Classification System (NAICS) and created a dummy for each sector: manufacturing and industrial, wholesale and retail trade, services, finance and real estate, and information (Table 2). These five sectors comprehensively cover almost all the manufacturing and service industries in the US. Such industry controls have been used in past outsourcing/offshoring studies such as Brynjolfsson et al. (1994) and Whitaker et al. (2005).

 Insert Table 2 about here

To control for age, we used the number of years the firm has been in existence till 2005. The data for this variable has been taken from multiple sources but primarily from http://www.manta.com (a website which gives comprehensive firm related information). For cases where the information was not available on this website, we referred to the company’s website and other sources. Age as a control for firm performance has been used in past outsourcing studies such as Rothaermel et al. (2006).

To control for size, we used total assets for each firm from Compustat. Size as measured by total assets has been used as a variable in past outsourcing studies like Ang and Cummings (1997), Ang & Straub (1998), Loh & Venkatraman (1992), et al.
Method

The first set of hypotheses aims at understanding if ‘offshoring event’ (OE) improves the performance of a firm. This is tested by comparing the firm performance on hypothesized attributes (revenue, cost, profitability, productivity, and market) one year before and after the offshore event. For calculating the dependent variables, for the first set of hypotheses, we used the concept of ‘research window’ (Smith et al., 1998). For each incident firm, we identified the year of first offshoring event given in the TechsUnite Website. This was the implementation year and was designated Year 0 for each incident firm. To study the effect of offshore event on performance we tabulated performance figures for each firm for Year -1 and Year +1, i.e. one year before and after the offshore event. The Year 0 for firms ranged from 1999 to 2004, thus the data on Year -1 and Year +1 ranged from 1998 to 2005 for different firms in our sample.

The second set of hypotheses purports to explain the relationships between the offshoring intensity (OI) (the cumulative number of jobs offshored) and firm performance on the hypothesized performance attributes (revenue, cost, profitability, productivity, and market). For the OI hypotheses, the independent variable is the ‘offshoring intensity’. In this paper, we define offshoring intensity as the total amount of production or service that has been transferred by the company from its parent country to a foreign destination. To operationalize the offshoring intensity, we use the cumulative number of jobs offshored by the company till the year 2005 (Srivastava et al., 2008). The data on dependent (performance) variables for the OI hypotheses are based on firm level financial data available in Compustat for the year 2005.

For analyzing these relationships, we use hierarchical regression i.e. we regress the cumulative offshoring intensity on different performance variables. The analyses are performed separately for different performance related variables. In the first step we enter the control variables and in the subsequent step, we add the ‘offshoring intensity of the firm’ to the respective regression equations.

Results and Discussion

Offshoring Event (OE) Hypotheses

In this section, we present the results for testing the set of hypotheses which state that the firm performance will improve significantly just after the offshoring event. Table 3 provides descriptive statistics for all the performance variables in the Year -1 (one year before the offshoring event) and Year +1 (one year after the offshoring event).

The paired mean differences for the performance variables (Table 3) show that, in general, performance has improved on all the variables after the offshoring event. A further analyses of the t-statistic shows that the revenue performance has improved significantly after the offshoring event [total sales (t = -4.236, p<.01)] signifying a strong support for hypothesis 1a. Hypothesis 1b is also supported indicating a significant reduction in operating expenses [operating expenses (t = 1.719, p<.05)] and hence an improvement in cost performance. Both the profitability performance hypotheses (hypothesis 1c and hypothesis 1d) are also supported [ROA (t = -2.287, p<.05); ROE (t = -1.705, p<.05)]. Table 3, further shows that the results for productivity performance are mixed. Though there is a strong support for hypothesis 1e, indicating a significant improvement in employee productivity after the offshoring event [employee productivity (t = -4.153, p<.01)], hypothesis 1f is not supported [asset productivity (t = -0.441, ns)]. Thus, the asset productivity has not improved significantly after the offshoring event. One plausible reason for this result can be the fact that we have considered firm performance only one year before and after the offshoring event. This may be too short a period for firms to significantly reduce their assets. Another reason can be the fact that most offshored work is knowledge based related to services, which may not involve a considerable reduction in the tangible accounting asset base of the firm. Hypothesis 1g, which states that there will be a significant improvement in dividend yield is also not supported [dividend yield (t = -1.236, ns)]. There can be two explanations. First, one year may be too short a time window to sense a change in dividend yield and second, the market perception of the offshoring event may be more visible in the speculative measures of performance (e.g. the market value at which the company shares are traded).
**Offshoring Intensity (OI) Hypotheses**

In this section, we present the results for testing of the second set of hypotheses, which relates the firm performance to the intensity of offshoring. In general this set of hypotheses states that the higher the number of cumulative jobs offshored, the better will be the firm performance. Table 4 provides the means, standard deviations, and correlations for all the variables used in the study. From the correlation table, we observe that among the independent/control variables the correlation between the age of firm and size (assets) [control variables] is significant. But all the correlations among the independent and control variables are below 0.80; hence, we conclude that there are no serious problems of multicollinearity (Gujarati, 2003).

**Insert table 4 about here**

We use hierarchical regression to test our hypotheses. The results of our analyses for the seven dependent performance related variables are presented in Tables 5 and 6.

**Insert tables 5 and 6 about here**

In the first step, we enter the control variables of industry dummies, firm age and firm size (assets). ‘Service’ and ‘information’ industry groups have significant relationships for most performance metrics. The relationships of firm age \((\beta=0.201, p<0.01)\) and firm size \((\beta=0.662, p<0.01)\) with total sales are significant (Table 5, Model 1a). In addition, relationship of firm size with asset productivity \((\beta=-0.127, p<0.05)\) is significant (Table 6, Model 6a). Thus, control variables are related in different ways to measures of performance.

In the second step for all the regression models we enter the offshoring intensity (number of jobs offshored). From the results in Tables 5 and 6 we observe that offshoring intensity is significantly related to total sales \((\beta = 0.123, p<0.05)\), operating expense \((\beta=-0.144, p<0.05)\), ROA \((\beta=0.219, p<0.01)\) and asset productivity \((\beta = 0.133, p<0.05)\) signifying support for hypotheses 2a, 2b, 2c, and 2f. Thus, the greater the number of jobs offshored, the higher will be the total sales, ROA and asset productivity and also the lower will be the operating expenses. Results also show that hypotheses 2d [ROE \((\beta=-0.014, ns)\)], 2e [employee productivity \((\beta = 0.004, ns)\)], and 2f [dividend yield \((\beta=-0.094, ns)\)] are not supported. The results suggest that offshoring more jobs may result in a better performance in terms of sales revenue, operating expense, ROA and asset productivity, but may not be helpful in improving the ROE, employee productivity and dividend yield. It will be interesting to analyze the reasons for non-support for some of the hypothesized relationships. ROE, which is the ratio of net income to average shareholder’s equity, is not only dependent on the net income which the firm earns but also its equity base. The cumulative numbers of jobs offshored may increase the income margins but may or may not have any impact on the equity base. Hence, offshored job numbers may not significantly related to the ROE of the firm. The result signifying that employee productivity, which is the ratio of sales to the number of employees, does not improve with increasing offshoring intensity is counter-intuitive. One plausible reason for this result could be the fact that firms that offshore more may have a negative effect on employee motivation and may lead to a decline in the productivity of remaining employees, thus counteracting the positive effect of increase in employee productivity due to offshoring. Another reason could be the fact that in a long term scenario the employees of the offshore firms may become a part of the client organization (by rebadging or merger) which will serve to increase the number of employees for the parent firm. Though, the wage cost of employees may become lesser, their absolute numbers may actually increase. This might serve to negate the benefits to the organization in terms of enhanced employee productivity due to offshoring. Dividend yield is more a market driven phenomenon and may not be related to the OI.

Comparing and contrasting results from the OE hypotheses with that of the OI hypotheses provide some interesting insights. Both sets of hypotheses (OE and OI) provide empirical evidence for the impact of offshoring on firm performance. Offshoring event as well as offshoring intensity serve to enhance firm performance but their effects have some interesting similarities and dissimilarities. First, the results show that both OE and OI are positively related to total sales revenue. Thus, offshoring can be a viable firm strategy, for increasing the total sales. Second, operating expenses of the offshoring firm are related to both the ‘event’ and the ‘intensity’. This brings forth the important role of offshoring in bringing about the cost savings for the organization. A number of popular press and academic literature has highlighted cost reduction as the biggest motivator for offshoring decisions (Hirschheim et al., 2005; Rost, 2006; Rao, 2004). Third, comparing the profitability performance measures we see that both ROA and ROE are significantly improved after the offshore event but only ROA is significantly related to the offshoring intensity. The result highlight that, profitability performance may not be uniformly associated with the ‘offshoring decision’. ROA is more closely related to offshoring as the company may be actually reducing its infrastructure and...
assets by offshore sourcing. ROE is more dependent on the equity base of the organization which may not have a direct relationship with offshoring decisions. Fourth, the results for productivity performance are also mixed. The offshoring event might bring a sudden increase in the employee productivity (in the short term) as there might be a reduction in the number of employees in the client organization. But if an indiscriminate offshoring is done, it might bring about a sense of insecurity among the remaining employees. Hence, higher number of jobs offshored may not serve to enhance employee productivity in the long run. Another reason for the lack of significant relationship between offshoring intensity and employee productivity is the fact that due to increased offshoring, many of the ‘productive employees’ of the organization may quit their jobs and leave the firm. As regards to asset productivity, we observe that the offshoring event does not bring about an improvement in asset productivity whereas it is positively related to the offshoring intensity. One reason which explains this difference is the fact that one year (the time period considered for OE hypotheses) is too short to assess the impact in asset productivity. The result from the OI hypothesis about asset productivity is consistent with past literature which states asset reduction as one of the motivations of offshoring (Rost, 2006; Rao, 2004). Fifth, the results consistently show that neither OE nor OI are related to the market performance as measured by dividend yield. Plausibly, dividend yield is associated with factors other than offshoring.

Limitations

The limitations of this study are mostly associated with the use of secondary data for analyzing our research questions. First, in our study we analyzed data only from those firms which were available in our datasets. It is possible that there are other firms in addition to the ones covered in our datasets. But considering the facts that we meticulously checked the validity and reliability of our datasets and that they have been used successfully in past studies like Srivastava et al. (2008), this limitation may not be a big concern. Second, in our analysis for OE hypotheses, we considered impact only for one year after the offshoring event. The prime reason for this was the fact that we were constrained by the availability of data. Many firms in our dataset had adopted offshore sourcing only in the year 2004 hence we could not go beyond Year +1 as the data ware unavailable. However, this may not be a serious limitation as firms do expect some tangible benefits of offshoring immediately in the short term, say 1-2 years in addition to long term benefits. Future studies can study the impact variation with time in terms of Year +2, +3, etc. Another limitation of this study is that we have not been able to compare our results with alternative insourcing arrangements for similar activities.

Despite these limitations associated with the use of secondary datasets, other fields of research e.g. finance, strategy, international business, etc. have been using secondary data research as an acceptable research methodology. Moreover, to our knowledge, this is the first study which innovatively uses secondary datasets to understand the impact of offshoring on firm performance.

Implications

The current study is one of the first that provides empirical evidence regarding the impact of offshoring. Recent advances in IT and the Internet made it possible for organizations to consider offshore sourcing as a practicable solution for fulfilling their business needs. Offshoring, as a sourcing option, promised to the firms a host of business benefits in terms of enhanced performance (Hirschheim et al., 2005; Rost, 2004; Rao, 2004). But does this novel sourcing option fulfill its promises? Does offshoring deliver performance benefits to the firms? Is it worthwhile for firms to consider offshoring as a sourcing option despite the multifarious inherent risks involved in such an arrangement? Should current offshoring firms consider offshoring more of their work across the borders? Current literature on offshore sourcing is still in a nascent stage and has not provided adequate answers to these questions. Our analysis in this paper was predicated on this significant gap in the offshoring literature. In addition to addressing this gap, our study brings out some important implications for research and practice.

Implications for research

There are several implications for research. First, this is one of the first attempts to study the impact of offshore sourcing on firm performance. By innovatively combining two sets of publicly available secondary datasets, we provide some important directions as to what parameters are impacted by the offshoring. Future research can study these and other individual parameters for ‘different offshored processes’ to understand how does this happen. In this
analysis, we have studied only the parameters derived from financial measures of performance. Future studies can also study the impact on perceptual measures of performance as well as study longer term impacts.

Second, though the results from this research (OE and OI hypotheses) provide performance impacts on revenue and cost, the impacts on profitability and productivity measures are mixed. This is an exciting result that justifies further research in offshoring. Researchers can now focus on processes that give better performance impacts. However, market performance (as measured by dividend yield) appears to be unrelated to offshoring. Though we have offered some explanations for these results, future research can understand the unresolved issues in greater detail.

Third, the focus of our research has been to study the improvement in firm performance brought about by offshore sourcing. In our discussion of results, we have given some implicit suggestions that offshoring may also impact certain firm level parameters adversely, such as employee motivation and morale, employee creativity and innovativeness, unintentional knowledge leakage, etc. Future research can study the effect of such changes on firm performance. It will also be interesting to know how firms tackle some adverse challenges brought about by offshore sourcing.

Fourth, we have defined two dimensions of offshoring: offshoring event (OE) and offshoring intensity (OI). This provides future research and practice with a viable theoretical framework to investigate offshoring in a more systematic way, which is an important theoretical contribution of this study. 6

Implications for practice
Through this study, we delineate several important implications for practitioners.

First, our results provide a broader understanding of the performance impacts of offshoring decision. In addition to cost reduction, our study highlights the importance of considering revenue, profitability, productivity, and market measures of performance. We also provide a set of measures for practitioners to help them assess their success or failure of offshoring.

Second, our work provides an understanding of the relationships between offshoring decision and the various performance measures. Specifically, we consider the impact of two dimensions of offshoring decision, the temporal dimension (the offshore event) and the volume dimension (the offshore intensity), on firm performance. This provides greater granularity for making ‘informed’ managerial decisions. The results can be used not only by managers contemplating fresh offshore adoption but also by managers considering increasing/decreasing the number of jobs offshored. In general, our results encourage practitioners to prudently offshore their non-core activities.

Third, our results suggest that managers striving for increasing their revenue or reducing their cost can contemplate to source more of their organization’s work from offshore destinations. The results also indicate that offshoring will have varying impacts on the firm profitability and productivity, which should also be considered by managers making offshoring decisions.

Conclusions
Currently there is little existing work examining the performance impacts of offshore sourcing. Additionally, it is not clear how the offshoring event (OE) or the offshoring intensity (OI) is related to firm performance. In this study, we propose and empirically test a model for performance impacts of offshoring. We find significant support for most of our hypotheses, which provides some empirical evidence for the positive impacts of offshoring on the financial firm performance parameters.

References

6 We thank one of the reviewers at ICIS-2007 for pointing out this contribution.


### Table 1. Performance variables and their description

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total sales</td>
<td>S</td>
<td>Rai et al. (1997); Rothaermel et al. (2006)</td>
</tr>
<tr>
<td><strong>Cost Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Profitability Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>ROA</td>
<td>Bharadwaj (2003); Brown et al. (1995), Dehning &amp; Stratopoulos (2002); Dess &amp; Davis (1984), Smith et al. 1998; Hitt et al. (2002); Hunton et al. (2003); Santhanam &amp; Hartono (2003); Tam (1998); Rai et al. (1997)</td>
</tr>
<tr>
<td>ROE</td>
<td>ROE</td>
<td>Mahmood &amp; Mann (1993), Palepu (1986), Smith et al. 1998; Hitt et al. (2002); Tam (1998); Rai et al. (1997)</td>
</tr>
<tr>
<td><strong>Productivity Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Market Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividend yield</td>
<td>(DPS/PPS)*100</td>
<td>Smith et al. (1998), Smith &amp; Watts (1992)</td>
</tr>
</tbody>
</table>

**Key:** S = Total sales, COGS = cost of goods sold, SG&A = Selling, general and administrative expenses, ROA = return on assets, ROE = return on equity, NE = number of employees, A = assets, DPS = dividend per share, PPS = price per share
### Table 2. Industry dummies created as control

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>NAICS 2-digit codes</th>
<th>Description</th>
<th>Number of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11, 21, 22, 23, 31-33</td>
<td>Manufacturing and industrial</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>42, 44-45</td>
<td>Wholesale and retail trade</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>48-49, 54, 55, 56, 61, 62, 71, 72, 81, 92, 99</td>
<td>Services and others</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>Information</td>
<td>39</td>
</tr>
<tr>
<td>5</td>
<td>52, 53</td>
<td>Finance and real estate</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>168</strong></td>
</tr>
</tbody>
</table>

### Table 3. Paired Sample Statistics: Differences In Firm Performance One Year before and after the Offshoring Event

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Paired Diffs Mean</th>
<th>t</th>
<th>Sig. (1-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Year -1</td>
<td>18219.75</td>
<td>31883.36</td>
<td>-3372.60**</td>
<td>-4.236</td>
<td>0.000</td>
</tr>
<tr>
<td>Sales Year +1</td>
<td>21592.35</td>
<td>38660.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oper. Expen. Year -1</td>
<td>.91</td>
<td>0.53</td>
<td>0.06*</td>
<td>1.719</td>
<td>0.044</td>
</tr>
<tr>
<td>Oper. Expen. Year +1</td>
<td>.86</td>
<td>0.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Profitability Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA Year -1</td>
<td>-2.39</td>
<td>33.66</td>
<td>-3.96*</td>
<td>-2.287</td>
<td>0.012</td>
</tr>
<tr>
<td>ROA Year +1</td>
<td>1.58</td>
<td>20.94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE Year -1</td>
<td>5.80</td>
<td>41.19</td>
<td>-6.45*</td>
<td>-1.705</td>
<td>0.045</td>
</tr>
<tr>
<td>ROE Year +1</td>
<td>12.26</td>
<td>40.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Productivity Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emp. Prod. Year -1</td>
<td>360.60</td>
<td>428.18</td>
<td>-72.71**</td>
<td>-4.153</td>
<td>0.000</td>
</tr>
<tr>
<td>Emp. Prod. Year +1</td>
<td>433.31</td>
<td>526.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Prod. Year -1</td>
<td>.77</td>
<td>0.56</td>
<td>-0.01</td>
<td>-0.441</td>
<td>0.330</td>
</tr>
<tr>
<td>Asset Prod. Year +1</td>
<td>.78</td>
<td>0.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Market Performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Div. Yield Year -1</td>
<td>1.09</td>
<td>1.49</td>
<td>-0.27</td>
<td>-1.236</td>
<td>0.108</td>
</tr>
<tr>
<td>Div. Yield Year +1</td>
<td>1.30</td>
<td>3.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\* \( p < 0.05 \), \** \( p < 0.01 \)
### Table 4. Descriptives and Correlations of Performance for Offshoring Firms (Year 2005)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Total Sales</td>
<td>22523.56</td>
<td>38034.91</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Operating Expenses</td>
<td>0.83</td>
<td>0.12</td>
<td>-0.056</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  ROA</td>
<td>3.84</td>
<td>11.91</td>
<td>-0.014</td>
<td>-0.349**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  ROE</td>
<td>18.83</td>
<td>48.40</td>
<td>-0.044</td>
<td>-0.176</td>
<td>0.346**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5  Employee Productivity</td>
<td>470.73</td>
<td>548.58</td>
<td>0.267**</td>
<td>0.028</td>
<td>0.035</td>
<td>0.099</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6  Asset Productivity</td>
<td>0.83</td>
<td>0.61</td>
<td>-0.116</td>
<td>0.505**</td>
<td>0.101</td>
<td>0.037</td>
<td>0.076</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7  Dividend Yield</td>
<td>1.63</td>
<td>4.31</td>
<td>0.181*</td>
<td>-0.100</td>
<td>0.032</td>
<td>-0.019</td>
<td>-0.016</td>
<td>-0.121</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8  Age</td>
<td>42.89</td>
<td>45.32</td>
<td>0.339**</td>
<td>-0.099</td>
<td>-0.038</td>
<td>-0.009</td>
<td>0.069</td>
<td>-0.129</td>
<td>0.085</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>9  Size (Assets)</td>
<td>98717.12</td>
<td>244697.53</td>
<td>0.543**</td>
<td>-0.336**</td>
<td>-0.075</td>
<td>-0.041</td>
<td>0.184*</td>
<td>-0.397**</td>
<td>0.125</td>
<td>0.236**</td>
<td>1.000</td>
</tr>
<tr>
<td>10 Cum. No. of Jobs Offshored</td>
<td>2172.46</td>
<td>3867.59</td>
<td>0.188*</td>
<td>-0.061</td>
<td>0.095</td>
<td>0.031</td>
<td>-0.105</td>
<td>0.105</td>
<td>-0.007</td>
<td>0.116</td>
<td>0.087</td>
</tr>
</tbody>
</table>

### Table 5. Results of hierarchical regression (Revenue, Cost, and Profitability Performance)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Revenue Performance</th>
<th>Cost Performance</th>
<th>Profitability Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1a</td>
<td>Model 1b</td>
<td>Model 2a</td>
</tr>
<tr>
<td>Step 1: Control^8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.201**</td>
<td>0.184**</td>
<td>-0.124</td>
</tr>
<tr>
<td>Size (Assets)</td>
<td>0.662**</td>
<td>0.643**</td>
<td>-0.042</td>
</tr>
<tr>
<td>Step 2: Offshore Intensity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of jobs offshored</td>
<td></td>
<td></td>
<td>0.123*</td>
</tr>
</tbody>
</table>

- ^8 We also control for industry segment by creating five industry dummies as per NAICS classification
- * p < 0.05, ** p < 0.01; N=168

---

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Table 6. Results of hierarchical regression (Productivity, and Market Performance)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Productivity Performance</th>
<th></th>
<th></th>
<th></th>
<th>Market Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employee Productivity</td>
<td>Asset Productivity</td>
<td>Dividend Yield</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Model 5a</td>
<td>Model 5b</td>
<td>Model 6a</td>
<td>Model 6b</td>
<td>Model 7a</td>
</tr>
<tr>
<td><strong>Step 1: Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.029</td>
<td>-0.030</td>
<td>-0.081</td>
<td>-0.099</td>
<td>0.074</td>
</tr>
<tr>
<td>Size (Assets)</td>
<td>0.049</td>
<td>0.048</td>
<td>-0.127*</td>
<td>-0.148*</td>
<td>0.057</td>
</tr>
<tr>
<td><strong>Step 2: Offshore Intensity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of jobs offshored</td>
<td>0.004</td>
<td>0.133*</td>
<td></td>
<td></td>
<td>-0.094</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.165</td>
<td>0.165</td>
<td>0.563</td>
<td>0.577</td>
<td>0.031</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.131</td>
<td>0.126</td>
<td>0.546</td>
<td>0.558</td>
<td>-0.009</td>
</tr>
<tr>
<td>F</td>
<td>4.911</td>
<td>4.182</td>
<td>32.698</td>
<td>29.469</td>
<td>0.773</td>
</tr>
<tr>
<td>Δ R²</td>
<td>0.000</td>
<td></td>
<td>0.014*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9 We also control for industry segment by creating five industry dummies as per NAICS classification

*p < 0.05, ** p <0 .1; N=168