

**INDUSTRY STUDIES ASSOCIATION  
WORKING PAPER SERIES**

Printing Industry Offshoring:  
Perspectives from US-Based Printers

By

Sandra Rothenberg

Zhi Tang

Printing Industry Center

and

Philip E. Saunders College of Business

Rochester Institute of Technology

Rochester, NY 14623

Ron Hira

Printing Industry Center

and

College of Liberal Arts

Rochester Institute of Technology

Rochester, NY 14623

2007

Industry Studies Association

Working Papers

WP-2007-27

<http://isapapers.pitt.edu/>

The footer image is a continuation of the header's design, featuring a red background with white and green technical motifs, including circuit patterns and industrial structures.

## **Introduction**

Offshoring and offshore outsourcing, the movement of work and tasks to low-cost countries, has been increasing in scale and scope. While offshoring in the manufacturing sector has been an ongoing phenomenon for more than forty years, more recently, examples of offshoring in services industries such as software programming, once considered non-tradable and therefore immune to offshoring, have emerged. The concurrent effects of the recent very rapid growth of the Indian & Chinese economies at eight to ten percent per annum (about four times the rate of developed countries), and dramatically lower cross-border transaction costs have led many to predict significant changes in the structure of many industries. Some have even gone so far as to call this as historic an economic transformation as the industrial revolution (Blinder, 2006).

Offshoring has transformed a number of industries. On the manufacturing side, in response to pressures from foreign competitors, US semiconductor firms were able to take advantage of labor in low-cost countries by modularizing their value chain (Sturgeon, 2006). By modularizing, they could break off pieces of the value chain and locate each production step in the most efficient geographic location. Over time, the site location decisions followed a path of increasing division of labor. Firms first moved the very labor-intensive tasks such as assembly offshore. Later they moved more complex and capital intensive processes, such as foundries, to more efficient locations while keeping high level design closer to customers, who remained in large developed countries (Brown & Linden, 2005). This modularization process has been replicated in a number of U.S. industries, such as automotive, where firms improved their competitive position by moving some labor intensive production to Mexico to lower its costs.

On the services side, which are much more labor intensive, certain industries are being transformed very rapidly. In a span of about three years, the Information Technology (IT) services industry has adopted a "Global Delivery Model" where customers now expect bids on projects with blended rates; i.e., including both on-site and offshore labor components (Hira and Hira, 2005). This would have been unheard of even as recently as 2003. But the transformation appears to be almost complete. As an Electronic Design Systems executive recently put it, "I can't remember the last time we put a bid out that didn't involve some form of offshoring." (Glick, 2006). This offshoring, or geographic re-location of certain tasks, has transformed the organizational structure of the IT services industry, with new business models proliferating such as: joint ventures, build-operate-transfer, captive facilities, acquisitions, brokering, and outsourcing. The variety of business models has given a diverse set of firms greater opportunities to take advantage of offshoring, and accelerated its adoption.

The printing industry has characteristics similar to both manufacturing and services industries. Like a manufacturer, printers produce tangible goods but like a service the product is often highly customized requiring co-production by customer and printer. As a result, increased cross-border trade, especially with China and India, will affect the printing industry in ways distinctive from other industry sectors. Many printing trade publications are writing about the coming offshoring wave, and targeted trade conferences on offshoring are proliferating. As a result, many U.S. printers are concerned with the wrenching changes being predicted.

While printers and their suppliers are keenly interested in how globalization and offshoring is impacting their industry, the official trade statistics indicate that it's still very small relative to the size of the industry. The US printing industry production was approximately \$166 billion in 2005, but imports for that year were only \$4.7bn and exports were \$5.2bn. While the

industry ran a trade surplus of \$0.5bn, it was down from a \$1bn surplus in 2000. And there are other reasons for concern. The U.S. trade deficit with China is \$1bn and growing 26% per year. (Davis & Gleeson, 2006).

This paper aims to better understand the way in which the offshoring phenomenon is playing out in the printing industry. A number of factors make this analysis more difficult. First, small firms make up a large share (about 80%) of the printing industry. Second, most of those firms are not publicly traded, so much of the financial data is proprietary. Third, the U.S. industry itself is complex. It is characterized by a large number of small to mid-size enterprises making customized products and serving many niche markets. Therefore, in this paper we move beyond the limitations of publicly available data. Using a mix of survey and interview data, this study explores how much and what types of business U.S. printers have lost to offshoring, and what they are doing to buffer their businesses from these losses. We also explore the extent to which they are taking advantage of globalization.

## **The Printing Industry**

Offshoring comes at a unique time for the printing industry. First, it is an industry that is undergoing intense competitive and economic pressures. Some analysts estimate that approximately 500 establishments per month have gone out of business from 1999 to 2001 (Romano and Soom, 2003). One reason may be that demand for traditional print products is down. Indicative of this drop in demand is U.S. daily newspaper circulation, which was 63,147 in 1973 but has steadily declined over the past thirty years to just 55,186 in 2002 in spite of an increase in population of one-third. And this decline has been accelerating. From 2000 to 2002, newsprint consumption decreased 14% from 12.039 to 10.395 million metric tons (Newspaper

Association of America, 2004). Moreover, many print clients can increasingly meet shrinking print needs in-house through sophisticated, yet easy-to-use desktop publishing systems, thus displacing demand for stand-alone printers.

Second, there is also a shift in the very nature of print, as digital printing and information exchange increase in popularity. Digital printing has changed the skills needed in the industry, and has expanded the range of service opportunities for printers to such areas as data management. This shift to digital media, particularly on the pre-press side, is particularly important when looking at the issue of offshore outsourcing, as online file transfer and other aspects of e-commerce have significantly reduced the transaction costs, physical transport and the speed of the information transfer, of pre-print media. Obviously, this expands the world of potential printers to a global basis, where an enterprising U.S. printer might be able to modularize its printing process and hand-off its labor intensive pre-press processes to low-cost geographies.

These two changes, reduced consumption and the introduction of disruptive technologies, have strained the U.S. printing industry. The hypercompetitive market coupled with uncertainty probably heightens their concerns about the globalization. Thus, printers face both challenges and opportunities with greater cross-border trade. On the upside, U.S. printers have the opportunity to expand their customer base by selling to new markets like China and India, and to lower costs by more efficiently locating their inputs and processes. The potential upsides of globalization can be a larger overall market due to rapid overseas growth, a larger market in the US through efficiency gains in offshoring components, a larger market in the US by offering more products as a broker for offshored products, and more competition in the US from new entrants overseas through remote delivery and entry in the US market. On the downside, and

perhaps what gets the most press, is that offshoring can result in the loss of customers who move their operations overseas and may stave off the ability to move into higher-value complementary services such as database management and print pre-processing since these may move offshore as well (Nason, 2005).

## **Theory**

One of the key questions facing U.S. printers is determining the products and services more and less vulnerable to offshoring. By understanding which products, for example, are geographically sticky, printers can take appropriate steps in response to the competitive changes. This analytic framework of offshoring vulnerability has parallel. Alan Blinder (2007) has argued that estimating the vulnerability of particular occupations to offshoring is an important exercise. He concludes that workers should specialize in those occupations that are particularly immune to offshoring and abandon those that are particularly vulnerable to it (Blinder, 2007).

There are a number of factors impacting whether or not firms are likely to lose print jobs to overseas competitors. Industry experts emphasize several criteria as important when a customer chooses a printer, including: turnaround time, quality, cost, trust, ability to customize, co-location with other production processes, availability of other services, unique abilities, and others.

While some pre-print processes can be sent distances electronically, the end product of printed products is still a physical good that must be shipped. Long distances and crossing political borders (clearing customs) adds delays. Also, given the high weight-to-value ratio of most printed products, speedy shipping options are often limited. For long distances, sea transportation, often adding 6 weeks to the length of the production cycle, is the only option. It

follows, therefore, that “quick print” jobs, those that require a short production cycle, would not move overseas. Thus,

**H1: Printers that offer “quick printing” will be less likely to experience job loss to offshore printers<sup>[1]</sup>**

On the other hand, based on our discussion with industry experts, books often don’t require this quick turn around time. Also, many books, such as children’s “pop up” books are labor intensive requiring complicated finishing, and offshore providers often have a labor cost advantage. Given their longer product cycle and higher labor content, we hypothesize that books are more susceptible to offshoring.

**H2: Printers that print books will be more likely to experience job loss to offshore printers**

Packaging also often requires significant labor intensive complex finishing, making it vulnerable to offshoring. In addition, package printing is often co-located with the production process of the final product, be it a toy or more complex product. As more manufactured goods are completed offshore, packaging often moves with it, and it is likely that printing of that packaging will move as well. Thus,

**H3: Printers that print packaging will be more likely to experience job loss to offshore printers**

Variable data print is used to personalize printed products. The print vendor often completes the complementary activities of mailing and fulfillment of the printed materials. Given the logistics of the process, sorting and physical transportation to the mailing facility, we believe that these products are less vulnerable to offshoring. Also, these products generally have a short cycle times from inception to grave, making shipping delays prohibitive. Advertising is one such

product that is increasingly taking advantage of variable data printing. Therefore, we propose the following two hypotheses:

**H4: Printers that offer variable data printing will be less likely to experience job loss to offshore printers**

**H5: Printers that print advertising materials will be less likely to experience job loss to offshore printers**

Little is understood about the types of services that can help printers retain jobs that would otherwise be lost to overseas competitors (Sorce, Pellow, and Frey, 2003). On the one hand, greater digitization of the printing process, as in other industries, can facilitate information transfer on a global scale (Levy & Murnane, 2004). On the other hand, offering additional complementary services, increasingly facilitated by digital technology, is often seen as the means to address global competitive pressures, through product differentiation (Bauer, 2006). This latter view is supported by the concept of embeddedness, as developed by Uzzi (1997) and is central in relationship marketing (Morgan & Hunt, 1994).

In reality, new technologies have actually increased the embeddedness of some economic transactions in printing and decreased it for others. In the past, the basic printing process was more embedded in relationships. One printed item required multiple personal trips back and forth from the customer to the printer, to ensure layout and color accuracy. In fact, many printers have lavish waiting areas with movies, food, etc., for customers to comfortably wait while an item is printed for review. With current technology, however, much of this physical face-to-face interaction is no longer necessary. A customer can email a file, the printer can print it with significant accuracy, and then the customer can mail it back for review, and iterate until the exchange is complete. All of this can occur without any face-to-face interactions. While these



services may make them a more efficient printer, there is no reason to think that it would protect them from job loss to overseas companies that offer similar standard print services.

**H6: Printers that offer standard digital services such as digital proofing will be more likely to experience job loss to offshore printers**

Another new area of service provision is data management services, where printers take and manage the data that will be used in the printed material. In its simplest form, this is a mailing list, but it often encompasses more complex and sensitive information such as financial information. In addition, what seems like simple information, such as a menu layout for a restaurant, can have embedded in it information that is quite central to the firm, such as information for proper supply chain management (i.e. what food to order and when). Innovative printers are finding ways to manage this type of information, and as they do so they create more complex business and social relationships with their customers. As printers take on some of the services that are further up and down the value chain, they increasingly embed the economic transaction in a relationship that requires trust, needed for the handling of sensitive information, and mutual knowledge exchange, both which serve to facilitate the effectiveness and efficiency of the interaction. Therefore, customers engaged in these relationships will face increased transaction costs if they move to a new print supplier. Thus,

**H7: Printers that offer data management services will be less likely to experience job loss to offshore printers**

**H8: Printers that offer non-standard IT services will be less likely to experience job loss to offshore printers**

**Methods**

We relied on primary data collection comprising of three stages. The first stage was a set of exploratory interviews with industry domain experts. Six interviews were conducted with individuals well known in the industry for their expertise in industry dynamics. These interviews varied from ½ hour to 1 hour in length, and focused on their opinions regarding how offshore outsourcing was playing out in the printing industry, the factors that might influence the degree to which printers were either negatively or positively affected by offshore outsourcing trends, and the potential future of offshore outsourcing.

These exploratory interviews lay the basis for an industry survey, the second stage. The web-based survey was written in cooperation with the GATF/PIA, the leading U.S. trade association. After pre-testing by some industry contacts, the survey was sent to approximately one half of the GATF/PIA membership. A total of 3,228 printers were sent an email. Of these emails, 465 were returned as undeliverable. After 2 email reminders, a total of 242 responses were received, resulting in a response rate of 8.8%. While this response rate is low in comparison to most academic surveys, this population has a greater number of smaller firms than most industries, many of which are extremely pressed for resources. In addition, the survey was administered during a period of great economic uncertainty and turbulence. Therefore, with potential issues of response bias in mind, we felt that this was an acceptable response rate.

In order to validate the survey results and to gain better insight into how printers viewed, and were responding, to offshoring, we conducted follow-up interviews, the third stage. In the survey, we asked for contact information for those participants that would be willing to discuss the issue more with us. We randomly chose fifteen interested participants and conducted semi-structured phone interviews, each of which lasting 45 minutes to an hour long. All interviews were taped and transcribed for accuracy.

## **Survey Measures**

In this section we describe the various measures used in the survey instrument.

### Independent Variables

*Product Type.* We created a twelve-item list to cover the common product types in printing industry. They are: advertisement, color books, black and white books, catalogs, direct mail, directories, forms, transaction statements, packaging, periodicals, labels, and quick printing. Many of these products are related, so we conducted an exploratory factor analysis (EFA) on these 12 items (SPSS 14.0). By employing principal components method with oblique rotation and by analyzing the correlation matrix, four factors were extracted with eigenvalue greater than 1 (eigenvalue = 1.108). Then we tested for appropriateness, through KMO, and strength of relationships, through Bartlett’s test of sphericity. The KMO measure of sampling adequacy was 0.68, which is above the 0.50 threshold needed to indicate appropriateness. KMO measure is used both for the entire correlation matrix and each individual variable in order to evaluate the appropriateness of applying factor analysis. Another indicator of the strength of the relationship among variables is Bartlett's test of sphericity. It is used to check if the variables in the population correlation matrix are uncorrelated. In this EFA, Bartlett's test of sphericity was significant at .001 level. This level of significance indicates that the strength of the relationship among variables is strong and it is a good idea to proceed with a factor analysis for the data.

By reading item content, the four factors clearly represent four different product types: ADVERT included advertisement, catalogs, and periodicals; BOOKS included color books, black and white books, direct mail, and directories; QUICKVAR included forms, quick printing, labels, and transaction statement; and the last product type PACKAGE is a single item factor –

packaging. 61.65% of the total variance was explained by these four factors. From the pattern matrix, we found that even though most of the loadings were no lower than .50, two items loaded on each factor at 0.47 (catalogs) and 0.41 (periodicals). Catalogs seem to load with ADVERT as well (loading = .46), which makes sense since catalogs are one form of distribution for advertisements. Periodicals seem not load on any factor firmly – the second highest loading of periodicals is 0.30, with the factor BOOKS. We then double checked the structure matrix loading table. The factor structure is consistent with the result from pattern matrix. Structure matrix is simply the factor loading matrix as in orthogonal rotation, representing the variance in a measured variable explained by a factor on both a unique and common contributions basis. The pattern matrix, in contrast, contains coefficients which just represent unique contributions. In EFA with oblique rotation, we are advised to look at both matrices and find the consistent factor structures. Therefore, in this exploratory study, the factor structure as above is consistent in both matrices and we employ it in the following regression analysis.<sup>[2]</sup> We summarized the item content and factor loading information is included in Table 1.

---

Take in Table 1 About Here

---

Since the last factor – PACKAGE – only includes one item, we further wondered if it was necessary to include packaging into other factors and force the group form three factors instead of three factors. Further examination found that the component correlations of the four factors were from .04 to .23, indicating that there were no strong correlations among any of the four product types and thus, they are distinctively different and not further EFA was needed. The Cronbach’s Alpha for QUICKVAR, BOOKS, and ADVERT were .71, .69, and .58, respectively.

The arithmetic averages of grouped items were entered into regressions to measure the four product types.

*Service Type.* Going through the same process for determining product types, we developed a nine-item list to cover many common service types in printing industry. They are mailing and fulfillment, variable data printing, supply chain management, digital photography, online template, web development and hosting, CD-ROM production, digital proofing, laminating and mounting. We also conducted exploratory factor analysis on these items. By employing principal components method with oblique rotation and by analyzing the correlation matrix, three factors were extracted with eigenvalue greater than 1 (eigenvalue = 1.001). KMO measure of sampling adequacy was 0.69. Bartlett's test of sphericity was significant at .001 level. Therefore, both tests conclude that the strength of the relationship among variables is strong and it is a good idea to proceed a factor analysis for the data.

By reading item content, the three factors represent three different service types: DIGSERV including web development and hosting, CD-ROM production, digital photography, and online template development; DATSERV including mailing and fulfillment, variable data printing, and supply chain management; and PRESSSERV including digital proofing and laminating and mounting. 55.96% of the total variance was explained by these three factors. No loading was lower than .50 and the structure matrix also suggested the same factor structure. Further examination found that the component correlations of the four factors were from .08 to .25, indicating that there were no strong correlations among any of the four product types and thus, they are distinctively different and not further EFA was needed. We summarized the item content and factor loading information was included in Table 2.

---

Take in Table 2 About Here

---

The Cronbach’s Alpha for DIGSERV, DATSERV, and PRESSSERV were .61, .60, and .22, respectively. The factor reliabilities are above the threshold point 0.60 suggested by previous research (Nulley, 1994). However, the validity of reliability test in this study can be questioned. Different from reflective measures who describe different aspects of the same object, the product and service types can be classified into different groups with distinctive natures and objectives. Therefore, the product and service types can be recognized as formative measures and low reliability is not a concern. Furthermore, in order to validate our future regression results, besides using the arithmetic averages of grouped items as the independent variables, we also broke the low-reliability factor – PRESSSERV – into two single-item factors: digital proofing and laminating and mounting. The direction and significance of the regression coefficients do not change and therefore, our conclusion is robust to the service type structures.

### Dependent Variables

*Job Loss.* Three items were used to measure if the printing firm suffered from losing print jobs to foreign competitors. They are if firms lost job(s) to a foreign competitor with a non-US customer(s), if firms lost jobs to a foreign competitor with US customer(s) where the print job was NOT being exported, and if firms lost job(s) to a foreign competitor with US customer(s) where the print job was being exported. If a printing firm lost jobs in any of the above situation, the case was coded as “1”; otherwise “0”. This dummy variable is used later in regression to measure job loss (JOBLOSS).

### **Control Variables**

Four variables that may affect the explored relationships are controlled in regressions. The first control variable is SIZE, which is measured by the number of employees. The second control variable is REPEAT. We asked printing what percentage (approximate) of the total business is a result of repeat business from existing customers. The greater percentage of repeat business, the greater the likelihood of loyalty of the customer to the printers and, therefore, the less likely it is to lose business to foreign competitors. The third control variable measures the firms' product INNOVATION. We ask firms what is the percentage of sales in FY 2004 from products not offered 3 years ago. As discussed earlier, many in the printing industry see advanced technology, such as digital printing, and new services as a means to remain competitive in the changing marketplace. This measure was one way to gauge the degree to which the printer was introducing new products and services as a means to deal with increased competitive pressure. The last control variable is SOURCESERV. We ask firms if they outsource the following services to overseas: customer relation care/call center, finance/accounting, human resource service, and legal service. There were two reasons for this question. First, this may capture an overall comfort with outsourcing; the more comfortable a firm feels about outsourcing, the more likely it will outsource both here and in the US. Second, this may also indicate an organizational structure that is more amenable to outsourcing. The Cronbach's Alpha for these four items was .72. The arithmetic averages of the four items were entered into regressions to measure experience with outsourcing in internal service areas.

### **Other Tests**

All of the data used in the regression analysis is drawn from a single source – the online survey. As the variables to be measured were generally straightforward and objective in nature,

however, the survey method may be subject to common methods variance. Therefore, we tried to estimate the potential common method bias by conducting Harmon's one factor test (Podsakoff & Organ, 1986). The items that were used to measure both dependent and independent variables were entered into one exploratory factor analysis. In analyzing the correlation matrix, we found that the first factor accounted for only 12.81% of the total variance, which suggested that no single factor accounted for the majority of covariance; therefore, common method variance is not solely responsible for our findings. Thus, common method bias would not explain many interactive relationships between the predictor and outcome variables.

We conducted two ANOVA tests to detect any non-response bias and missing-value bias. The first ANOVA was conducted to see if there is geographic bias between the respondent cases and non-respondent cases. Another 50 printing firms were randomly selected from the non-respondent pool. The ANOVA test did not find any significant bias in the geographic location between the 145 respondents and the 50 non-respondent firms. The second ANOVA was employed to test if there is any bias between the final sample and the cases that were deleted for missing values. No bias was found among our key variables such as employee number, job loss, product types, and service types.

## **Survey Findings**

### Descriptive Statistics

The descriptive statistics suggest that while many in the printing industry are aware of the threat of competition, and are being affected by it, they are not operating on a global scale to any large extent. When asked how foreign competition would change over the next two years, 72% responded that would increase and 18% thought it would stay the same. 49% of the respondents reported having lost a job to a foreign competitor, a far larger percentage than we



expected given the relatively small amount of U.S. imports of printed materials. On average, 57% of those losses were to China, 16% to Mexico, 16% to Canada, and 10% to Europe. Despite the increased digital component of printing, on average only 5% of these losses were to Indian printers.

For those that did lose jobs, lower costs were suggested to be the primary reasons for this loss (34.0%). The next most common reason was that the customer's work moved outside the US (7.7%), better local reach (5.7%), and the larger size of the foreign competitor (5.7%). 14% of those losing jobs reported that a common factor across lost jobs were long print runs, while 11% reported that a common factor across lost jobs were that they had a reasonable or long turn around or labor intensive finishing.

For the most part, the printers in this sample did not have a global customer base, with 17% of the respondents reporting that they had performed a print job for a customer outside of the US. Most of their own outsourcing, if done, was done within the United States. For most aspects of the printing process, less than one percent of the respondents outsourced outside the US, meaning that they were not taking advantage of modularizing the print processes and sending pieces of it to the most efficient geographic location. There were a few small exceptions to this. 5.4% of those outsourcing reported that they outsourced printing to China, 3.4% to Canada and 1.5% to Mexico. Approximately 2% of the respondents outsourced finishing and assembly to Mexico and 3% to China. Lastly, 1.5% of the participants reported that they sent some prepress and design to China and 1.9% reported that they outsourced this to India. For those that took advantage of offshore outsourcing, approximately 43% reported no savings, 40% reported savings between 1 and 39%, and 16% reported savings of higher than 39%. This means that a small number of firms are able to offshore outsource for competitive advantage.

Table 3 summarizes how those that were engaged in offshore outsourcing saw the problems and benefits associated with this activity. Some of the highest rated benefits (other than cost savings) were use of and learning about new technologies (using a scale of 1-5, where 1 was did not agree and 5 was fully agree, the means were 4.02 and 4.03 respectively) and increased product quality (4.03). In general, the problems were rated lower than the benefits, but the highest rated one was shipping delays (2.8), and then quality problems (2.49). These findings are summarized in Table 3.

---

Take in Table 3 about here

---

While only a small number of firms were engaged in offshore outsourcing, many are considering it as an option for the future. Eighteen percent of the respondents who had not engaged in offshore outsourcing had definite plans to do so in the near future. The most often cited concerns for these printers were loss of client control (74% saying this was a concern) and risk of losing key employees (31%),

### Regression Analysis

Table 4 summarizes the mean, standard deviation, and correlation of the pertinent variables. The highest correlation among independent variables is between ADVERT and DATSERV ( $r = .42, p < .001$ , two-tailed test), which may be the only source for concern. However, ADVERT is a product type, whereas, DATSERV is a service type, so they are entered into regressions separately. Therefore, there are not serious multicollinearity concerns in our later regression analysis.

---

Take in Table 4 About Here

---

Since our dependent variables are dummy variables, logistic regression is employed to test the hypothesized relationships. Logistic regression is used to predict a categorical (usually dichotomous) variable from a set of predictor variables. The benefit offered by logistic regression is that logistic regression makes no assumptions about the distribution of the predictor variables. Therefore, it is more applicable when the predictor variables are a mix of continuous and categorical variables and/or if they are not approximately normally distributed.

Two sets of logistic regression were employed to test the hypothesized relationships. The two sets of regressions relate job loss to product types and service types, respectively. We control the same variables in these two regressions. By doing this, we hope that we can clearly map how product and service types explain the variance in firm job loss.

After excluding one outlier that is outside two standard deviations, we summarized the regression results in Table 5. Model 1 in the table includes only the control variables. Its results show that none of the control variables are statistically significantly related to job loss. However, in Model 2, which adds in four product type variables to the control variables, we find that BOOKS positively and significantly relates to job loss ( $B = 1.06, p < .01$ , one-tailed test). It indicates that that the more printing firms focus on BOOKS, the more likely they will lose jobs to overseas competitors. Therefore, H2 is supported. The same relationship is found between packaging and job loss ( $B = .43, p < .05$ , one-tailed test), indicating that the more printing firms focus on packaging business, more likely they will lose jobs to overseas competitors. H3 is thus supported. ADVERT is also found to positively impact on job loss situation. However, this relationship is not statistically significant ( $B = .23, p > .05$ , one-tailed test). Therefore, H5 is not supported. The opposite relationship is found between QUICKVAR and job loss ( $B = -.84, p <$

.05, one-tailed test). It shows that the more printing firms focus on quick and variable printing, the less likely they will lose jobs to foreign competitors. Therefore, H1 and H4 are supported.

---

Take in Table 5 About Here

---

Models 3 and 4 of Table 5 show the logistic regression results of testing the impact of service types on job loss. Model 3 has three service types and they are DIGSERV, DATSERV, and PRESSSERV. Model 4 breaks PRESSSERV into two groups: digital proofing and laminating and mounting. This is done because the two-item service type PRESSSERV has a low reliability (Cronbach's Alpha = .22) and we want to test whether by entering two single-items into regression the hypothesized relationship will change. The consistency between the two analyses will assure the robustness of our conclusion.

In both Models 3 and 4, DATSERV shows a positive and significant relationship with job loss ( $B = .46, p < .05$ , one-tailed test). This indicates that the more printing firms focus on data related services, the more likely they will lose jobs to overseas competitors. Therefore, H7 is not supported. The same relationship is found between PRESSSERV and job loss ( $B = 1.29, p < .001$ , one-tailed test), indicating that the more printing firms focus on press related services, the more likely they will lose jobs to overseas competitors. The relationships between digital proofing and laminating and mounting and job loss are also confirmed by testing the two services separately, as Model 4 in Table 5. Digital proofing positively and significantly relates to job loss ( $B = .73, p < .001$ , one-tailed test) and the same is found between laminating and mounting and job loss ( $B = .59, p < .001$ , one-tailed test). Therefore, H6 is supported. However, even though DIGSERV has a strong negative relationship with job loss, this relationship is only close to being significant ( $B = -.42, p > .05$ , one-tailed test). Therefore, H8 is not supported.

However, we can see that those firms that provide digital IT services will be less likely to have job loss to offshore competitors, which is in the hypothesized direction.

## **Analysis and Discussion**

The survey data suggest that printers are aware of the offshoring trends and are being impacted by it, mostly adversely. A surprisingly large share, 49%, of printers claim to have lost a job to an offshore competitor. Based on the interviews, there were three main ways the printers are improving their competitiveness vis a vis offshore competitors. One was by sticking to a specific niches or product areas that are considered “safe.” Some of these areas were deemed safe by printers because the markets are small and there is a specific customer base that few large printers would be interested in targeting. Two examples from our interviews included a firm that specialized in high-end stationary and another that targeted the funeral service industry, an industry that is also highly fragmented. Other areas printers believed are less vulnerable to offshoring include jobs that involve quick-turn around time and high shipping costs. As expressed by one printer who did not feel threatened by the offshoring trends: *“Yes, if I was book printer, I’d be dammed scared. But if I’m a magazine printer, a direct mail printer or other things that are more timely, I see much less of a threat.”*

Our survey results suggest that this view is reasonably correct, but printers have to be careful about what products they assume are “safe.” We found, for example, that printers who were involved with the printing of periodicals were more likely to be experiencing job loss. Another comment we heard in the interviews was that short runs were also safe, a common assumption in the industry (Bauer, 2006). But it is not clear that this will continue to be the case. Much of the assurance is based on the high weigh-to-value ratio of printing, driving up shipping

costs, coupled with time sensitivity, both working in favor of domestic printers. But these characteristics are subject to change through technology. For example, China is heavily investing in its air freight infrastructure with the hopes of lowering shipping costs for time-sensitive materials. Additionally, customers could reduce their time sensitivity by re-engineering internal processes. We heard one example of a catalogue customer that re-engineered its processes to accommodate the six week shipping delay in order to source from China. It saved more than \$1 million by doing so.

In addition, it may be the case that printers may not understand the reason for the lower costs overseas, and thus can not respond appropriately. The common story is that labor is cheaper, therefore print is cheaper. One of our sources suggested that this may not be the case, which could impact the strategies firms can take to remain competitive. He stated:

*I was doing some estimating of jobs in Sri Lanka and a pressman there at that time would earn \$90 a month. I then quoted [the job] in the Philippines, where a pressman made \$220 a month, and later I quoted in Thailand, where they made \$440, and at that time Hong Kong was at \$1,250. The interesting thing was the job cost more in Sri Lanka than it did in the Philippines, and in the Philippines it cost more than Thailand, and Thailand cost more than Hong Kong. That didn't seem right because it wasn't in relationship to the amount of wages that were being paid to an individual person. And that bothered me for a long time and I was finally able to work out what are differences and one of them is that almost all products in the world are dumped in Southeast Asia so that the price that anybody else in a high-end country has to pay for them for are a lot greater. So for example, at the current time - and this is of a couple of days ago - an eight color Heidelberg press in San Francisco installed in the company is going to be about \$3.1 or \$3.2 million. I know of a specific case where that same identical press was put into Hong Kong only a few months ago at \$2.4 million.<sup>[3]</sup> I know the top code paper which is made in Japan and sells for about 78 cents a pound here and its 39 cents a pound in Hong Kong. And almost all papers are less expensive.*

*In the Philippines, 60 cents out of every dollar goes to materials whereas only 8 to 10 cents goes to labor. China at the current time, about 45 cents goes to materials and about 35 cents goes to labor - maybe a little less than that. And in the United States, you're talking 20 cents for paper roughly and 54 cents for labor. You know so you can see that labor has something to do with it but overseas, but if you can impact the cost of your materials, it has a greater impact on the cost of that job than labor ever will.*

A second way printers told us they were remaining competitive was by offering creative value added services. Several people we talked to discussed how they were moving into services such as data management, supply chain management, and other IT related services. Some examples in our interviews included a printer of real estate books who expanded in to areas such as real estate ad design, mailing and fulfillment and even invoice billing. Another participant told us about how his company moved from printing menus to using menus to develop detailed supply chain information. As expressed by one printer:

*You know five years ago or seven years ago if somebody were to say, you know, 'what business are you in?' I'd automatically say commercial printing. But not so much anymore. A lot of our printing is driven from some of the other services we offer.*

This particular printer outsourced much of his printing work now, but was adamant about not moving offshore for reasons of patriotism. Interestingly, our survey findings suggest that offering data management services alone will not protect printers from job loss. Those printers offering less standard services, such as web page design, hosting and digital photography do seem to be less susceptible to job loss. It may be that these types of services require creative content and therefore greater levels of communication and embeddedness. As India's booming IT industry becomes more involved with the printing industry, however, these services may also move offshore.

Another area of service that we did not explore in the survey, but was mentioned in two interviews was that they hoped to retain some customers by offering “green” printing. As explained by one printer who was Forest Stewardship Council (FSC) certified:

*We're finding a lot of [government] agencies insisting on that. I guess what the trend is there are people that are concerned about the environment and it's difficult to say that you're an environmental company and yet use outsourcing.*

They also described how several large retailers, such as Target, were also looking into sourcing print from green printers.

The last way that printers were staying competitive was by offshore outsourcing themselves. In our survey, we found that while many printers are outsourcing, they are not yet doing this on a global scale. But, there are many fears about moving offshore, some of which are well founded, while others seem less so. Our survey suggests that shipping delays were the greatest problem for those that did offshore outsource. Overall, however, the benefits of moving offshore were rated higher than the costs. Firms were able to lower cost, use new technologies, and even increase product quality. Our interviews suggest that firms that have connections overseas are first-movers in the process. While some have argued that large firms have an inherent advantage in this regard, we found that this was not necessarily the case. For example, we had one firm CEO tell us he made contacts in China on a trip that was part of his MBA program. The result was he tested out outsourcing some of his work to a Chinese shop. He got multiple bids and his results were excellent and he is planning to expand his overseas operations.

As one print broker observed, however, feeling comfortable making these types of contacts may pose a challenge for American printers in particular. Reflecting on his global experience, he stated:

*I think also one of the things that may be hitting the United States more than other countries is the fact that we're more provincial. We're less used to travel, language, currencies and other things and so when we see other people tending to do what we think we should be doing, we're less tolerant of it and I think we're also less understanding of the fact that it can be our benefactor as well as a detrimental thing is we want to fight it.*

One area where companies derive competitive advantage is by product differentiation through better quality. Based on our interviews most, though not all, thought that overseas print material was equal to or better than the quality of domestic printers. Not only did they think the



foreign competitors were just as good, quality-wise, they didn’t believe there was any hope to create a comparative advantage in quality since the equipment vendors are not discriminating between markets based on advanced technology. Printers in China have access to the latest equipment as a U.S. printer.

## **Conclusions**

In this paper we found that printers are aware of the offshoring threat and are being affected by it. In terms of products and services, quick and variable printing, as well as non-standard IT services (with the exception of data management), are the areas that are less likely to suffer from job loss due to the offshoring. To respond to the threat of offshore outsourcing, printers are trying to either focus on “safe” products, introduce new services, or offshore themselves. For the former two strategies, comparing our interviews with the survey data, it is not clear that printers have a good understanding of what the “safe” products and services are. For the latter strategy, very few printers are taking advantage of lower offshore costs. This is due to fears about its implications for customer and employees, lack of knowledge about how to explore this option, and overall feelings of patriotism. Those that have offshored have enjoyed benefits above and beyond lower costs, including increased quality.

Complicating this picture is the fact that the costs and benefits of offshoring are likely to change. India and China, for example, are both working on improving transportation, particularly air freight. Customers are becoming increasingly global and even changing their business models to adjust to the downsides of offshoring.

While the macro trade numbers indicate that offshoring is a relatively small phenomenon, the effects will very likely be amplified in an industry that has a shrinking market and low

barriers to entry. Overseas printers will likely pick off certain market segments, forcing domestic firms, incumbent in those segments, to crowd into the "safe" segments. This leads to increased competition even for firms in those "safe" segments. The primary barrier to entry for printers is the capital equipment needed. As some firms go out of business due to increased foreign competition, their equipment is generally sold on the secondary market at a steep discount. This makes it even easier for firms, both foreign and domestic to enter the market, escalating competitive pressures.

Clearly, this paper is just the beginning of understanding the dynamics of offshoring in the printing industry. Given the low response rate and the nature of our dependant variable, we are limited in understanding the complicated nature of the issues involved. In the survey, we did ask for performance data, but the response rate was so low we were unable to use those questions. This is a limitation that researchers in this industry will have to find a way to overcome given that for a large percentage of the industry there is no public data available. The interviews were one method to get to some more detailed understanding, and there is a need for additional qualitative data. Given these limitations, however, this paper offers some answers regarding offshoring and the future of print and raises a number of questions for future study.

## References

- Bauer, C. (2006), "Global Competition — Danger Lurks Offshore", PI World. June 1. <http://www.piworld.com/story/story.bsp?sid=30700&var=story> (Accessed 20, September 2006)
- Blinder, Alan S. (2007), "How Many U.S. Jobs Might Be Offshorable?", CEPS working paper no. 142, Princeton's Center for Economic Policy Studies, March.
- Blinder, A. (2006), "Offshoring: The Next Industrial Revolution?", Foreign Affairs, Vol.85 No. 2, pp. 113.
- Brown, C. and Linden, G. (2005), "Offshoring in the semiconductor industry: A Historical Perspective", Brookings Trade Forum. pp. 279-322. [http://muse.jhu.edu/journals/brookings\\_trade\\_forum/v2005/2005.1brown.pdf](http://muse.jhu.edu/journals/brookings_trade_forum/v2005/2005.1brown.pdf) (Accessed 20, September 2006)
- Davis, R. and Gleeson, E. (2006), Transitioning to Global Print Markets: Strategic and Competitive Implications of the U.S. Printing Industry, PIA/GATF Press, Pittsburgh, PA.
- Global News Wire - Asia Africa Intelligence Wire. (2006), "IBM Braces up to reap SOA in India", India Business Insight. April 11.
- Glick, Bryan (2006), "Q&A: EDS General Manager for Europe Bill Thomas", Computing, October 18.
- Hira, R. and Hira, A. (2005), Outsourcing America: What's Behind Our National Crisis and How We Reclaim American Jobs. AMACOM, New York, NY.
- Levy, F. and Murnane, R. J. (2004), The New Division of Labor: How Companies are Creating the Next Job Market. Princeton University Press, Princeton, NJ.
- Morgan, R. M. and Hunt, S. D. (1994), "The commitment-trust theory of relationship marketing", Journal of Marketing, Vol. 58, pp. 20-38.
- Nason, C. (2005), "Offshore Printing Devastated Us", Graphic Arts Monthly, Vol. 77 No. 1, pp. 20
- Newspaper Association of America (2004), <http://www.naa.org/info/facts04/newsprint-growth.html> and <http://www.naa.org/info/facts04/readership-circulation.html> (Accessed 20, September 2006)
- Nunnally, J. C. (1994), Psychometric Theory. McGraw-Hill, New York, NY.
- Podsakoff, P.M. and Organ, D.W. (1986), "Self-reports in Organizational Research: Problems and Prospects", Journal of Management, Vol. 12 No. 4, pp. 531-545.
- Romano, F. (2004), An Investigation into Printing Industry Trends. A Research Monograph for the Printing Industry Center at RIT. December. Number PICRM-2003-05, Rochester Institute of Technology, Rochester, NY.
- Romano, Frank and Soon, M. (2003), An Investigation into Printing Industry Demographics. A Research Monograph for the Printing Industry Center at RIT. October. Number PICRM-2003-01. Rochester Institute of Technology, Rochester, NY.

Sorce, P., Pellow, B. and Frey, F. (2003), The role of value added services in successful digital printing, A Research Monograph for the Printing Industry Center at RIT. October. Number PICRM-2003-02, Rochester Institute of Technology, Rochester, NY.

Sturgen, T. (2006), Services Offshoring Working Group Final Report. Industrial Performance Center Working Paper. Massachusetts Institute of Technology. Cambridge, MA.

Uzzi, B. (1997), “Social structure and competition in interfirm networks: The paradox of embeddedness”, *Administrative Science Quarterly*, Vol. 42 No.1, pp. 35-67.

Table 1: Exploratory Factor Analysis on Product Types				
	Factor 1	Factor 2	Factor 3	Factor 4
B&W Book	.84 (.81)			
Color Book	.77 (.77)			
Directories	.60 (.65)			
Catalogs	.472 (.573)		.460 (.571)	
Forms		.90 (.90)		
Quick Printing		.78 (.80)		
Labels		.60 (.59)		
Transaction Statements		.55 (.53)		
Advertisements			.83 (.80)	
Direct Mail			.80 (.79)	
Periodicals	.30 (.38)		.41 (.50)	
Package				.90 (.89)
<p>Note: The default loadings are from Pattern Matrix, and the loadings in () are from Structure Matrix.</p>				

Table 2: Exploratory Factor Analysis on Service Types			
	Factor 1	Factor 2	Factor 3
Web Development and Hosting	.81 (.82)		
CD-ROM Production	.71 (.71)		
Digital Photography	.66 (.69)		
Online Template	.61 (.63)		
Mailing and Fulfillment		.85 (.82)	
Variable Data Printing		.74 (.76)	
Supply Chain Management		.54 (.60)	
Digital Proofing			.72 (.73)
Laminating and Mounting			.65 (.67)
<p>Note: The default loadings are from Pattern Matrix, and the loadings in () are from Structure Matrix.</p>			

**Table 3: Problems and Benefits of Offshore Outsourcing**

<b>Benefits</b>	<b>Mean*</b>	<b>Problems</b>	<b>Mean*</b>
Used new technology	4.02	Language Barriers	2.38
Increased production volume	3.67	Communication Problems (Other than language)	2.33
Increased product quality	4.03	Technology Incompatibility	2.06
Increased product variety	3.15	Shipping Delays	2.8
Learned about new technologies	4.03	Quality Problems	2.49
Increased operational efficiency	3.67	Substrate Availability	2.42
		Loss of Intellectual Property	2.22
		Increased Travel Budget	2.32
		Increased Employee Training	2.34

\* Respondents were asked to rate their level of agreement with a number of statements, with 1 being no agreement and 5 being full agreement.

Table 4: Mean, Standard Deviation, and Correlation

	1	2	3	4	5	6	7	8	9	10	11	12	13
ME	.42	.60	2.53	75.60	14.14	.82	.89	.72	1.16	.51	.72	1.34	1.91
SD	.50	.49	1.46	18.80	17.54	1.14	.51	.50	.55	.69	.66	.73	.74
1.JOBLOSS	1												
2.OUTSOURCE	.07	1											
3.SIZE	.02	-.05	1										
4.REPEAT	-.12	.10	-.12	1									
5.INNOVATION	.02	-.10	-.08	-.09	1								
6.SOURCESERV	-.04	.29***	-.02	.02	-.01	1							
7.BOOKS	.23**	.05	-.03	-.01	-.11	.08	1						
8.QUICKVAR	-.13+	.05	-.00	-.10	.16*	.01	.11	1					
9.ADVERT	.17*	-.05	.04	-.07	-.13+	.08	.39***	-.10	1				
10.PACKAGE	.18*	-.04	.05	-.15*	.08	-.02	.08	-.08	.09	1			
11.DIGSERV	.05	-.00	.09	-.10	.17*	-.01	.03	.00	.17*	.11	1		
12.DATSERV	.15*	.04	.02	.05	-.02	.03	.22**	-.00	.42***	.04	.34***	1	
13.PRESSSERV	.33***	.00	-.04	.00	.19*	.02	.21**	.06	.26***	.27***	.32***	.26***	1



Table 5: Logistic Regression Result of Job Loss (JOBLOSS)					
Product	Model 1	Model 2	Service	Model 3	Model 4
<b>Control Variable</b>					
SIZE	.02 (.11)	.03 (.12)	SIZE	.07 (.12)	.06 (.12)
REPEAT	-.01 (.01)	-.01 (.01)	REPEAT	-.02 (.01)	-.02 (.01)
INNOVATION	.00 (.01)	.01 (.01)	INNOVATION	-.01 (.01)	-.01 (.01)
SOURCESERV	-.08 (.14)	-.13 (.15)	OUTSOURCE	-.12 (.15)	-.12 (.15)
<b>Independent Variable</b>					
BOOKS		1.06** (.38)	DIGSERV	-.42 (.30)	-.42 (.30)
QUICKVAR		-.84* (.37)	DATSERV	.46* (.26)	.46* (.27)
ADVERT		.23 (.35)	PRESSSERV	1.29** (.32)	
PACKAGE		.43* (.25)	DIGPROOF		.73*** (.23)
			LAMMOUNT		.59** (.20)
<b>Fitness Indices</b>					
Model Chi-square	2.51	22.71**		28.57***	28.82***
d.f.	4	8		7	8
-2 log likelihood	221.79	201.59		195.73	195.48
Nagelkerke R <sup>2</sup>	.02	.17		.21	.22
Note:					
1. * p < .05, ** p < .01, *** p < .001, one-tailed test					
2. Coefficients are regression coefficients (B). The numbers in () are standard error.					

## Endnotes

<sup>1</sup> In this paper “job loss” refers to print jobs, and not worker jobs.

<sup>2</sup> In order to confirm the explored relationships between product types and dependent variables, we also tested the factor structure with catalogs grouped with factor ADVERT. Even though the absolute value of regression coefficients slightly changed, the direction of the coefficients and the significance of the relationships do not change. Therefore, our regression results are robust to the change of the factor structure.

<sup>3</sup> Some OEM's have suggested that perhaps the equipment being sold overseas is older, this accounting for the price difference.