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Introduction

Offshoring and offshore outsourcing, the movement of work and tasks to low-cost countries, has been increasing in scale and scope. 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, once considered non-tradable and therefore immune to offshoring, have emerged. The concurrent effects of very rapid growth of the Indian and Chinese economies and dramatically lower international cross-border transaction costs have the potential to change the structure of many industries. Some have called this as historic an economic transformation as the Industrial Revolution (Blinder, 2006).

Offshoring has already transformed a number of industries. On the manufacturing side, in response to pressures from foreign competitors, U.S. semiconductor firms were able to take advantage of labor in low-cost countries by modularizing their value chains (Sturgeon, 2006). By modularizing, they could isolate pieces of the value chain and site them in the most efficient geographic locations. Very labor-intensive tasks such as assembly were first moved offshore, and later foundries were moved to more efficient locations, while high-level design was kept closer to customers (Brown & Linden, 2005). Similarly the U.S. automotive industry has been able to improve its competitive position by moving some of its labor-intensive production to Mexico to lower its costs.

On the services side, certain industries are being transformed very rapidly. In a span of about three years, the American IT services industry has adopted a "global delivery model," in which customers expect bids on projects to have blended rates, including both on-site and offshore labor components. These projects do not reflect a simple division of labor, where the work completed on-site is high-skill and the offshore work is low-skill. Instead, major companies are creating product-specific centers in low-cost countries that will serve customers throughout the world. For example, IBM has announced that Bangalore will be the global home for its Service Oriented Architecture (SOA), a strategic business segment it expects will grow rapidly over the next decade (Global News Wire, 2006).

The printing industry has characteristics similar to both manufacturing and services industries. Like manufacturers, printers produce tangible goods, but like services providers, the products delivered are often highly customized, requiring coproduction by customer and printer. As a result, increased international cross-border trade, especially with China and India, will affect the printing industry in distinctive ways.

The goal of this paper is to better understand how the offshoring phenomenon is playing out in the printing industry. Because of the high number of small firms in the printing industry and thus the lack of public data, and because of the complex nature of the industry itself, there is much to be understood about how offshoring is affecting U.S. printers. This problem is magnified for the lack of data on service offshoring (Sturgeon, 2006). Printers and their suppliers are keenly interested in how globalization and

offshoring are impacting their industry. The fact that China and India have emerged as market sources as well as competitors has been a frequent topic in trade publications and industry conferences. In this paper we will offer a number of hypotheses, review descriptive survey data on the industry, test the hypotheses with this data, and expand these quantitative findings with interview data.

The Printing Industry

The offshore outsourcing movement comes at a unique time for the printing industry. First, the industry is simultaneously undergoing complex competitive and economic pressures. One source estimates that approximately 500 establishments per month went out of business between 1999 and 2001 (Romano and Soom, 2003). One reason may be that the demand for traditional print products is down. U.S. daily newspaper circulation, for example, was 60,655,431 in 1975 (Newspaper Association of America, 2004a). Over the next thirty years it steadily declined, so that by 2002 it was 55,186,000 (Newspaper Association of America, 2004a). From 2000 to 2002, newsprint consumption decreased 14%, from 12.039 to 10.395 million metric tons (Newspaper Association of America, 2004b). Moreover, many print clients can increasingly meet shrinking print needs in-house through sophisticated yet easy-to-use desktop publishing systems.

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 skill sets needed in the industry, and has expanded the range of service opportunities for printers to such areas as data management. The shift to digital media, particularly on the pre-press side, is especially important when looking at the issue of offshore outsourcing, because online file transfer and other aspects of e-commerce have significantly reduced the cost of transportation of pre-print media. Obviously, this expands the world of potential printers to a global basis.

Thus, printers face both challenges and opportunities with greater cross-border trade. On the upside, U.S. printers can expand their customer bases by selling to new markets like China and India, and can lower costs by more efficiently locating their inputs and processes. The potential upsides of globalization can be:

- larger overall markets due to rapid overseas growth,
- a larger market in the U.S. through efficiency gains in offshoring components, and
- a larger market in the U.S. because more products are offered as a broker for offshored products

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. This may stave off a printer's 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).

While some observers believe offshoring has not had a dramatic impact on most segments of the printing industry, the potential for a significant increase in cross-border trade exists. Unlike most domestic goods sectors, the U.S. runs a trade surplus in printed materials. In 2005 the U.S. was a net exporter of printed materials with a trade surplus of over $500 million. But some segments of the printing industry have already been transformed. This $500 million number, for example, is down from over $1 billion in 2000 (Davis & Gleeson, 2006). Some major printing companies that see the writing on the wall have already expanded overseas. R.R. Donnelley, for example, purchased OfficeTiger in 2005 to expand its presence in the business processing outsourcing (BPO) market in India (Outsourcing Times, 2006).

Theory

Printers are likely to be affected by and respond to offshore outsourcing in different ways. Some industry data hints at the types of printed products that are most likely to move offshore (Davis & Gleeson, 2006), but this data is limited in content and scope.

A number of factors impact whether firms are likely to lose printing jobs to overseas competitors. Industry experts emphasize that several criteria are important to print customers, including turnaround time, quality, cost, trust, ability to customize, co-location with other production processes, availability of other services, and a printer's unique abilities. It isn't simply a matter of choosing the printer who quotes the lowest price for a job. For each printing job, the weighting of the various criteria will change.

One of the biggest risks with offshore outsourcing is the risk of delays in shipping. It follows, therefore, that "quick print" jobs will not move overseas. Thus,

Hypothesis 1: Printers that offer "quick printing" will be less likely to experience loss of print jobs to offshore printers.

On the other hand, our initial discussions with industry experts revealed that books often don't require quick turnaround time. Some books, such as children's "pop up" titles, require complicated finishing. When such labor-intensive finishing is involved, a clear cost advantage exists for offshoring these operations to countries that have much lower labor costs, such as Mexico and China. This makes the printing of books more susceptible to offshoring, leading to the second hypothesis:

Hypothesis 2: Book printers will be more likely to experience loss of print jobs to offshore printing.

Packaging also often requires complex finishing. Also, as manufacturing moves overseas, there are some financial and logistical benefits for packaging printing to move overseas as well. Thus,

Hypothesis 3: Packaging printers will be more likely to experience loss of print jobs to offshore printing.

The high cost of shipping is a main detractor to the benefits of offshore printing. As in other industries, printers need to attend to the value-to-weight ratio (Brown & Linden, 2005). In variable data printing this ratio tends to be small, so it does not make economic sense to pay high shipping costs. The printing of items that are personalized and mailed is less likely to be moved offshore if customers rely on the printers for mailing and fulfillment. Thus,

Hypothesis 4: Printers that offer variable data printing will be less likely to experience job loss to offshore printers.

Hypothesis 5: Printers that produce advertising materials will be less likely to experience job loss to offshore printers.

Little is understood about the types of services that will help printers retain jobs that would otherwise be lost to overseas competitors. On the one hand, greater digitization of the printing process can facilitate information transfer on a global scale (Levy & Murnane, 2004). On the other hand, the personal service that customers have come to expect of a printing firm (increasingly involving digital technology) is often seen as the means to address global competitive pressures (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).

New technologies have 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 modern technology, however, a customer can e-mail a file, the printer can print it with significant accuracy and then e-mail it back to the customer for review, and the exchange is completely online. While these services may make printing companies more efficient, there is no reason to think that they will therefore be protected from job loss to overseas companies that offer similar standard printing services.

Hypothesis 6: Printers that rely on standard digital services such as digital proofing to attract and retain customers will be more likely to experience job loss to offshore printers.

Another new area of service that printing companies provide is data management services, in which printers manage and store the data used in a customer's printing jobs. At the simplest level, this involves mailing lists. More complex and sensitive data may include financial information. In addition, what seems like simple information, such as a menu layout for a restaurant, can have other information embedded in it that is quite

central to the customer, 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 social relationships with their customers. As printers take on managing services that are further up and down the value chain, they increasingly embed their economic transactions in relationships that require trust. This trust between customer and printer is needed for the handling of sensitive information and for an efficient mutual knowledge exchange, both of which serve to facilitate the effectiveness of interactions. Customers engaged in these relationships will face increased transaction costs if they switch to a new print supplier. Thus,

Hypothesis 7: Printers that offer data management services will be less likely to experience job loss to offshore printers.

Hypothesis 8: Printers that offer non-standard IT services will be less likely to experience job loss to offshore printers.

Methods

The data collection was comprised of three parts. The first part was a set of exploratory interviews with industry experts. Six interviews were conducted with individuals well known in the industry for their expertise in industry dynamics. These interviews varied from one-half to one hour in length, and focused on

- 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 provided the basis for an industry Web-based survey, written in cooperation with the Graphic Arts Technical Foundation/Printing Industries of America (GATF/PIA). After pre-testing by some industry contacts, the survey was sent to approximately one half of the GATF/PIA membership. (Because we were offering a $25 incentive to all respondents, we did not send the survey out to the entire membership of over 7000 printers.) The e-mail survey was sent to a total of 3,228 printers, and of these, 465 were returned as undeliverable. After two e-mail reminders, a total of 242 responses were received, a response rate of 8.8%. This response rate may be low in comparison to most academic surveys, but 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 8.8% was an acceptable response rate.

In the survey, we asked for contact information for those participants who would be willing to further discuss the issues. We randomly chose 15 interested participants and conducted semi- structured phone interviews with them, each lasting 45 minutes to an hour. All interviews were taped and transcribed for accuracy. These interviews were used to better understand survey findings.

Survey Measures

By reviewing related literature and interviewing professionals in the printing industry, we devised the following variables for the survey.

Independent Variables

Product Type. We created a twelve-item list to cover the common product types in printing industry:

- advertisement,
- color books,
- black and white books,
- catalogs,
- direct mail,
- directories,
- forms,
- transaction statements,
- packaging,
- periodicals (not including newspapers),
- labels, and
- quick printing.

We then conducted an exploratory factor analysis on the responses we received to questions regarding these 12 items (SPSS 14.0). By employing the principal components method with oblique rotation and by analyzing the resulting correlation matrix, four factors were extracted with an eigenvalue greater than one (eigenvalue = 1.108). The KMO measure of sampling adequacy was 0.68. The KMO (Kaiser-Meyer-Olkin) measure calculates both for the entire correlation matrix and each individual variable in order to evaluate the appropriateness of applying a factor analysis. Values above 0.50 indicate appropriateness. Another indicator of the strength of the relationship among variables is Bartlett's test of sphericity. In this exploratory factor analysis (EFA), Bartlett's test of sphericity was significant at the .001 level. Bartlett's test is used to check whether the variables in the population correlation matrix are uncorrelated. A significant result concludes that the strength of the relationship among variables is strong and it is a good idea to proceed to a factor analysis for the data.

The four factors extracted from the correlation matrix clearly represented four different product types:

1. ADVERT, including advertisement, catalogs, and periodicals,
2. BOOKS, including color books, black and white books, direct mail, and directories,
3. QUICKVAR, including forms, quick printing, labels, and transaction statements, and
4. PACKAGE, a single item factor, including only the packaging category.

The results showed that 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 seemed not to load on any factor firmly—the second highest loading of periodicals is 0.30, within the BOOKS factor.

We then double-checked the structure matrix loading table. The factor structure is consistent with the results from the pattern matrix. The structure matrix is simply the factor loading matrix 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 represent unique contributions. In an 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 employed it in the following regression analysis.* The summarized item content and factor loading information is included in Table 1.

Since the last factor, PACKAGE, only includes one item, we wondered whether it was necessary to include packaging into other categories, forcing the analysis to form three factors instead of four factors. Further examination revealed 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. Thus they are distinctively different and no 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.

* 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 did not change. Therefore, our regression results are robust to the change of the factor structure.

Table 1. Exploratory factor analysis on product types

	Factor 1	Factor 2	Factor 3	Factor 4
B&W books	.84 (.81)			
Color books	.77 (.77)			
Directories	.60 (.65)			
Catalogs	.472 (.537)		.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	
Packaging				.90 (.89)

Note: The default loadings are from the pattern matrix, and the loadings in parentheses are from the structure matrix.

Service Types. Going through the same process as for determining product types, we developed a nine-item list to cover many common services offered in the printing industry. They are:

- mailing and fulfillment,
- variable data printing,
- supply chain management,
- digital photography,
- use of online templates,
- Web site development and hosting,
- CD-ROM production,
- digital proofing, and
- laminating and mounting.

We also conducted an exploratory factor analysis on these items. By employing the principal components method with oblique rotation and by analyzing the resulting correlation matrix, three factors were extracted with an eigenvalue greater than one (eigenvalue = 1.001). The KMO measure of sampling adequacy was 0.69. Bartlett's test of sphericity was significant, again at the .001 level. Therefore, both tests concluded that the strength of the relationship among variables was strong, and it was a good idea to proceed to a factor analysis for the data.

In this case, three factors emerged from the correlation matrix, representing three different service types:

- DIGSERV, including Web site 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.

These three factors explained 55.96% of the total variance. No loading was lower than .50 and the structure matrix also suggested the same factor structure. Further examination revealed that the component correlations of the four factors ranged from .08 to .25, indicating that there were no strong correlations among any of the four product types. Thus, they were distinctively different and no further EFA was needed. The summarized item content and factor loading information is included in Table 2.

Dependent Variables

Job Loss. Three items were used to measure whether the printing firms in the study suffered from losing printing jobs to foreign competitors. They were:

- whether firms lost a printing job or jobs to a foreign competitor that serves mainly non-U.S. customer(s),
- whether firms lost a printing job or jobs to a foreign competitor with U.S. customer(s) where the print job was NOT already being exported, and
- whether firms lost a printing job or jobs to a foreign competitor with U.S. customer(s) where the print job was being exported.

If a printing firm lost a job or jobs in any of the above situations, the case was coded as "1," and if not, it was coded as "0." This dummy variable was used later in regression to measure job loss (JOBLOSS).

Table 2. Exploratory factor analysis on service types

	Factor 1	Factor 2	Factor 3
Web site development and hosting	.81 (.82)		
CD-ROM production	.71 (.71)		
Digital photography	.66 (.69)		
Use of online templates	.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)

Note: The default loadings are from the pattern matrix, and the loadings in parentheses are from the structure matrix.

Control Variables

Four variables that may have affected the explored relationships were controlled in the regression analysis. The first control variable was SIZE, measured by the number of employees at responding firms. The second control variable was termed REPEAT. We asked printing firms approximately what percentage of their total business could be considered repeat business from existing customers. The greater the percentage of repeat business, the greater the likelihood of loyalty on the part of customers to printers, and therefore the less likely it would be for firms to lose business to foreign competitors.

The third control variable measured the firms' product INNOVATION. We asked firms to share with us the percentage of their sales revenues in FY 2004 that came from products not offered during the three years prior to 2004. As discussed earlier, many in the printing industry see advanced technology, such as digital printing, and new value added services as a means to remain competitive in the changing marketplace. This measure was one way to gauge the degree to which printers were introducing new products and services as a means of counteracting increased competitive pressure.

The last control variable was termed SOURCESERV. We asked firms whether they outsourced the following services overseas:

- customer care / call center operations,
- finance / accounting,
- human resource services, and
- legal services.

There were two reasons for this question. First, we thought it may capture a firm's overall level of comfort with outsourcing, since the more comfortable a firm feels about outsourcing, the more likely it would be to outsource both here and in the U.S. Second, the question carried the possibility of indicating what types of organizational structures were amenable to outsourcing.

The Cronbach's Alpha for these four items was .72. The arithmetic averages of the four items were entered into the regressions to measure experience with outsourcing in internal service areas.

Other Tests

All of the data used in this study is drawn from a single source, the Web based survey. While the variables to be measured were generally straightforward and objective in nature, the survey method itself 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 determine geographic bias between the respondent cases and non-respondent cases (50 printing firms that had been randomly selected from the non-respondent pool). The ANOVA test did not find any significant bias in the geographic location between the 145 (some cases were deleted for missing values) respondents and the 50 non-respondent firms. The second ANOVA was employed to test whether any bias existed between the final sample and the cases that had to be deleted for missing values. No bias was found among our key variables such as employee number, job loss, product types, and service types.

Findings

Descriptive Statistics

The descriptive statistics suggest that while many in the printing industry are aware of the threat of global competition and are being affected by it, the U.S. industry is not yet operating on a global scale to any large extent. When asked how foreign competition would change over the next two years, 72% responded that it would increase, and 18% thought it would stay the same. Forty-nine percent of the respondents reported having lost a printing job to a foreign competitor. 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, only about 5% of these losses were to Indian printing firms.

For those companies that did lose printing jobs, lower costs were suggested to be the primary reason for this loss (34.0%). The next most common reasons were that the customers' work moved outside the U.S. (7.7%), that foreign companies actually had better local reach (5.7%), and that the larger size of the foreign competitor made it more economical for them to produce the job (5.7%). Fourteen percent of those firms that lost printing jobs reported that a common factor related to the work they lost was that those jobs required long print runs, while 11% reported that common factors were reasonable or long turnaround times and labor-intensive finishing.

For the most part, the printers in this sample did not have a global customer base; only 17% of the respondents reported that they had performed a printing job for a customer outside of the U.S. Most of the work that these companies outsourced was done within the U.S. For most aspects of the printing process, less than one percent of the respondents overall outsourced outside the U.S. There were a few small exceptions to this. Of those that did outsource work, 5.4% 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% did so 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 work 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%.

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 using and learning about new technologies (using a scale of 1–5, where 1 was "do 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. The highest rated problem was shipping delays (2.8), followed by quality problems (2.49). These findings are summarized in Table 3.

Table 3. Problems and benefits of offshore outsourcing

Benefits	Mean*	Problems	Mean*
Used new technology	4.02	Language barriers	2.38
Increased production volumes	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	2.34

* Respondents were asked to rate their levels of agreement with a number of statements, with "1" representing no agreement and "5" representing full agreement.

While only a small number of firms were engaged in offshore outsourcing, a few went so far as to say that they had ruled it out 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). However, ADVERT belongs to product types and DATSERV is a service type so they were entered into regressions separately. Therefore, there are not serious multicollinearity concerns in our later regression analysis.

Since our dependent variables were dummy variables, logistic regression was 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 it makes no assumptions about the distributions 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 regressions were employed to test the hypothesized relationships. The two sets of regressions relate job loss to product types and service types, respec-

tively. We controlled the same variables in these two regressions. By doing so, we had hoped that we could clearly map how product and service types explain the variance in firm job loss.

After excluding one outlier that was outside two standard deviations, we summarized the regression results in Table 5. None of the control variables was found to significantly relate to job loss, as Model 1 of Table 5 shows. However, after the four product types were added into regression (i.e., Model 2 of Table 5), we found that BOOKS positively and significantly correlated to job loss ($B = 1.06$, $p < .01$, one-tailed test). This means that the more printing firms focus on BOOKS, the more likely they will be to lose jobs to overseas competitors. Therefore, Hypothesis 2 is supported.

The same relationship was found between packaging and job loss ($B = .43$, $p < .05$, one-tailed test), which indicates that the more printing firms focus on packaging business, more likely they will be to lose jobs to overseas competitors. Hypothesis 3 is thus supported. ADVERT was also found to positively impact on job loss situation. However, this relationship was not significant ($B = .23$, $p > .05$, one-tailed test). Therefore, Hypothesis 5 is not supported. The opposite relationship was found between QUICKVAR and job loss ($B = -.84$, $p < .05$, one-tailed test), which shows that the more printing firms focus on quick and variable printing, the less likely they will be to lose jobs to foreign competitors. Therefore, Hypothesis 1 and Hypothesis 4 are supported.

Model 3 and Model 4 of Table 5 show the logistic regression results of testing the impact of service types on job loss. Model 3's service types were DIGSERV, DATSERV, and PRESSSERV. Model 4 breaks PRESSSERV into two groups: digital proofing and laminating and mounting. The purpose of proceeding in this manner was that because the two-item service type PRESSSERV had a low reliability (Cronbach's Alpha = .22), we wondered whether entering the two single items into regression would change the hypothesized relationship. The consistency between the two studies would assure the robustness of our conclusion.

In both Model 3 and Model 4 of Table 5, DATSERV showed 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 be to lose jobs to overseas competitors. Therefore, Hypothesis 7 is not supported. The same relationship was 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 be to lose jobs to overseas competitors.

The relationships between digital proofing and laminating and mounting versus job loss were also confirmed by testing the two services separately, as Model 4 in Table 5 shows. Digital proofing positively and significantly correlated to job loss ($B = .73$, $p < .001$, one-tailed test) and the same correlation was found between laminating and mounting and job loss ($B = .59$, $p < .001$, one-tailed test). Therefore, Hypothesis 6 is supported. However, even though DIGSERV had a strong negative relationship with job loss, this relationship was only close to being significant ($B = -.42$, $p > .05$, one-tailed test).

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

Note: * p < .05, ** p < .01, *** p < .001, one-tailed test
Coefficients are regression coefficients (B). The numbers in parentheses are standard error.

Table 5. Logistic regression result of job loss (JOBLOSS)

Product	Model 1	Model 2	Service	Model 3	Model 4
Control Variable					
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)
Independent Variable					
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)
Fitness Indices					
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^2	.02	.17		.21	.22

Note: * p < .05, ** p < .01, *** p < .001, one-tailed test
Coefficients are regression coefficients (B). The numbers in parentheses are standard error.

Therefore, Hypothesis 8 is not supported. However, we can see that those firms that provide digital IT services will be less likely to experience job loss to offshore competitors, which is in the hypothesized direction.

Analysis and Discussion

The data suggest that while printers are aware of offshoring trends, and are being impacted by it, they are nevertheless reluctant to take advantage of the benefits that offshoring practices can offer.

From the interviews, we ascertained three main ways that printers remain competitive in the face of offshore competitors. The first was by sticking to specific niches or product areas that they considered "safe." Some of these product areas were considered safe because they are targeted at a small and specific customer base that few printers pursue. Two examples of such areas that we saw in our interviews were high-end stationery and funeral service material. Other product areas were considered less likely to be outsourced because they had certain features that preclude offshoring: the need for a quick turnaround time and high shipping costs. As expressed by one printer who did not feel threatened by offshoring trends, "Yes, if I was book printer, I'd be damned 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 periodical printers 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 is the case. Again, what needs to be focused on is the value/weight ratio and the time sensitivity of the printed matter. One thing to keep in mind, however, is that this ratio can change.

In addition, some printers may not understand the reasons for lower costs overseas, and thus cannot respond appropriately. The common belief is that labor is cheaper overseas, and 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 explained:

> 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 [it] 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 [in] 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.
>
> I was finally able to work out what [the] differences [are], 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 [is] a lot greater. So for example, at the current time—and this is [as] of a couple of days ago—an eight-color Heidelberg press in San Francisco installed in [a] 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.* I know [that] the top code paper which is made in Japan sells for about 78 cents a pound here, and it's 39 cents a pound in Hong Kong. And almost all papers are less expensive [there, too].
>
> In the Philippines, 60 cents out of every dollar goes to materials, whereas only 8 to 10 cents goes to labor. [In] 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. … So you can see that labor has something to do with it, but overseas, but if you can [reduce] the cost of your materials, it has a greater impact on the cost of that job than labor ever will.

The second way printers told us they were remaining competitive was by offering creative value-added services. Several printers discussed how they were moving into data management, supply chain management, and other IT-related services. In our interviews we talked to a real estate book printer who expanded in to areas such as ad design, mailing and fulfillment, and even invoice billing. Another participant explained how his company moved from printing menus to using menus to develop detailed supply chain information. As expressed by another 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 was currently outsourcing much of his actual printing work, but was adamant about not moving offshore for reasons of patriotism.

Our survey findings suggest that offering data management services alone will not protect printers from job loss. But those printers offering less standard services, such as Web page design and 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 that was mentioned in two interviews, was offering "green" printing. One printer who was Forest Stewardship Council (FSC) certified explained: "We're finding a lot of [government] agencies insist-

* Some OEMs have suggested that perhaps the equipment being sold overseas is older, thus accounting for the price difference.

ing on that. I guess the trend is [that] 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." This printer also described how several large retailers, such as Target, were looking into sourcing print from green printers.

The third 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 so on a global scale. There are many fears about moving work offshore, some real and others less so. Our survey suggests that shipping delays was the greatest problem associated with offshore outsourcing. Overall, however, the benefits of moving offshore outweighed the drawbacks. Firms were able to lower costs, use new technologies, and even increase product quality.

Our interviews suggest that firms that have connections overseas are first-movers in the industry. 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, one firm's CEO told us he made contacts in China on a trip during his MBA program. As a result, he tried outsourcing some of his work to a Chinese shop. His results were excellent and he is planning to expand his operations overseas.

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 [offshoring] can be our benefactor, as well as a detrimental thing if we want to fight it.

Conclusion

In this study we found that printers are aware of the offshoring threat and are being affected by it. In terms of products and services, quick printing, variable printing, and non-standard IT services (with the exception of data management), are areas that are less likely to suffer from job loss due to offshoring.

To deal with the threat of offshore outsourcing, printers are trying to either focus on "safe" products, introduce new services, or offshore themselves. Regarding the first two strategies, comparing our interviews with the survey data, it is not clear that printers have a good understanding of what "safe" products and services are. Regarding the third strategy, very few printers are taking advantage of lower offshore costs. This appears to be due to fears about offshoring implications for customers and employees, a lack of knowledge about how to explore this option, and overall feelings of patriotism. Those

printers that have offshored have enjoyed benefits above and beyond the reduced costs, including increased product 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 themselves are becoming increasingly global and even changing their business models to adjust to the downsides of offshoring.

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

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