13 *Offshoring of IT and business, professional, and technical services*

The recent experience of the United States

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Introduction

The virtualization of work has increased the opportunities for global organizational collaboration several fold. Organizations today rely on supply chains that criss-cross the globe in the creation of both manufactured goods and services. Several large emerging countries such as China, India, and Russia, have embraced open trade and investment policies adding billions of workers to the global talent pool with implications for employment in both developed and developing nations. Global outsourcing and offshoring have exploded, enabled by new technologies in information processing, communication, and transportation. As Blinder (1988) noted, it is important to consider the dynamics of employment resulting from changes in international trade policies. For just as in the 1980s, when blue-collar workers began to see jobs shift to locations in Mexico and South Korea, today, white-collar service jobs are moving to countries like the Philippines and Poland. Moreover, changes in trade policies do not have the same effect on all occupations and sectors (Cohen and Zaidi, 2002). Some view these changes in the labor market as more harmful to national economies than manufacturing offshoring, because of the high-value jobs involved.

This chapter examines business, professional, and technical service (BPTS) and information technology (IT) service exports to the United States from a group of twenty-nine countries in a search for the country-level determinants of trade in these high value-added services. Panel regression analysis shows that significant relationships

exist between both BPTS and IT exports to the US and the following independent variables: geographic distance, use of English as a primary language, level of Internet access, and labor costs.

Trade in services

In developed countries, the importance of the manufacturing sector has waned while the service sector has waxed. Liberalization of trade in goods over this period fueled this transition, allowing developed countries to consume an increasing amount of manufactured goods, amidst a dramatic loss of manufacturing jobs. Accompanying the explosion in trade was the increase in manufacturing offshoring, which began in the 1960s and slowly increased allowing the economies of North America and Europe a few decades to adjust. Until the commercialization of the Internet, many services were untradeable across distances because of the inability to separate the production and delivery of services. While improved transportation and diminishing barriers to trade allowed for goods production to be relocated overseas, most business services remained insulated from trade by the required proximity to customers. However, in an era of electronic delivery, services offshoring typically requires less costly infrastructure and less time to execute than the relocation of manufacturing operations and is being adopted at a faster rate.

Measuring the growth of services offshoring is challenging. The lack of data related to services offshoring and outsourcing has been widely noted and international organizations have been working to standardize data collection to reduce this problem. Members of the World Trade Organization (WTO) adopted the General Agreement on Trade in Services (GATS) in 1995 to improve the comparability and completeness of international data. The WTO provides measures of services trade in three categories: transportation, travel, and other commercial services. As Table 13.1 shows, the category "other commercial services" includes communication, construction, insurance, financial, computer and information services, royalties and license fees, other business services, and personal, cultural, and recreational services. Table 13.1 shows the growth in the share of other commercial services trade for the US which rose from 40 percent in 1995 to 54 percent in 2003. During this period the share of financial services doubled and other business services increased by more than 50 percent.

Table 13.1 ***Trade in commercial services of the United States***

	Exports			Imports		
	Value	Share		Value	Share	
	$ billions	%	%	$ billions	%	%
	2003	1995	2003	2003	1995	2003
1. Transportation	47.5	22.7	16.5	65.7	32.3	28.8
2. Travel	84.1	37.7	29.2	59.7	35.8	26.1
3. Other commercial services	156.0	39.7	54.2	103.1	31.9	45.1
Communication services*	5.7	1.8	2.0	5.2	6.0	2.3
Construction services*	2.7	1.3	0.9	0.9	0.3	0.4
Insurance services*	4.9	0.6	1.7	26.7	4.0	11.7
Financial services*	17.6	3.5	6.1	4.2	1.9	1.9
Computer and information services*	5.4	1.2	1.9	1.5	0.2	0.7
Royalties and license fees	48.2	15.3	16.8	20.0	5.4	8.8
Other business services	64.1	14.6	22.3	44.2	14.0	19.3
Personal, cultural, & recreational services	7.4	1.3	2.6	0.3	0.1	0.1
Total commercial services	287.7	100.0	100.0	228.5	100.0	100.0

* Excludes transactions between affiliates, which are recorded under "Other business services".
Source: World Trade Organization (2005).

Other commercial services represent about half of the total services in the US and while overall services account for around 60 percent of world production, they only represent 20 percent of the trade volume (Freund and Weinhold, 2002: 1). As recently as 2003, WTO data showed that ten countries led by the US accounted for 63 percent of all services exports and 59 percent of imports of other commercial services. More recent data in Table 13.2 shows that in 2006 twenty-five European Union members (EU 25) accounted for half of world trade in other commercial services and the US accounted for 15 percent of exports and 11 percent of imports.

Table 13.2 ***Leading exporters and importers of other commercial services***

	Value	Share of world exports/imports		Annual percentage change			
	$ billions	%	%	%	%	%	%
	2006	2000	2006	2000–06	2004	2005	2006
Exporters							
European Union (25)	683.7	45.7	49.6	14	20	10	13
Extra-EU (25) exports	*317.9*	...	*23.1*	...	*16*	*11*	*14*
United States	211.9	19.5	15.4	9	12	10	12
Japan	69.0	5.9	5.0	10	27	16	16
India	58.3	...	4.2	...	...	...	39
Hong Kong, China	39.0	3.3	2.8	10	13	15	18
China	36.5	1.5	2.6	24	15	20	25
Switzerland	34.0	2.4	2.5	13	31	12	12
Canada	32.4	3.1	2.3	8	7	12	6
Singapore	31.0	1.7	2.3	19	30	12	13
Korea, Republic of	19.2	1.4	1.4	13	29	18	37
Taipei, Chinese	17.5	1.8	1.3	6	3	−9	19
Norway	13.9	0.9	1.0	15	22	29	34
Russian Federation	13.0	0.4	0.9	31	31	37	33
Israel	12.7	1.3	0.9	7	20	5	17
Brazil	10.2	0.9	0.7	10	12	33	30
Sum of above 15	1280.0	89.8	93.1				
Importers							
European Union (25)	*579.7*	46.8	48.2	12	16	9	11
Extra-EU (25) imports	*237.8*	...	*19.8*	...	*16*	*9*	*12*
United States	136.7	12.2	11.4	10	15	8	14
Japan	64.2	7.9	5.3	5	13	3	17
China	41.6	2.0	3.5	22	30	18	26
Canada	34.3	3.5	2.8	8	7	6	8
India	31.4	...	2.6	...	...	...	34

Table 13.2 ***(cont.)***

	Value	Share of world exports/imports		Annual percentage change			
	$ billions	%	%	%	%	%	%
	2006	2000	2006	2000–06	2004	2005	2006
Singapore	28.4	1.9	2.4	15	23	9	16
Korea, Republic of	28.2	2.4	2.3	11	19	16	25
Russian Federation	18.7	0.8	1.6	24	24	18	22
Brazil	14.8	1.2	1.2	12	1	43	18
Taipei, Chinese	14.8	1.8	1.2	5	17	5	4
Indonesia	14.8	1.3	1.2	. . .	. . .	. . .	. . .
Switzerland	12.5	0.6	1.0	22	49	10	11
Mexico	11.9	1.5	1.0	4	8	4	12
Thailand	11.3	0.9	0.9	12	15	14	31
Sum of above 15	1045.0	84.8	86.7	86.7			

Source: World Trade Organization (2009).

The combination of increased freedom to conduct business across borders and lower costs of conducting business internationally has changed the operations and sourcing decisions of multinational organizations. Corporate production of goods and services has been expanding internationally in four major forms: trade in goods, direct investment, hiring of labor services directly (work permits and offshore insourcing), and trade in labor services (outsourcing). These four forms can often be substituted for one another. For example, a computer manufacturer could decide to outsource assembly of the basic components of a personal computer to a Chinese firm. This involves shipping parts to a company and receiving a finished product in return, ownership of the parts remains with the computer manufacturer throughout the transaction. Alternatively, the computer manufacturer could simply give an order for a personal computer to the same company with specifications for the parts needed. In this case ownership is transferred until the personal computer is complete. Both scenarios require the same expertise of the Chinese company and the amount paid to

outsource the production should approximate the profit made by buying the components and then selling the finished computers to the computer manufacturer for final distribution. If the company simply set up a manufacturing plant in the foreign location, then the activities would be accounted for as foreign direct investment with additional trade among affiliated organizations. The case of hiring labor from one country and relocating it to another for the purpose of assembling computers is rare, but in the areas of research and design is common.

Impact of trade in services on the labor force

As labor is a derived demand, one of the implications of the growth in the offshoring of services for workers in the service sector is increased competition in the global labor market. Workers in manufacturing have faced significant global competition for a half century. Their experience shows that workers in developed countries need to remain skilled and adaptable to remain competitive. An Information Technology Association of America (ITAA, 2003) survey of hiring managers found that 12 percent of IT companies had opened outsourcing operations overseas. Most foreign outsourcing from the US is conducted by large IT companies and programming and software engineering positions are the ones most likely to be outsourced. The rapid rise of services offshoring has challenged developed economies' ability to realign their production capabilities and create new jobs for displaced workers. During the 1990s, over 97 percent of jobs created were in services (Goodman and Steadman, 2002: 3). Business-related services have grown to 36 percent of total employment from 2001 while consumer-related services fell to 52 percent the same year (Goodman and Steadman, 2002: 8).

Just as reduced shipping costs and improved delivery speeds made the sourcing of goods from remote areas commonplace in the 1980s, the instantaneous speed of the Internet is driving global sourcing of an increasing number of services. Unaccustomed to foreign competition, many service workers are concerned about the increasing supply of labor in their fields. For example, Cooper (2004) cites the example of Mass General Hospital in Boston offshoring radiologist work to India due to wage differences of $50,000 in India compared to $450,000 in

Boston. Ashok and Kroll (2003) report the following significant differences in hourly wages for the US and India in 2002 and 2003: telephone operator ($12.57 versus less than $1.00), payroll clerk ($15.17 versus $2.00), legal assistant ($17.88 versus $8.00), and accountant ($23.35 versus $15.00). Clearly, the cost savings are significant in several developing countries, provided the level of productivity is roughly the same.

Forrester Research (McCarthy *et al.*, 2002) estimated that 3.3 million US service jobs will be relocated abroad over the next fifteen years, accounting for $136 billion in wages. Approximately 400,000 of these jobs would be IT-related with the greatest outsourcing expected in software development, customer service, and call centers. This estimate was revised upward in 2004 to 3.4 million as the near term use of offshore resources grew 40 percent faster than expected, from around 590,000 jobs to about 830,000 jobs by the end of 2005 (Mears, 2004). However, the Forrester estimates reflect gross job losses and are relatively small compared to the overall number of jobs lost and created annually in the US which is typically greater than 100 million. Cost savings and higher profits will drive offshoring in the short term, but over time, competition will erode the cost savings. In the end, Forrester contends that increased offshoring would reduce labor demand, raise imports, and place downward pressure on the value of the dollar (Tilton, 2003). Gartner Inc. expected one in ten jobs at IT services firms to be moved offshore by the end of 2004 and that many of the job losses would be structural (Morello, 2003).

Mann (2003) argues that the projections which predict millions of jobs being lost to offshore workers ignore the fact that the globalization of software and IT services, in conjunction with diffusion of IT may create even stronger job demand in the developed countries for IT-proficient workers. Price reductions on the hardware-side of IT, coupled with increased productivity, resulted in an additional $230 billion in Gross Domestic Product (GDP) for the US between 1995 and 2002 (Mann, 2003). Also note that between 1993 and 2001, the increase in IT hardware spending was 6.7 percent; while growth in software and services was nearly double that at 12.5 percent. While the precise impact on professional, business, and IT jobs is unclear, it is likely that most skilled service jobs are both complements to and substitutes for similar jobs.

Determinants of offshoring BPTS and IT services

Abraham and Taylor (1993) distinguish three reasons for outsourcing: lower employee costs achieved by lower wages and/or benefits, transfer of demand risk to the contractor, and access to human capital. Wage savings may be due to the presence of trade unions or efficiency wage considerations that do not affect the outside contractor. In their study based on data for manufacturing firms, Abraham and Taylor (1993) provide evidence that differences in labor costs and the comparative advantage of outsourcers due to scale and specialization are crucial in explaining the decision for firms to outsource manufacturing work. This logic should apply to jobs in the service sector, as well.

Thondavadi and Albert (2004) list six factors driving offshoring: cost reduction, focus on core operations, improving quality, access to deeper pool of talent, more rapid product development, and product and process innovation. Labor savings are consistently cited as a reason for global outsourcing. A survey by Deloitte (2005) found 70 percent of managers surveyed cited cost savings as the reason for global outsourcing, while 57 percent sought quality, innovation, or industry best practice. Technology can enable outsourcing decisions by providing the ability to work in ways not previously possible, though it does not determine them directly. For example, collaborative software enables teams located half a world away to work on tasks simultaneously or in time-zone determined shifts. Lowering the transaction costs of managing a dispersed workforce increases global outsourcing. Examining how country differences vary should indicate the qualities of a destination country that make it attractive as a global sourcing location.

Measuring offshoring of business and IT services

Comparing trade in services between countries is problematic due to the different definitions and methods used by national governments and organizations such as the WTO. Accounting for low-value transactions, smaller providers, and purchasers is difficult. An OECD (2004) report estimates a discrepancy of $20.6 billion in India's reported services exports and imports by the major non-Asian economies. This speaks to considerable problems with the current measures available. The data used in this chapter comes primarily from the US Bureau of

Economic Analysis (2004, 2005, 2008) and the US Bureau of Labor Statistics (2004, 2005). Landefeld and Mataloni (2004) offer useful advice on using this data to explore topics such as global sourcing.

Service exports are used as the proxy variable to examine the offshoring level of business, professional, and technical services global outsourcing. This data does not include affiliate transactions, so it cannot be said to represent the offshoring levels of these activities, as offshoring includes intra-company trade across borders. Unfortunately, the data on intra-company trade in services is not available. Therefore, this analysis does not capture the BPTS and IT work moving to other countries within organizations.

The model used as the basis for this analysis is a modification of the gravity model of trade (Isard, 1954). The gravity model predicts that the size of each country's economy and the distance between them will be the major predictors of their aggregrate trade. For this reason, size is dealt with as a left-hand variable and the dependent variable used is a share variable. The calculation of the dependent variable was performed as follows: the level of BPTS or IT imports from a given country to the US for the given year was divided by the exporting country's GDP. It is obvious that the absolute level service exports will be highly associated with the size of the exporting country's economy and using a share variable has some other econometric advantages. The technique of using a share variable as the dependent variable was taken by Bognanno, Keane, and Yang (2005) in a study examining the effect of tariff reductions and US multinational activities which found host country market size to be the primary determinant of production location decision for US multinationals using firm-level data. Going forward, the dependent variables will be referred to as "BPTS export share" and "IT services export share."

Four possible determinants of BPTS and IT services offshoring

Several possible correlates between the United States and the BPTS and IT services and attributes of offshoring destinations were considered: labor costs, communication infrastructure, human capital quality, and travel costs are commonly cited factors in selecting an offshoring destination (neoIT, 2004). These factors can be categorized into four macroeconomic variables around cost of labor, availability of Internet

access, knowledge of English, and geographic distance from the US. Better measures of human capital quality were desired, but measures of education were not used due to paucity of good international measures of educational levels for the countries examined. Literacy levels were explored as a proxy for educational level relevant to performing professional services, but not found to be significant in the models. Measures of governance, corruption, and cultural distance were also entered into some preliminary models, but were not found to be helpful in predicting levels of offshoring in these services.

Distance

Despite the claims that distance was dead as a consideration in the creation of knowledge work during the dotcom boom, time zones and long overseas flights do impose transaction costs. Geographic distance increases the cost of exchanging services, though to a lesser degree than for physical goods. See Krugman (2009) for an excellent overview of the importance of economic geography. Services offshoring still requires travel costs for inspection, negotiations and planning meetings, training, and oftentimes for the provision of the service. As a result, it is hypothesized that BPTS and IT service exports to the US will be lower for countries that are geographically further from the US. The measure of distance used is the Great Circle distance between capital cities cited in much of the gravity literature (Feenstra *et al.*, 2001). This leads to the first hypothesis:

(**H1**) Distance will be negatively related to BPTS and IT services export share.

Labor costs

Labor costs are the most commonly cited reason for selecting an offshoring destination (Mann, 2003; neoIT, 2004; Yourdon, 2004). Labor arbitrage is a reason given by many outsourcing consultants to shift production to lower-wage countries; therefore lower-wage countries should see more offshoring of services work. The data used to represent national labor costs is wage data taken primarily from the US Bureau of Labor Statistics *Foreign Labor Statistics*, which is one of the few sources of internationally comparable wage information. This

source contains specific labor costs for thirty countries (Freeman and Oostendorp, 2000).

This labor cost data comes from the manufacturing sector and while we acknowledge a better measure would be directly from business and IT services, it is believed that, at the country level, this proxy measure will function reasonably well. There is typically a correlation between the average manufacturing wage and service wage in a country. Also, these measures of wages ignore benefit costs and employment taxes, thereby understating the true cost. Wage data for China and India was not available for some of the years between 1990 and 2000. Countries with lower labor costs are expected to have greater levels of BPTS and IT service exports to the US. The second hypothesis addresses the cost of labor:

(**H2**) Labor costs will be **negatively** associated with BPTS and IT services export share.

Technological infrastructure

Technological infrastructure is expected to have been a driver in the shifting of work in many professional and technical occupations. Using the number of households with Internet access per hundred people may be a good proxy for both computer literacy and the level of technological infrastructure of a country. Technological changes are cited as a primary driver of the increase in offshoring (Friedman, 2005; Yourdon, 2004). Countries with higher levels of households with Internet connections are predicted to have greater levels of BPTS and IT service exports to the US leading to the third hypothesis:

(**H3**) Technological infrastructure will be **positively** associated with BPTS and IT services export share.

English as an official language

The development of the personal computer and the Internet in North America has solidified the status of English as the language of international business. Given that much of Europe uses English for international commerce, those countries that are more proficient in English are better able to trade services with the largest consumers of services. India's success in attracting services jobs is often attributed to its large

Table 13.3 *Variable descriptions and sources*

Variable	Description and source
Dependent variables	
BPTS exports as a share of GDP	Information Technology exports from country X to US divided by exporting country's GDP from Bureau of Economic Analysis, Bureau of Labor Statistics
IT exports as a share of GDP	Business, Professional and Technical exports from country X divided by exporting country's GDP from Bureau of Economic Analysis, Bureau of Labor Statistics
Independent variables	
Distance in kilometers	Great Circle distances between capital cities
English language	*CIA World Factbook*. A dummy variable is used to denote if English is an official language.
Internet use per 100 households	Taken from World Development Indicators data. http://devdata.worldbank.org/data-query/
Hourly labor costs	Hourly labor costs for manufacturing workers standardized to be internationally comparable. Bureau of Economic Analysis, Bureau of Labor Statistics. Some data for China and India was also obtained from other sources.

pool of English-speaking employees. As a result, it is expected that the offshoring level of BPTS and IT service exports will be higher in those countries for which English is an official language. Thus:

(**H4**) Countries that use English as an official language will have **higher** levels of BPTS and IT services export share.

Description of the data

In order to test whether each of the four attributes above determine offshoring levels, proxy variables were identified for each of the independent variables. Table 13.3 describes the measure used as a proxy for each attribute and lists the source of the measure.

Table 13.4 ***Trade partners included in dataset ranked by exports to the US***

Country	2003 BPTS exports in millions USD	2003 GDP PPP in billions USD
Canada	2,786	970.3
United Kingdom	1,834	1,610.5
Japan	519	3,567.8
Germany	494	2,291.1
India	420	3,120.3
France	373	1,654.1
Mexico	260	937.8
Australia	230	589.1
Switzerland	193	224.5
Netherlands	185	476.5
Singapore	167	104.0
Brazil	166	1,375.8
Italy	164	1,563.4
Hong Kong	154	185.3
Sweden	144	239.6
South Korea	142	861.0
Spain	142	920.3
China (PRC)	137	6,446.0
Israel	113	134.0
Argentina	90	445.1
South Africa	81	474.1
Philippines	65	352.9
Norway	63	171.9
Thailand	44	471.0
New Zealand	37	90.5
Malaysia	29	235.7
Chile	14	162.1
TOTAL	7,043	29,674.7

The creation of the dataset used to test the four hypotheses started with the identification of those countries for which the dependent variables (share of BPTS and share of IT exports to the US) were available. Table 13.4 lists the countries for which this data was available from the Bureau of Economic Analysis. The countries included in this dataset represent the vast majority of both world trade and

Table 13.5 *Descriptive statistics*

	Observations	Mean	Standard deviation	Min.	Max.
Dependent variables					
BPTS exports as a share of GDP	395	503.9949	1262.807	0	12232
Log BPTS exports as a share of GDP	294	.0452041	.053369	0	.38
IT exports as a share of GDP	375	104.8453	387.302	0	4070
Log IT exports as a share of GDP	274	.0054745	.0235486	0	.18
Independent variables					
Distance in kilometers	392	9299.377	4220.694	733.894	16370.82
English an official language	395	.2936709	.4560206	0	1
Internet users per 100 people	315	19.81905	19.81319	1	76
Hourly labor cost in USD	295	19.34634	53.42626	1.02	919

world output. One may note that the largest exporters of these services share a common language with the US. As previously noted, wage data for India and China is particularly hard to find, especially for earlier time periods. This resulted in an unbalanced panel regression equation, which omitted country observations for some years.

Table 13.5 lists the descriptive statistics for each of the measures obtained from government records as an aid to interpreting the results of the regression analysis which follows. One will note that the average distance from the US capital is 9,300 kilometers, the average wage was about $19.35 an hour, and the average percentage of households with Internet connections was 20 percent. Roughly 30 percent of these trading partners use English as an official language. In the regression analysis, the natural logarithms of both labor costs and distance were used as the independent variables.

Results

Panel regression techniques were used to predict share of BPTS and IT services exports to the US over a 16-year period from 1990 to 2005. The results, reported in Table 13.6, support each of the first three hypotheses. The support is weakest for the proxy variable used for labor costs. The coefficient on labor costs is significant at the .05 level for the model regressing on BPTS exports. However, the level of statistical significance is .10 for the model regressing labor costs on IT exports. These results provide strong evidence that distance has a negative effect. Table 13.6 also suggests that the use of English and the number of Internet users per household are positively associated with BPTS and IT service exports to the US as predicted. Both models are highly significant as revealed by the high Wald statistics and the regression equation accounts for a majority of the variance with R^2 values of 57 and 52 percent, respectively.

Table 13.7 shows the results of regression analysis using panel estimation techniques on BPTS over three 5- or 6-year periods from 1990 to 2005. Distance remains highly significant and negative in all time periods, a finding which is consistent with gravity theory. The coefficients for English language are highly significant and positive as predicted in all time periods. The latter two time periods show that this model provided mixed support for the hypothesis about labor costs, though support for labor costs weakens in the second period with only a .10 level of significance. However, in the 1990 to 1994 period labor costs were actually positively associated with offshoring levels, which is contrary to the prediction. Some factors may diminish with time, such as the measure of the number of Internet users per household, which loses significance in the last period. The regression equations for all three time periods are highly statistically significant. With overall R^2 values ranging from 59 to 77 percent, these models explain most of the variation in the dependent variable, which is good for a simple model with only four predictors.

The results for IT service exports were also divided into the same three time periods, and the results are provided in Table 13.8. Reviewing the results, one finds strong support for the hypothesis on distance, but little evidence for the hypotheses on labor costs and Internet usage. However, no relationship between labor costs and IT service exports

Table 13.6 ***Share of BPTS and IT exports to United States 1990 to 2005 – generalized least squares unbalanced panel estimation***

	Total BPTS exports		Total IT exports	
	Coefficient	Standard error	Coefficient	Standard error
(1) Log distance (in thousands kilometers)	−.0425082**	.0075282	−.0212921**	.0028451
(2) Log labor cost (USD per hour)	−.0086515*	.0043047	−.0031261+	.0019205
(3) Internet users per 100	.0008411**	.0001226	.0003092**	.0000663
(4) English	.0548018**	.0109225	.0156345**	.0041503
constant	.4148824**	.0702748	.1931589**	.026848
sigma u	.02176556		.00722148	
sigma e	.0321076		.01709019	
rho	.3148529		.15149923	
R^2 within	0.1794		0.0889	
R^2 between	0.7068		0.7084	
R^2 overall	0.5732		0.5204	
Wald Chi^2	102.98**		91.05**	
Observations	239		221	
Groups	25		25	

+ $p < .10$, * $p < .05$, ** $p < .01$ NS not significant at $p < .10$

Table 13.7 *Share of BPTS exports to United States – three time periods from 1990 to 2005 – generalized least squares unbalanced panel estimation*

	1990–1994		1995–2000		2001–2005	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
(1) Log distance (in thousands kilometers)	−.009971	.003626**	−.046512	.007769**	−.064124**	.011626
(2) Log labor cost (USD per hour)	.009379	.002881**	−.010557	.006302+	−.014144+	.008623
(3) Internet users per 100	.004018	.001696*	.000990	.000285**	.000399NS	.000352
(4) English	.039559	.006549**	.055523	.011062**	.076711**	.017062
constant	.068420	.035016*	.457416	.074760**	.628440**	.109348
sigma u	.0088851		.018937		.03571517	
sigma e	.0067640		.0318334		.01645305	
rho	.6330946		.2613906		.82493239	
R^2 within	0.3525		0.1150		0.0350	
R^2 between	0.7963		0.7594		0.7027	
R^2 overall	0.7743		0.5902		0.7017	
Wald Chi^2	49.97**		76.92**			52.07**
Observations	31		116			92
Groups	14		23			25

+ $p < .10$, * $p < .05$, ** $p < .01$, NS not significant at $p < .10$

Table 13.8 *Share of IT exports to United States – three time periods from 1990 to 2005 – generalized least squares unbalanced panel estimation*

	1990–1994		1995–2000		2001–2005	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
(1) Log distance (in thousands kilometers)	−.001085*	.000534	−.02290**	.002557	−.032521**	.005188
(2) Log labor cost (USD per hour)	.000278NS	.000573	−.00330NS	.002476	−.004114NS	.003456
(3) Internet users per 100	.00013NS	.000493	.000462**	.000146	.00007NS	.000131
(4) English	.001757+	.00106	.015122**	.003764	.027169**	.007635
constant	.008447NS	.005579	.208323**	.024858	.299273**	.048445
sigma u	0.0		.0025075		.016230	
sigma e	.0027388		.0167253		.005313	
rho	0.0		.0219832		.903230	
R^2 within	0.0188		0.0963		0.0018	
R^2 between	0.5557		0.7707		0.7058	
R^2 overall	0.2351		0.5474		0.7257	
Wald Chi^2	7.99+		113.25**		51.21**	
Observations	31		108		82	
Groups	14		23		24	

+ $p < .10$, * $p < .05$, ** $p < .01$, NS not significant at $p < .10$

exists possibly due to the lack of statistical power resulting from dividing the dataset into three parts. The relationship between the number of Internet users per household and IT service exports is significant only in the 1995 to 2000 time period.

These results should be treated with caution due to problems with the number of observations due to missing data for several countries. The model produces highly significant results for the overall regression equation for the latter two time periods and the overall R^2 increases from 55 percent to 73 percent in the latter period suggesting a change in the importance of these variables around the cut point. However, when only the subset of data for the period of time prior to 1994 is entered into the regression, there is no support for the overall model.

Limitations and future directions

The results above analyze the sourcing decisions of US multinationals *ex post facto* and do not capture the success of offshoring decisions. Even if the relative success rate of offshoring to each country was known, it would be difficult to attribute the causality to either the country level variables used in this study or to company-specific management issues. Some of the variables used may be poor measures of the constructs included in the regression equation. Adding measures of education and human capital more generally might help explain whether skilled and unskilled labor are sources of comparative advantage. However, such data is difficult to come by in a format that permits international comparisons.

Replicating this study for particular industries and occupations is likely to provide more specific information for businesses and policy makers. Finally, it should be noted that several variables were added to this model to see if they added to the explanatory power of the model. These included literacy rates, educational attainment data, Hofstede's (2001) cultural dimensions, measures of political stability, and corruption. None of these country-level attributes were found to be significant for the service exports examined. A similar analysis of determinants of BPTS exports to Canada, Australia, France, and the United Kingdom found use of English and distance to be the most important factors in explaining service exports to these countries.

Conclusions and implications

The newspapers have for a decade been filled with reports of lower-skilled jobs in business, professional, and technical services migrating to India and Eastern Europe. More recently, the process has been moving up the value chain to occupations, such as accountants, financial analysts, and software engineers that previously had been insulated from such wage pressures. The inevitability of further offshoring of commercial services is likely to invigorate both its proponents and critics. A nation that embraces free trade should be open to offshoring. Efficient markets may render offshoring as an inevitable form of trade; however, governments may chose to protect high-value service jobs through intervention. Understanding the determinants of offshoring will help governments seeking increased attractiveness as an offshoring location to invest in appropriate areas such as computer literacy and English language skills.

The lack of detailed data and analysis has resulted in most offshoring decisions being made on qualitative factors. The value of services being offshored is increasing dramatically and countries are providing incentives such as tax free or reduced tax zones to influence companies' offshoring decisions. Countries attempting to attract offshoring should consider the factors that influence their relative attractiveness and take measures to improve where needed.

This chapter suggests that along with geographic distance, linguistic distance matters when it comes to importing services. English is currently the most important language for trade in services and may become the global standard. For example, China is mobilizing to compete with India for a greater share of service offshoring and a key initiative is working to increase the level of English proficiency by increasing the focus on teaching English in elementary and secondary schools. Labor costs appear to matter, but work needs to be done in collecting data that better accounts for productivity differences that is currently available. The importance of having state-of-the-art technology such as Internet penetration appears to convey advantages, but these advantages may not be permanent.

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