

Measuring Tradable Services and the Task Content of Offshorable Services Jobs

Lori G. Kletzer

University of California, Santa Cruz

Peterson Institute for International Economics

May 17, 2007

Understanding Services Trade

- Evolution in thinking about services trade
- From “non-tradable” to “tradable”
- From tradable to offshoring
- From offshoring to “is your job next”

- Goal of this paper: to develop measures of the scale and scope of potentially tradable services jobs

Agenda

1. Review estimates of potentially tradable services, by industry and occupation
2. Examine task content of potentially tradable services jobs (occupations), using O*Net data
3. Take ranked list (from #2) to 2004 and 2006 Displaced Worker Surveys
 - a. count
 - b. worker characteristics
 - c. industry cross-tab
4. Refine list using industry information (tradable vs. non-tradable industry)

Measuring tradable services using geographic concentration

2000 Decennial Census 5% PUMS

- Place of Work
 - Industry
 - Occupation
 - Worker demographic characteristics
 - Income
- Measures of geographic concentration
 - Ellison and Glaeser “economic concentration”

$$EC_i = \sum_p (s_{i,p} - IDS_{i,p})^2$$

Gini coefficient

$$G_i = | 1 - \sum_p (\sigma S_{i,p-1} + \sigma S_{i,p}) * (\sigma IDS_{i,p-1} - \sigma IDS_{i,p}) |$$

Tradable Occupations in Non-Tradable Industries

		Non-tradable Occupations	Tradable Occupations
Management (11)	Non-tradable Industries	24	27
	Tradable Industries	11	39
Business and Financial Ops. (13)	Non-tradable Industries	14	28
	Tradable Industries	18	41
Computer and Mathematical (15)	Non-tradable Industries	0	24
	Tradable Industries	0	76
Architecture and Engineering (17)	Non-tradable Industries	8	13
	Tradable Industries	28	51
Life, Physical, and Social Science (19)	Non-tradable Industries	7	36
	Tradable Industries	9	47
Legal (23)	Non-tradable Industries	4	19
	Tradable Industries	0	77

Sales and Related Occupations

First-Line Supervisors/Managers of Non-Retail Sales Workers 41-1012
Parts Salespersons 41-2022
Advertising Sales Agents 41-3011
Securities, Commodities, and Financial Services Sales Agents 41-3031
Travel Agents 41-3041
Sales Representatives, Services, All Other 41-3099
Sales Representatives, Wholesale and Manufacturing 41-4010
Models, Demonstrators, and Product Promoters 41-9010
Real Estate Brokers and Sales Agents 41-9020
Sales Engineers 41-9031
Telemarketers 41-9041
Sales and Related Workers, All Other 41-9099

Office and Administrative Support Occupations

Telephone Operators 43-2021
Communications Equipment Operators, All Other 43-2099
Bill and Account Collectors 43-3011
Billing and Posting Clerks and Machine Operators 43-3021
Gaming Cage Workers 43-3041
Procurement Clerks 43-3061
Brokerage Clerks 43-4011
Credit Authorizers, Checkers, and Clerks 43-4041

Office and Administrative Support Occupations

Customer Service Representatives 43-4051
Eligibility Interviewers, Government Programs 43-4061
Loan Interviewers and Clerks 43-4131
New Accounts Clerks 43-4141
Order Clerks 43-4151
Human Resources Assistants, Except Payroll and Timekeeping 43-4161
Reservation and Transportation Ticket Agents and Travel Clerks 43-4181
Cargo and Freight Agents 43-5011
Couriers and Messengers 43-5021
Postal Service Clerks 43-5051
Postal Service Mail Sorters, Processors, and Processing Machine Operators 43-5053
Computer Operators 43-9011
Data Entry Keyers 43-9021
Word Processors and Typists 43-9022
Desktop Publishers 43-9031
Mail Clerks and Mail Machine Operators, Except Postal Service 43-9051
Office Machine Operators, Except Computer 43-9071
Proofreaders and Copy Markers 43-9081
Statistical Assistants 43-9111

What are the characteristics of potential tradability (offshorability)?

1. “Internet-enabled” (output that can be traded or transmitted by ICTs) - ICT-enabled services
2. High information content (codifiable knowledge content; little tacit, nonroutine, implicit knowledge)
3. No face-to-face (customer) contact

O*NET –successor to Dictionary of Occupational Titles, as “the nation's primary source of occupational information.”

O*NET database: contains information on hundreds of standardized and occupation-specific descriptors.

Descriptors – in six major domains

worker characteristics – enduring attributes of individuals

worker requirements – developed or acquired attributes, including education

experience requirements – required skills, licenses

** occupational requirements – typical activities**

labor market characteristics – demand projections

occupation-specific information – detailed tasks

<http://www.onetcenter.org/overview.html>

Work Activities – Medical transcriptionists

- **Documenting/Recording Information** — Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.
- **Interacting With Computers** — Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.
- **Updating and Using Relevant Knowledge** — Keeping up-to-date technically and applying new knowledge to your job.
- **Getting Information** — Observing, receiving, and otherwise obtaining information from all relevant sources.
- **Communicating with Supervisors, Peers, or Subordinates** — Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.
- **Identifying Objects, Actions, and Events** — Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.
- **Processing Information** — Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.
- **Establishing and Maintaining Interpersonal Relationships** — Developing constructive and cooperative working relationships with others, and maintaining them over time.
- **Evaluating Information to Determine Compliance with Standards** — Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.
- **Monitor Processes, Materials, or Surroundings** — Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.

Occupational requirements

Generalized work activities – general types of job behaviors

11 work activities items used to construct index

On information content:

- Getting information (+)
- Processing information (+)
- Analyzing Data or Information (+)
- Documenting/Recording Information (+)

On Internet-enabled:

- Interacting with computers (+)

On face-to-face contact:

- Assisting or Caring for Others (-)
- Performing or Working Directly with the Public (-)
- Establishing or Maintaining Interpersonal Relationships (-)

On the routine or creative nature of work:

- Making Decisions and Solving Problems (-)
- Thinking Creatively (-)

One additional characteristic was used to proxy for the “on-site” nature of work:

Inspecting equipment, structures or material (-).

O*Net provides information on the “importance” and “level” required of each characteristic.

For the attribute “Performing or Working Directly with the Public,” data entry keyers are assigned importance (I) =43, and level (L) = 33. For Security Guards, I=74 and L=62.

Starting (arbitrarily) with a weight of three-quarters to importance and one-quarter to level, a composite index of offshorability is the sum of the eleven components, using my priors on the sign of the attribute in regard to offshoring potential. Higher values of the index indicate more offshorability potential, yielding a ranking of all occupations for which the attributes are available.

SOC code	Offshoring index ranking	Title	Employment (May2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or more	identified as tradable	index1
15209100	1	Mathematical Technicians	1,430	\$36,470			x	1.777
19102100	2	Biochemists and Biophysicists	17,690	\$71,000			x	1.510429
15204100	3	Statisticians	17,480	\$62,450	0.0	100.0		1.308857
23209300	4	Title Examiners, Abstractors, and Searchers	64,580	\$35,120	57.4	2.1	x	1.304
43404100	5	Credit Authorizers, Checkers, and Clerks	65,410	\$29,330	44.1	34.5		1.03
43511100	6	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	79,050	\$25,310	61.0	0.0		1.025786
43902100	7	Data Entry Keyers	296,700	\$23,810	77.7	0.7	x	1.015929
13201100	8	Accountants and Auditors	1,051,220	\$52,210	2.0	92.2	x	1.01
31909400	9	Medical Transcriptionists	90,380	\$29,080	34.3	0.4		0.998786
15201100	10	Actuaries	15,770	\$81,640	0.0	100.0	x	0.981357
19302100	11	Market Research Analysts	195,710	\$57,300	0.0	60.5	x	0.9275
19201100	12	Astronomers	970	\$104,670	0.0	100.0		0.923286
43303100	13	Bookkeeping, Accounting, and Auditing Clerks	1,815,340	\$29,490	21.5	18.0		0.914857
17301300	14	Mechanical Drafters	74,650	\$43,350	0.0	0.0		0.908857
19301100	15	Economists	12,470	\$73,690	0.0	100.0	x	0.905214
15202100	16	Mathematicians	2,930	\$80,920	0.0	100.0		0.905143
19304100	17	Sociologists	3,500	\$52,760	0.0	100.0		0.904857
15203100	18	Operations Research Analysts	52,530	\$62,180	0.0	100.0	x	0.885786
19302200	19	Survey Researchers	21,650	\$31,140			x	0.882786
13204100	20	Credit Analysts	61,500	\$50,370	29.3	56.9	x	0.881143
43305100	21	Payroll and Timekeeping Clerks	205,600	\$31,360	42.3	8.4	x	0.872857

Table 15. Ranking of occupations by offshorability index

SOC code	Offshoring index ranking	Title	Employment (May2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
15209100	1	Mathematical Technicians	1,430	\$36,470			x	1.777
19102100	2	Biochemists and Biophysicists	17,690	\$71,000			x	1.510429
15204100	3	Statisticians	17,480	\$62,450	0.0	100.0		1.308857
23209300	4	Title Examiners, Abstractors, and Searchers	64,580	\$35,120	57.4	2.1	x	1.304
43404100	5	Credit Authorizers, Checkers, and Clerks	65,410	\$29,330	44.1	34.5		1.03
43511100	6	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	79,050	\$25,310	61.0	0.0		1.025786
43902100	7	Data Entry Keyers	296,700	\$23,810	77.7	0.7	x	1.015929
13201100	8	Accountants and Auditors	1,051,220	\$52,210	2.0	92.2	x	1.01
31909400	9	Medical Transcriptionists	90,380	\$29,080	34.3	0.4		0.998786
15201100	10	Actuaries	15,770	\$81,640	0.0	100.0	x	0.981357
19302100	11	Market Research Analysts	195,710	\$57,300	0.0	60.5	x	0.9275
19201100	12	Astronomers	970	\$104,670	0.0	100.0		0.923286
43303100	13	Bookkeeping, Accounting, and Auditing Clerks	1,815,340	\$29,490	21.5	18.0		0.914857
17301300	14	Mechanical Drafters	74,650	\$43,350	0.0	0.0		0.908857
19301100	15	Economists	12,470	\$73,690	0.0	100.0	x	0.905214
15202100	16	Mathematicians	2,930	\$80,920	0.0	100.0		0.905143
19304100	17	Sociologists	3,500	\$52,760	0.0	100.0		0.904857
15203100	18	Operations Research Analysts	52,530	\$62,180	0.0	100.0	x	0.885786
19302200	19	Survey Researchers	21,650	\$31,140			x	0.882786
13204100	20	Credit Analysts	61,500	\$50,370	29.3	56.9	x	0.881143
43305100	21	Payroll and Timekeeping Clerks	205,600	\$31,360	42.3	8.4	x	0.872857
17102100	22	Cartographers and Photogrammetrists	11,260	\$48,250	14.9	29.5	x	0.839714
43911100	23	Statistical Assistants	18,700	\$28,950	2.2	62.0	x	0.828429
23201100	24	Paralegals and Legal Assistants	217,700	\$41,170	11.0	29.1	x	0.808572
19309200	25	Geographers	810	\$63,550	0.0	100.0		0.8015
15105100	26	Computer Systems Analysts	492,120	\$68,300	1.2	64.1	x	0.772857
13206100	27	Financial Examiners	22,160	\$63,090	2.2	94.9	x	0.754857
17217100	28	Petroleum Engineers	14,860	\$93,000	0.0	100.0	x	0.752714
13203100	29	Budget Analysts	53,510	\$58,910	0.0	96.4	x	0.741929
23209100	30	Court Reporters	17,130	\$41,640	0.8	4.1	x	0.734143
13205100	31	Financial Analysts	180,910	\$63,860	0.0	100.0	x	0.731857
19102001	32	Biologists	77,000	\$51,150			x	0.718643
19309400	33	Political Scientists	5,010	\$84,100	0.0	100.0		0.709786

SOC code	Offshoring index ranking	Title	Employment (May2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
43302100	34	Billing and Posting Clerks and Machine Operators	513,020	\$27,780	50.6	6.9	x	0.7
19309300	35	Historians	2,850	\$44,400	0.0	82.0		0.693214
27304200	36	Technical Writers	46,250	\$55,160	1.6	93.2	x	0.677643
15106100	37	Database Administrators	99,380	\$63,250	3.4	52.0	x	0.660357
19402100	38	Biological Technicians	67,080	\$34,270	14.3	78.9	x	0.649071
19203100	39	Chemists	76,540	\$57,890	0.0	84.8	x	0.641357
15103100	40	Computer Software Engineers, Applications	455,980	\$77,090	0.0	67.7	x	0.633214
17216100	41	Nuclear Engineers	14,290	\$88,290	0.0	92.3	x	0.631357
11303101	42	Financial Managers	471,950	\$86,280	0.5	65.7	x	0.621357
17201100	43	Aerospace Engineers	81,100	\$84,090	0.0	93.9	x	0.606357
17301200	44	Electrical and Electronics Drafters	30,270	\$45,550	8.4	16.4		0.6
17302400	45	Electro-Mechanical Technicians	15,130	\$43,880	26.0	0.0		0.585
25105100	46	Teachers, Postsecondary	8,810	\$65,720	0.0	100.0		0.582571
17207200	47	Electronics Engineers, Except Computer Administrative Law Judges, Adjudicators, and	130,050	\$78,030	0.0	84.1	x	0.574857
23102100	48	Hearing Officers	15,350	\$70,680	17.1	66.4	x	0.574286
27401300	49	Radio Operators	1,190	\$36,230			x	0.5705
19403100	50	Chemical Technicians	59,790	\$38,500	22.8	33.3	x	0.5685
19104100	51	Epidemiologists	3,630	\$52,170	0.0	94.2	x	0.554214
13208100	52	Tax Examiners, Collectors, and Revenue Agents	72,290	\$44,210	28.3	41.0	x	0.544214
19309100	53	Anthropologists and Archeologists	4,790	\$45,910	0.0	100.0		0.51
13107200	54	Compensation, Benefits, and Job Analysis Specialists	97,740	\$48,870	0.4	61.3		0.489714
19204200	55	Geoscientists, Except Hydrologists and Geographers	27,430	\$71,640	0.0	99.9	x	0.4895
15102100	56	Computer Programmers	389,090	\$63,420	3.4	81.5	x	0.484214
43415100	57	Order Clerks	259,760	\$25,570	90.2	0.0	x	0.482929
19203200	58	Materials Scientists	7,880	\$71,450	0.2	99.6	x	0.482786
15103200	59	Computer Software Engineers, Systems Software	320,720	\$82,120	11.7	57.4	x	0.473428
17302200	60	Civil Engineering Technicians	90,390	\$39,210	32.9	19.0		0.464714
25106100	61	Anthropology and Archeology Teachers, Postsecondary	5,320	\$60,710	0.0	100.0		0.454071
19401100	62	Agricultural and Food Science Technicians	19,340	\$31,360	38.1	37.7	x	0.45

SOC code	Offshoring index ranking	Title	Employment (May2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
43901100	63	Computer Operators	129,160	\$32,070	15.7	34.3	x	0.446429
19101200	64	Food Scientists and Technologists	7,570	\$51,440	7.1	90.5		0.430715
17204100	65	Chemical Engineers	27,550	\$77,140	0.0	100.0	x	0.424143
17207100	66	Electrical Engineers	144,920	\$73,510	0.0	62.7	x	0.4225
43301100	67	Bill and Account Collectors	431,280	\$28,160	30.6	0.1	x	0.414072
13205200	68	Personal Financial Advisors	108,640	\$63,500			x	0.405714
13202100	69	Appraisers and Assessors of Real Estate	63,800	\$43,440	18.3	37.3		0.4
11912100	70	Natural Sciences Managers	40,400	\$93,090	0.0	100.0	x	0.396572
19404100	71	Geological and Petroleum Technicians	11,130	\$43,750	9.7	46.2	x	0.39
19202100	72	Atmospheric and Space Scientists	7,050	\$73,940	0.0	100.0	x	0.372286
13208200	73	Tax Preparers	58,850	\$25,700	39.0	41.1		0.352
17302300	74	Electrical and Electronic Engineering Technicians	165,850	\$48,040	4.6	13.3		0.35
43904100	75	Insurance Claims and Policy Processing Clerks	239,120	\$30,130	57.6	1.4		0.35
25108200	76	Library Science Teachers, Postsecondary	3,960	\$53,810	0.0	100.0		0.337214
19303200	77	Industrial-Organizational Psychologists	1,070	\$84,690	0.0	100.0		0.321286
17302600	78	Industrial Engineering Technicians	73,310	\$45,280	19.6	51.8		0.321143
17211200	79	Industrial Engineers	191,640	\$66,670	0.0	86.8	x	0.315786
19409200	80	Forensic Science Technicians	11,030	\$44,590	12.3	74.8		0.313786
43503200	81	Dispatchers, Except Police, Fire, and Ambulance	172,550	\$31,390	77.2	0.8		0.299357
29207100	82	Medical Records and Health Information Technicians	160,450	\$26,690	10.3	43.1		0.2975
13111100	83	Management Analysts	441,000	\$66,380	8.6	75.8	x	0.290071
19102200	84	Microbiologists	15,250	\$56,870	0.0	96.4		0.287929
13205300	85	Insurance Underwriters	98,970	\$51,270	33.1	17.2	x	0.287357
43601200	86	Legal Secretaries	265,000	\$37,750	15.5	0.0		0.281143
17213100	87	Materials Engineers	20,950	\$69,660	0.0	100.0	x	0.278429
25106300	88	Economics Teachers, Postsecondary	12,670	\$68,910	0.0	100.0		0.261286
43306100	89	Procurement Clerks	71,390	\$32,210	33.1	12.8	x	0.248
25105300	90	Environmental Science Teachers, Postsecondary	4,340	\$60,880	0.0	100.0		0.232857
19204300	91	Hydrologists	8,360	\$63,820	0.0	100.0	x	0.231286
19201200	92	Physicists	15,160	\$89,810	1.7	93.6		0.225714
43905100	93	Mail Clerks and Mail Machine Operators, Except Postal Service	148,330	\$22,870			x	0.215214
17214100	94	Mechanical Engineers	220,750	\$67,590	11.7	81.7	x	0.212357
19405100	95	Nuclear Technicians	6,050	\$61,120				0.2

SOC code	Offshoring index ranking	Title	Employment (May 2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
39509100	388	Makeup Artists, Theatrical and Performance	1,070	\$23,480			x	-1.045714
29203400	389	Radiologic Technologists and Technicians	184,580	\$45,950	0.0	8.8		-1.05
11906100	390	Funeral Directors	21,960	\$47,630	11.0	26.0		-1.053571
31202100	391	Physical Therapist Assistants	58,670	\$39,490	0.0	2.3		-1.060429
39309200	392	Costume Attendants	3,900	\$25,360	69.6	22.0		-1.062286
29108100	393	Podiatrists	8,290	\$100,550	0.0	100.0	x	-1.067857
31201100	394	Occupational Therapist Assistants	22,160	\$39,750	13.7	22.6	x	-1.076286
19303100	395	Clinical, Counseling, and School Psychologists	98,820	\$57,170	0.0	94.7	x	-1.08
31201200	396	Occupational Therapist Aides	6,220	\$24,310	31.2	19.5	x	-1.100071
37101200	397	First-Line Supervisors/Managers of Landscaping, Lawn Service, and Groundskeeping Workers	106,280	\$36,320	55.3	1.4		-1.110714
29102400	398	Prosthodontists	560 #		0.0	95.5		-1.121071
29909100	399	Athletic Trainers	15,110	\$34,260	0.0	100.0		-1.121357
27102300	400	Floral Designers	63,920	\$21,060	69.7	22.0		-1.124071
39202100	401	Nonfarm Animal Caretakers	100,550	\$17,720	95.1	0.0		-1.139357
35303100	402	Waiters and Waitresses	2,274,770	\$14,200	85.8	0.1		-1.156714
11903100	403	Education Administrators, Preschool and Child Care Center/Program	47,670	\$37,010	8.8	78.9		-1.159928
41202100	404	Counter and Rental Clerks	473,090	\$18,970	100.0	0.0		-1.162214
39602200	405	Travel Guides	3,120	\$29,240				-1.165714
11905100	406	Food Service Managers	191,420	\$41,340	63.3	10.6		-1.167929
21201100	407	Clergy	36,590	\$38,540	14.1	60.0	x	-1.1805
37301100	408	Landscaping and Groundskeeping Workers	896,690	\$20,670	78.2	4.4		-1.192071
29102100	409	Dentists, General	86,270	\$125,300	7.6	85.2	x	-1.203214
35901100	410	Dining Room and Cafeteria Attendants and Bartender Helpers	391,320	\$15,040	92.8	3.7	x	-1.213214
35302200	411	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	501,390	\$15,820	99.6	0.0		-1.240429
29209100	412	Orthotists and Prosthetists	5,190	\$53,760	0.0	87.1		-1.242357
29205100	413	Dietetic Technicians	23,780	\$23,470	85.6	2.7		-1.242571
29106100	414	Anesthesiologists	27,970 #		0.0	100.0		-1.247
33201100	415	Fire Fighters	282,180	\$39,090	47.8	0.0	x	-1.26
29112200	416	Occupational Therapists	87,430	\$56,860	0.0	82.7	x	-1.267643
31101100	417	Home Health Aides	663,280	\$18,800	93.0	0.0		-1.278214

SOC code	Offshoring index ranking	Title	Employment (May2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
		Fine Artists, Including Painters, Sculptors, and						
27101300	418	Illustrators	10,390	\$41,280	38.1	32.6		-1.279143
21109300	419	Social and Human Service Assistants	313,210	\$25,030	24.0	38.1		-1.281214
27402100	420	Photographers	58,260	\$26,100	64.0	3.8	x	-1.295928
39903200	421	Recreation Workers	264,840	\$20,110	30.8	48.1		-1.3315
39509400	422	Skin Care Specialists	22,740	\$23,340				-1.332572
		Janitors and Cleaners, Except Maids and						
37201100	423	Housekeeping Cleaners	2,107,360	\$19,390	89.5	6.5		-1.345357
39402100	424	Funeral Attendants	30,220	\$19,720	66.0	3.6	x	-1.353214
39902100	425	Personal and Home Care Aides	566,860	\$17,340	85.7	0.0	x	-1.354
39602100	426	Tour Guides and Escorts	28,320	\$19,990	40.9	18.9	x	-1.359786
27301200	427	Public Address System and Other Announcers	8,150	\$23,290	86.7	2.7		-1.387714
		First-Line Supervisors/Managers of Fire Fighting and						
33102100	428	Prevention Workers	53,490	\$60,840	55.5	4.7	x	-1.39
		First-Line Supervisors/Managers of Retail Sales						
41101100	429	Workers	1,083,890	\$32,840	93.1	2.7		-1.411714
39309100	430	Amusement and Recreation Attendants	232,030	\$15,920	97.9	1.9	x	-1.420928
35201500	431	Cooks, Short Order	203,350	\$17,230	99.9	0.0	x	-1.448571
		Wholesale and Retail Buyers, Except Farm Products						
13102200	432	Wholesale and Retail Buyers, Except Farm Products	132,900	\$42,870	63.0	15.4	x	-1.475286
27202200	433	Coaches and Scouts	145,440	\$25,990	0.7	91.1		-1.478714
29205400	434	Respiratory Therapy Technicians	22,060	\$38,200				-1.4935
27204200	435	Musicians and Singers	50,410 *		26.3	41.4	x	-1.5
35101100	436	Chefs and Head Cooks	115,850	\$32,330	58.5	4.7	x	-1.501928
		Transportation Attendants, Except Flight Attendants						
39603200	437	and Baggage Porters	24,810	\$19,290			x	-1.505714
35301100	438	Bartenders	480,010	\$15,850	74.6	0.4		-1.508357
27101200	439	Craft Artists	4,300	\$22,430	51.5	18.2		-1.527929
		Lifeguards, Ski Patrol, and Other Recreational						
33909200	440	Protective Service Workers	107,620	\$16,910	94.1	0.6	x	-1.544072
27203100	441	Dancers	16,240 *		81.5	15.5	x	-1.577929
27203200	442	Choreographers	16,150	\$32,950	40.0	40.0	x	-1.585214
39201100	443	Animal Trainers	8,320	\$24,800	65.1	5.3		-1.585429
25302100	444	Self-Enrichment Education Teachers	141,650	\$32,360	31.7	38.4		-1.606714
39901100	445	Child Care Workers	557,680	\$17,050	62.9	15.0		-1.617357

SOC code	Offshoring index ranking	Title	Employment (May 2005)	Median annual earnings (May 2005)	Percent w/ HS diploma or less	Percent w/ BA or as more	identified tradable	index1
41901200	446	Models	1,430	\$22,700				-1.619643
25201100	447	Preschool Teachers, Except Special Education	348,690	\$21,990	43.1	16.9		-1.625857
39903100	448	Fitness Trainers and Aerobics Instructors	189,220	\$25,840	59.1	22.6		-1.645643
29205500	449	Surgical Technologists	83,680	\$34,830	15.3	9.0		-1.681072
33909100	450	Crossing Guards	69,390	\$20,050	96.4	0.0	x	-1.7085
31901100	451	Massage Therapists	37,670	\$32,890	10.2	24.7	x	-1.7195
39301100	452	Gaming Dealers	82,320	\$14,260	87.5	0.0	x	-1.752571
27201100	453	Actors	59,590 *		60.2	12.0		-1.889643
39509200	454	Manicurists and Pedicurists	42,960	\$18,280	57.1	0.0	x	-1.961571
39501200	455	Hairdressers, Hairstylists, and Cosmetologists	338,910	\$20,610	6.0	0.0		-1.981286
39603100	456	Flight Attendants	99,590	\$46,680	48.2	16.8		-2.064714
39501100	457	Barbers	13,630	\$21,760	27.1	0.0		-2.21

Source: O*Net data

Potential offshorability and skill:

From O*Net file, educational attainment, as fractions of jobholders with varying levels of education

percent with a high school diploma or less

percent with a BA degree or more

Using the BA category, the rank correlation between educational attainment and relative offshorability is +0.306 – occupations with a greater share of BA holders are more highly ranked as offshorable

The top quartile of jobs in the ranking has a mean percentage of BA+ degree holders of 61%, the second quartile, 53.7%, the third quartile 47.3% and the bottom quartile, 29.1% The least offshorable jobs are the least formally educated and have lower median annual earnings.

From here

1. Develop count of potentially tradable jobs (establish cutoff point(s))
2. Examine worker characteristics of tradable occupations using DWSs, and develop cross-tab of industry and occupation
3. Refine “count” using industry information